The Availability of Parks for Children:

A Case Study of Scottsdale, Arizona

by

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ABSTRACT

The United States has a long history of providing public parks and amenities, especially for children. Unfortunately, children today are spending less time in public parks, less time getting physical activity and more time being indoors and sedentary. While multiple factors may be responsible for this lack of activity, multiple researchers have found the availability of parks is a significant influence on the physical activity levels of children as well as on the occurrence of obesity related illness. Public parks are ideal locations for children to get physical activity, however they are not always equitably distributed within communities. Income and race/ethnicity especially are common variables found to impact availability of parks. Such socioeconomic variables typically have an impact on the availability of public parks within a community. Such variables may also impact the quality of the parks provided. A case study of Scottsdale, Arizona was conducted analyzing the availability of public parks within the City between the years of 1990 and 2000 and the current quality of the parks. Statistical analysis and observation were utilized to assess the amount of park space available (in acres) and the quality of the parks in comparison to selected socioeconomic variables including ethnicity, income and total percent housing type (single family or multi-family). All analysis was conducted using U.S. Census data from the years 1990 and 2000 and was at the tract level. The results of the analysis indicate that in contrast to the initial hypothesis and past research, within the City of Scottsdale, lower income neighborhoods actually have more public park space available to them than higher income neighborhoods. Between 1990 and 2000 the difference in park space between the lowest and highest income quartiles increased considerably, approximately 230% over the ten years. The

quality analysis results indicate that the overall quality of parks is slightly higher in the highest income neighborhoods, which also have no parks that could be considered of poor quality. Given the atypical results of this analysis, further research is necessary to better understand the impacts of socioeconomic characteristics on park, especially regarding children.

DEDICATION

I dedicate this thesis to my family, without whom I would never have gotten through all the stressful and challenging times. I also would like to thank Indro for his never ending support.

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TABLE OF CONTENTS

CHAPTER Page

CHAPTER Page

LIST OF TABLES

LIST OF FIGURES

LIST OF MAPS

Chapter 1

INTRODUCTION

The United States has a long history of providing public parks and amenities, especially for children. It is likely that if asked, the majority of people would have at least one fond childhood memory of playing outdoors or in a park. Unfortunately, research shows that today fewer children are spending significant time outside and in parks. This is evident in the increasing obesity rates for children and increases in sedentary behaviors (CDC 2008 and CDC 2008b). While several factors likely are responsible for this, the availability of parks has been found by multiple researchers to be a major influence on the physical activity of children as well as decreasing obesity related illness (Cohen, Ashwood, Scott, Overton and Everson, 2006 and Potwarka, Kaczynski and Flack, 2008). While public parks are ideal locations for children to get physical activity, they are not always equitably distributed within communities. Income and race/ethnicity especially are common variables found to impact availability of parks (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004). If adequate park space and amenities are lacking, how can it be expected for people, especially children, to benefit? This research study will attempt to investigate such issues.

U.S. Park standards

Within the United States, there are no official park standards adopted at the national level. Instead, each individual municipality is able to set their own public park standards, based on the community's needs. While this organizational system (or lack of) may be a positive in certain communities, it also has drawbacks namely that communities can have in reality insufficient public park

space, but interpret their needs in such a way as to not acknowledge the issue. Generally speaking, to hopefully alleviate this potential problem, many communities throughout the U.S. follow the guidelines provided by the National Recreation and Park Association. The general guidelines provided by the NRPA state that the minimum total levels of public park spaces should be between 6.25 to 10.5 acres of park space per 1000 population (National Recreation and Park Association, 1990). The official NRPA standards are provided below in Table 1.

Park Type	**Ratio (Acres per 1000 population)**
Mini-park	.25-.5 ac/1000 pop
Neighborhood/Playground	1-2 ac/1000 pop
Community	5-8 ac/1000 pop

Table 1: NRPA Level of Service Guidelines (1990)

While most municipalities default to using the NRPA guidelines as the standards for their own community, the current perspective of the National Parks and Recreation Association is that each municipality should consider the NRPA guidelines as a starting point, and assess the needs of their community to determine what the standards should be. The City of Scottsdale has chosen to determine their own standards for public park space.

The Scottsdale 2001 General Plan provides guidelines for each type of park regarding its recommended size. The area served by each park type is briefly summarized below and also includes the recommended park size in acres. All the information included in the summaries comes from the Scottsdale 2001 General Plan.

- Neighborhood Parks: Serve either a single neighborhood or several neighborhoods, depending on the exact location of the park. The recommended size is 7-20 acres.
- School Parks: Are adjacent to a school and serve a group of neighborhoods. All households in the service area should be a reasonable driving distance to the park. The recommended size is 7-20 acres.
- Community Parks: Serve either several neighborhoods or a total city planning unit. All households in the service area should be a reasonable driving distance to the park. The recommended size is 20-80 acres.
- Specialty Parks: The recommended area of location is dependent on the purpose of the park (i.e. capitalizing on an existing feature or facility) and the park should serve the entire city and beyond. The recommended size is also variable.

The above definitions of park types allows for considerable flexibility for Scottsdale in determining sufficient amounts of public park space. At no point are references made to standards or recommendations for park sizes or amenities in terms of population, which is uncommon and potentially a problem. Since Scottsdale defines park service levels generally be neighborhood/community boundaries, there is not method to account for differing population densities. For instance, a single neighborhood could be defined as a 1 square mile area and may be comprised of either 200 single family homes (approximately 200 units) or several large apartment complexes (approximately 400 units). Under the system described in Scottsdale's General Plan, each neighborhood could be allotted the same amount of park acreage since they are of equal service areas (1

neighborhood each) and equal sizes (1 square mile) even though the population densities are different and the actual population may be different. To alleviate this possible risk, Scottsdale also includes in their General Plan the goal of equitable distribution of parks and facilities. The current research study will attempt to assess if there are issues with pubic park and amenity distribution occurring within Scottsdale or if the equity goal is being met.

Research Question

The primary research question being investigated in this study is "*Is the quantity and quality of public parks and amenities for children impacted by socio-economic characteristics within the city of Scottsdale, Arizona?"* Additionally, this research will analyze how successful one method of park and amenity distribution is. The majority of municipalities in the United States, including those in the Phoenix metro region, utilize a level of service method for their park distribution. In essence, this technique uses population figures to determine the size and location of parks and amenities. The City of Scottsdale utilizes a different method however. They determine if they have sufficient parks and amenities solely by the actual number of amenities they provide within the city. No research was found on this particular distribution technique, so this study will be significant by adding to the current body of knowledge. While most municipalities determine sufficient levels of service by population, research has clearly indicated this is not always the best technique for equitable park distribution. Consequently, there is a high possibility that a different method, such as that used by the City of Scottsdale, would be a better model resulting in a more equitably distributed park system.

Methodology

By utilizing one selected municipality within the Phoenix metro region, the City of Scottsdale will function as the subject of a case study for analyzing the issues of public park space and amenities regarding children. Using a combination of qualitative and quantitative methods including statistical analysis, survey and observation and Geographical Information Systems (GIS), the availability and quality of parks and amenities for children in Scottsdale will be assessed. Additionally, U.S, Census Bureau data will be included as part of the analysis to determine if socio-economic characteristics impact the availability of parks and amenities.

Results

The results of this analysis indicate that the City of Scottsdale does in fact provide an equitable distribution of public parks and amenities within their city. By analyzing the actual acreage of public parks within the city, it was determined that Scottsdale has a park distribution method that would be highly applicable for other municipalities to duplicate. Further, observational analysis of the parks and amenities within Scottsdale found there to be an anticipated level of quality, with the majority of parks being considered “average” and only a few parks falling within the “below average” category. On a positive note, several parks within the Scottsdale system were categorized as “above average.”

Conclusions

While many municipalities in the United States do not have wholly adequate distribution of their public parks and amenities, it is essential to aim for more highly equitable systems. This is even more true now as more children are becoming obese and suffering the detrimental health consequences. Parks provide children with an ideal location for getting physical activity which would make great positive change in the rates of childhood obesity. Further, as past research has indicated, parks provide a much needed location for children to (subconsciously) develop socially and emotionally. Without sufficient public parks and amenities for children, the potential long term consequences for them as individuals and for society as a whole, could be devastating. This research study attempts to determine how well parks and amenities are distributed within one selected municipality, with the goal of using this case study as an assessment for determining the potential impacts of socioeconomic characteristics on parks and amenity distribution regarding children.

Chapter 2

LITERATURE REVIEW

Introduction

While the United States has a long history of providing public parks and amenities, especially for children (age 18 and under), the necessity of these parks has become more urgent than ever. Research is determining that children are not getting sufficient amounts of physical activity and obesity rates are steadily increasing (CDC, 2008 and CDC, 2008b). Additionally, multiple studies have found that proximity and/or availability of public parks and related amenities is correlated to healthy development of children by physically (Cohen et al, 2006 and Potwarka, Kaczynski and Flack, 2008) and emotionally and socially (Kuo and Sullivan, 2001 and Casey, 2007). Given such research, the need for public parks is evident, but also important is how much park space is available. As no formal requirements exist, each municipality is able to determine how much public park space and amenities are sufficient for their needs, but general standards do exist (NRPA, 1990). Unfortunately, the standards are not always equally applied or even followed at all resulting in inequities of park and amenity distribution. Such inequities often follow economic or ethnic lines as well (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004). What are the benefits of public parks for children? Do inequities exist regarding park availability for children? Do children even need parks? Such questions will be answered within this discussion of previous research.

Establish fact that parks are necessary

Several studies indicate that outdoor environments are some of the favorite places to play, when people remember their childhoods. One study surveyed college students who had attended the same nursery school on what they remembered best from the school. The students responses indicated that time spent at a nature center were the most favorable (Galambos Stone, 1970). Another study by Sebba found that 96.5% of survey respondents believed that the outdoors was the most significant environment in their childhood (Tai, Taylor Haque, McLellan and Jordan Knight, 2006). A 2002 study by Kellert surveyed 700 participants of outdoor programs over the previous 25 years and found that the majority stated the experience “as being one of the most important in their lives” and also that it “impacted their personality and development,” (Tai et al, 2006, p.15-16). Such studies indicate that time spent in the outdoors is essential for children and is also highly influential on their lives. Further, given the time periods of such studies (over 30 years) it is evident that outdoor environments are influential to multiple generations, indicating children will continue to enjoy spending time outdoors.

Children of today are more frequently growing up in urban areas, away from nature. In 2002, in the United States, approximately one million acres of land was lost to sprawl and the development of infrastructure (Orr, 2002). In 2005, 87% of the U.S. population resided in cities (Tai et al, 2006). With this sprawl, people become more and more dependent on cars to transport them from one place to another and this also impacts children. Children no longer walk to school, eliminating any outdoor exploration and no longer have parks and open space within walking distance, forcing them to rely on adults to drive them to outdoor

areas. Not only does this distance them from the outdoors, but also in turn children spend more time inside watching television or playing video games (Tai et al, 2006). Many problems arise from children spending little time outdoors including increases in attention deficit hyperactivity disorder (ADHD), increases in obesity, aggressive behavior and a desensitization to violence (Orr, 2002, Tai et al, 2006). Lack of time outdoors also reduces children's knowledge as evidenced by a 2002 study that found that 8-year-old children could better recognize Pokémon characters than beetles, otters and oak trees (Louv, 2005). Tai et al reference a study which found that children were able to name only a few plants and animals but "could name over 1000 corporate logos," (2006, p. 17). Studies such as these indicate that there is a growing crisis for children regarding spending time in outdoor environments. Given the findings of previous research (Galambos Stone, 1970 and Kellert, 2002) stating the importance of outdoor environments, what are the children of today going to remember of their childhoods and what other impacts could they be facing?

Children's Rights to Play

In 1989, the Convention on the Rights of the Child was created to set out the basic human rights of children (UNICEF). As children typically "need special care and protection that adults do not," the convention provides a legally binding mechanism for the basic rights of children (UNICEF, 2008). While the Convention sets out many different aspects of children's rights, the most pertinent for children's rights regarding play and parks are in Articles 29 and 31. Article 29, section 1 includes that "…the education of the child shall be directed to (a) The development of the child's personality, talents and mental and physical abilities to their fullest potential," and "(e) the development of respect for the natural

environment," (UNICEF, 1989). Article 31 specifically identifies the need for play stating, "the right of the child to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts," and that the "States Parties shall respect and promote the right of the child to participate fully in cultural and artistic life and shall encourage the provision of appropriate and equal opportunities for cultural, artistic, recreational and leisure activity," (UNICEF, 1989). Provisions such as these clearly indicate that it is a basic human right for children to have access to play and recreation and that all children are to have equal opportunities to do so.

In 1977, the International Play Association (IPA) prepared the IPA Declaration of the Child's Right to Play in preparation for the International Year of the Child (1979), (Brett, Moore and Provenzo, 1993). The Declaration includes that play is not optional for children, but that "play, along with the basic needs of nutrition, health, shelter and education, is vital to develop the potential of all children," and that "play helps children develop physically, mentally, emotionally and socially," (IPA, 1977). Both of these documents recognize that play is a fundamental element in the lives of children and that play is necessary for the healthy development of children. Parks are the most convenient and practical way to provide for this basic right of children, just in the way that schools provide children the basic right of education.

Inequalities exist

Much research exists to-date on the inequalities of access to park facilities by low income and minority groups (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004). This can be clearly seen in a

2005 study by Wolch, Wilson and Fehrenbach, which found that in Los Angeles, California neighborhoods whites had 17.4 acres of park space per 1000 residents while Latinos had only 1.6 acres per 1000 residents. While less frequently studied, research also finds this is a problem for children as well (Trust for Public Land, 2004). Additionally, a study in Edmonton, Canada found that while playgrounds were in fact equitably distributed, when the quality of the playgrounds was considered, a greater disparity existed between need and availability (Smoyer-Tomic, Hewko and Hodgson, 2004).

Researchers are not the only group noticing this issue of a lack of public park space. For example, a UCLA study found that approximately 30% of adolescents from low income neighborhoods stated they had no access to safe public parks while only 20% of higher income adolescents reported the same (Yanez and Muzzy, 2005). The same study found that approximately 30% of both African American and Latino adolescents had no access to safe parks but only 22% of white adolescents reported the same problem (Yanez and Muzzy, 2005).

In 2008, a study conducted by Crawford, Timperio, Giles-Corti, Ball, Hume, Roberts, Andrianopoulos and Salmon, intended to determine if socio-economic status impacted public parks. 540 families were involved in a longitudinal study gathering information on all public open spaces within 800 meters of the participants homes (Crawford et al, 2008). While no differences were found in the number of available playgrounds and recreational facilities, higher socio-economic neighborhoods had more overall amenities in parks to promote physical activity (Crawford et al, 2008). The researchers were not able to determine if the increased amenities at parks in the higher socio-economic neighborhoods were the result or cause of physical activity. Essentially, it is

unclear if the existence of park amenities causes people to be physically active or if the desire for physical activity results in additional amenities. Understanding this cause and effect relationship is an area within the currently available research that is severely lacking.

A 2006 study by Powell, Slater, Chaloupka and Harper used multivariate analysis to determine if the characteristics of socio-economic status were associated with availability of physical activity outlets including physical fitness facilities using Census data for over 28,000 zip codes. The results of indicated that in lower income level neighborhoods and in neighborhoods with high minority populations, there were fewer physical activity outlets available (Powell et al, 2006). Neighborhoods with high populations of Hispanic or African Americans were less likely to have physical activity outlets available with only 20% availability as opposed to White neighborhoods which had 52% availability (Powell et al, 2006). Similar to the findings of Wolch in 2005, researchers found that neighborhoods with at least 50% Hispanic residents were 172% less likely than White neighborhoods to have physical fitness outlets available to them (Powell et al, 2006). Additionally, Powell found that lower income neighborhoods were also less likely to have physical activity outlets available as an increase in income from $25,000 to $75,000 increased the availability of physical fitness outlets by 17% (2006.) From this research, it is clear that socio-economic status plays a significant role in access/availability to physical activity.

Why children need parks

Health (physical development)

Obesity, lack of physical activity.

According to the Centers for Disease Control and Prevention (CDC, 2008), obesity rates for children in the United States between the ages of 6-11 have more than doubled in the last 20 years. The obesity rates for children between the ages of 12-19 have tripled in the same time period to a 2006 figure of 17.6% (CDC, 2008). CDC research further indicates that obese children are at greater risk for cardiovascular disease such as high blood pressure, than are children of a healthy weight[1] as measured by BMI (Body Mass Index) (CDC, 2008). Additional problems such as "bone and joint problems, sleep apnea, and social and psychological problems such as stigmatization and poor self-esteem" are also likely (CDC, 2008). Another CDC study released in 2008 found that only 34.7% of U.S. students met their recommended amount of physical activity in the seven days before the survey (CDC, 2008b). Worse still, researchers also found that nearly 25% of students did not participate in any type of physical activity in the seven days before the survey. These figures provide clear evidence that children in the United States are not getting sufficient amounts of physical activity for healthy development.

Providing further support for the CDC findings, a 2004 study by Cooper, Nimet and Galassetti indicates that physical activity is essential for child growth and development. Physical activity is able to reduce stress and childhood obesity,

[1] "Healthy weight" is measured as a BMI in the 5th -84th percentile on CDC BMI-for-age growth charts. (CDC, 2009 http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html)

stimulate the immune system and reduce the probability of Type 2 diabetes (Cooper, Nimet and Galassetti, 2004). According to the authors, current medical research is also finding a possible pediatric origin to certain adult disease including cardiovascular disease, bone disease, obesity and diabetes (Cooper, Nimet and Galassetti, 2004). This research provides strong support that physical activity is absolutely necessary for the healthy development of children.

A 2006 research study by Cohen, Ashwood, Scott, Overton and Everson, included data from 1,556 adolescent girls regarding the availability of parks and physical activity. The randomly selected girls wore accelerometers for six days to measure and gather their moderate-vigorous physical activity (Cohen et al, 2006). Additionally, all parks within one mile of each participant's home were mapped, and all amenities were noted. The researchers found that adolescent girls who lived closer to more parks, especially those parks with more activity promoting amenities, participated in more non-school physical activity than those girls that lived near fewer parks (Cohen et al, 2006). As previous research has found girls to be less physically active than boys (Boyle, Marshall and Roberson, 2003, Epstein et al, 2001 and Lewis and Phillipsen, 1998), these results are an important step for ensuring girls have improved opportunities for physical activity.

Similar to the Cohen et al (2006) study, in 2008, a study by Potwarka, Kaczynski and Flack attempted to determine if a healthy weight status among children was related to proximity and availability of parks. The Body Mass Index (BMI) of 108 children was gathered and analyzed in relation to parks within a set distance for a total of 52 parks (Potwarka, Kaczynski and Flack, 2008). Logistic regression

analysis was conducted to determine the likelihood of a child being overweight based on the proximity to parks and amenities and it was determined the only relevant factor was the existence of playgrounds (Potwarka, Kaczynski and Flack, 2008). Researchers found that children living within 1 kilometer of a playground were five times more likely to be a healthy weight (Potwarka, Kaczynski and Flack, 2008). While several possible factors were theorized as to why proximity to parks in general was not relevant, nothing was able to be proven. One important factor mentioned is that parents may select the parks children go to and may do so for reasons other than proximity, such as shade or cleanliness (Potwarka, Kaczynski and Flack, 2008). The Potwarka, Kaczynski and Flack (2008) study was able to establish the idea that parks are more likely to encourage healthy development if they are designed to facilitate more physical activity.

In 2006, a study was done by Epstein, Raja, Gold, Paluch, Pak and Roemmich to "assess whether the neighborhood environment is related to physical activity among youth when their sedentary behaviors are increased or decreased" (p. 654). Physical activity levels of 58 children between the ages of 8-15 were observed for nine weeks. Statistical analysis indicated that when sedentary behavior was reduced, physical activity increased for children who lived near large parks (Epstein et al, 2006). The researchers determined that limiting access to sedentary behaviors forces children to reevaluate how to spend time, which can "push" them to play outdoors and a nearby public park may "pull" the children in for physical activity (Epstein et al, 2006, p. 657-658). As could be expected, increasing sedentary behaviors of children reduced the time spent at

parks (Epstein, 2006). Results of this study indicate that an increase in physical activity possibly could be accomplished by locating parks close to neighborhoods.

Several conclusions can be drawn from the past research on physical activity. First, children today are not getting sufficient amounts of physical activity (CDC, 2008b). The consequences of this, including heart disease and diabetes, are troubling and potentially damaging well into the future (Cooper, Nimet and Galassetti, 2004). On a positive note, research also has determined that public parks, especially large parks with playgrounds and additional amenities, are beneficial in combating this deficit in physical activity for children (Cohen et al, 2006, Epstein et al, 2006 and Potwarka, Kaczynski and Flack, 2008). This research provides strong support that researching public parks as a location for increasing children's physical activity is ideal. Public parks are the ideal location for children to get the necessary amount of physical activity, but this cannot occur if all children do not have access to parks with sufficient amenities. Understanding if such an inequality is a problem within the City of Scottsdale will provide a step in the right direction for finding solutions to this problem.

Social & Emotional Development

The benefits of play for children's social development has been studied since at least the 1930's with an initial study by Parten in 1932 identifying socialization types such as solitary, onlooker and associated/cooperative (Hart and Sheehan, 1986). Both Piaget in 1962 and Smilansky in 1968 continued researching the cognitive development benefits of children's play, but it has been only in more recent years that the study of the social and emotional development benefits of

play have begun to focus on outdoor play. As such, the benefits of outdoor play on child development are less understood than the physical development benefits. Despite less empirical research, there is little doubt play and time in outdoor environments is beneficial to the social development of children.

In addition to physical development, parks and the outdoors also impact children's social and emotional development. Kellert acknowledges that the time of middle childhood (also known as a child's "earth period") is when children simultaneously begin to see themselves as separate from nature but also desire a connection with nature (Tai et al, 2006). A study by Sobel intended to identify the relationship between children of different ages and the environments around them found that beginning at the age of 4, children explore and the ages of 8-11 is a time for exploration of "lots, woods, ditches, and other interesting places around their home," (Tai et al, 2006, p. 15). By the age of 12, children's earth period is ending and the more social world of shopping malls begins to appear more attractive for spending time (Tai et al, 2006). This age is also when children begin to play less and sedentary behaviors begin to increase.

Parks and playgrounds also provide opportunities for children to socialize with others and develop a sense of identity. Casey (2007) discusses how children need to have time to develop confidence independent from adults and structured lessons. Time spent playing provides children with the opportunities to spend time with other children and learn how to socialize and understand the cultures and traditions they are growing up in (Casey, 2007). Further, play time, especially outdoors, provides children with the opportunity to begin to understand codes of

conduct and behavior for socialization with peers that is necessary for their emotional development (Casey, 2007).

A final, but no less significant developmental benefit of time outdoors is a reduction in stress, anxiety and violence. Considerable research has been conducted on precursors to violence indicating three main symptoms: “irritability, inattentiveness, and decreased control over emotions,” (Kuo and Sullivan, 2001, p. 347). Several research studies have indicated that, in children especially, inattentive behavior has a close link to aggression (Stewart, 1985 and Scholte, van Aken, and van Leishout, 1997) as does impulsive behavior (Brady, Myrick and McElroy, 1998; Markovitz, 1995; Tuinier, Verhoeven, and Van Praag, 1996). As a 1987 study by S. Kaplan found, each of these symptoms is indicative of mental fatigue. Time spent in the outdoors and in contact with nature has been shown in considerable research studies to reduce mental fatigue and increase cognitive ability (Cimprich, 1993, Hartig, Mang, and Evans, 1991, R. Kaplan, 1984, Lohr, Pearson-Mimms, and Goodwin, 1996, Miles, Sullivan, and Kuo, 1998, and Tennessen and Cimprich, 1995). From this research, it is highly evident that spending time outdoors is highly beneficial in regards to positive social development in people. While much of the research on the benefits of contact with nature and time outdoors involved adults, with such overwhelming evidence it seems unlikely that children would not also be similarly affected. Further, while no known research directly supports it, the concept that children would be negatively impacted regarding their development if exposed to such negative conditions such as the above symptoms of mental fatigue seems clear.

The above discussion of the social and emotional development impact of play and time outdoors lead to several conclusions. First, between the ages of 4-11, play, especially outdoors, is very important for children and a significant time for developing a respect for the environment (Tai et al, 2006). Second, play has a highly significant role in helping children understand how to socialize and in developing their individual identity (Casey, 2007). Finally, spending time outdoors, in public parks for example, helps to reduce mental fatigue which may otherwise lead to aggressive and potentially violent behavior (Kuo and Sullivan, 2001). Public parks provide the ideal environment to provide all of the above opportunities for the healthy social and emotional development of children.

Impact of design & environment on park use

Understanding that parental perceptions of a park are essential in understanding where children play, a 2006 study by Veitch, Bagley, Ball and Salmon was conducted to determine where children usually played and why, by analyzing parents perceptions of environments where children play. Face to face interviews were conducted with 78 parents of children in grades 1-6 (Veitch, Bagley, Ball and Salmon, 2006). Using statistical analysis, it was found that 94% of parents stated safety as their primary concern in where their children could play (Veitch, Bagley, Ball and Salmon, 2006). Various reasons were given including physically unsafe conditions such as poor equipment or drug needles, traffic concerns or other park users (teenagers were especially mentioned). Additionally, the researchers found that 74% of parents said that home was where their children played the most, but this factor was influenced (often unknowingly by the parents) by how much yard space was available (Veitch, Bagley, Ball and

Salmon, 2006). If the parents did not believe there was enough safe space around the home, children were more likely to play at parks (Veitch, Bagley, Ball and Salmon, 2006). As parents have such influence over where their children can play, understanding their perceptions of potential play spaces is essential for analysis of children's play behavior and use of parks.

Just as Veitch, Bagley, Ball and Salmon (2006) indicated the importance of parental perceptions, children's perceptions of the physical environment are also a relevant factor in understanding children's play behavior. A 2007 study by de Vries, Bakker, van Mechelen and Hopman-Rock investigated the relationship between children's physical activity and the built physical environment. Using regression analysis on the behavior of 422 children ages 6-11 years old, researchers found a significant correlation between physical activity and the amount of green space, the impression of activity-friendliness, sports fields, water, heavy traffic and safe walking and cycling conditions among other factors (de Vries et al, 2007). The results of this research indicate that safety and heavy auto traffic levels are influential factors for both parents and children in determining where to be physically active.

A study similar to de Vries et al (2007) conducted by Mota, Almeida, Santos and Ribeiro (2005) surveyed 1,123 adolescents between grades 7-12 to determine if environmental factors influenced physical activity. Regression analysis found that the existence of recreational facilities and the aesthetics of the facilities were highly influential in physical activity levels (Mota et al, 2005). Additionally, researchers found that active adolescents believed that accessibility to shops and the social environment were important (Mota et al, 2005). While the specific influential factors were different from this study to the de Vries et al (2007) and

the Veitch, Bagley, Ball and Salmon (2006) studies, it is evident that the physical environment impacts children's physical activity.

A 2007 study by Veitch, Salmon and Ball attempted to understand better children's perceptions of the physical environment in regards to play and public parks. Conducting focus groups with 132 children between the ages of 6-12, researchers investigated children's perceptions about public parks. The existence of appealing and challenging playground equipment was one of the most important elements for children, as was general open space to run or ride bikes (Veitch et al, 2007). As was also found in the Veitch, Bagley, Ball and Salmon (2006) and de Vries et al (2007) studies, safety and the presence of teenagers/bullies were also a relevant factor in how children perceived the park (Veitch et al, 2007). The existence of various amenities within parks, especially playgrounds, is clearly an important element in determining children's perceptions and use of public parks.

History of parks

The history of parks and playgrounds stems back over 100 years to around the approximate time of the Industrial Revolution. Given the rapid increase in the size of cities and the severe conditions of the tenements, people began desiring places to escape back to nature and the rural environments. This was especially needed for children. As children were often residing in slums, streets and vacant lots were common areas for them to play in (Mooney Melvin). Social reformers such as Jane Addams with Hull House and Jacob Riis pushed to provide places where children could play. In Germany in 1837, Fredrich Froebel created the concept of kindergartens, which means "garden of children" as places where children could be educated by teachers in an environment containing plants,

animals, building materials and props (Tai et al, 2006). The concept of kindergarten has clearly changed over the years since Froebel's initial introduction, but the significance of providing children with a school playground can be traced back to this point.

The ideas of public parks and playgrounds became a larger issue in the United States in the late 19th Century as a method of social reform. Jane Addams, founder of Hull House and Jacob Riis, a photographer, were strong advocates for providing children, especially immigrant children in the slums, with a place to play and improve themselves (Gagen, 2000). Desire for social reform was the main catalyst behind public parks and playgrounds for children as evidenced in Riis own words, "`Nothing is now better understood than that the rescue of the children is the key to the problem of city poverty... a character may be formed where to reform it would be a hopeless task," (Riis,1997, p. 139). As pointed out by Gagen, "playgrounds displayed children in a public arena so their transformation from `street urchin' to `civilised' child could be witnessed by the surrounding community," (2000, p. 603).

The most significant movement for parks and playgrounds came in 1906 with the creation of the Playground Association of America (Gagen, 2000). The PAA was lead with Jane Addams as the Vice President, Jacob Riis as the Honorary Vice President and eventually Henry Curtis[2] as President (Gagen, 2000). The main philosophies of the PAA and its leaders were highly influenced by the research of G. Stanley Hall, a noted psychologist specializing in child development (Gagen, 2000). Hall believed that "democratic equality and social coherence" could be learned by children through play in groups (Young, 1995, p. 540) and that it was

[2] Henry Curtis would eventually write several instruction manuals on developing playgrounds including *The Practical Conduct of Play* and *Education through Play*.

necessary for children to develop correctly throughout recapitulated evolutionary stages or risk becoming corrupted (Gagen, 2000). Ideas such as this lead to the segregation of boys and girls and different age groups on playgrounds for many years.

The early years of playgrounds included providing separate playgrounds for boys and girls, as it was believed they needed to develop different socially. Playgrounds for boys were to be larger than those for girls and in full view of the street, whereas girls playgrounds were to "be shut off from the street and also from the boys playground by a high, solid hedge…Especially the section where the swings and teeter ladders are…should be completely secluded from direct observation from the street as possible," (Curtis, 1917, p. 60-61). Playgrounds for girls needed to be smaller and were recommended to have facilities where girls could play with dishes and invite the boys over for "ice cream or lemonade after the game is over," (Curtis, 1917, p. 61). Given that contemporary research has found there to be differences in the frequency and intensity of play and park use between boys and girls, it seems logical that the roots could be found in such recommended segregation.

The traditional playground as known today evolved around the time of World War 1 (Brett, Moore and Provenzo, 1993). From there, very little change occurred in playgrounds until the 1960s with the development of "designer playgrounds" as part of the urban reform movement (Brett, Moore and Provenzo, 1993). The playgrounds of this period were often designed by architects or landscape architects who attempted to create a "play environment" more than just a playground and used ideas such as different materials, changes in elevation and large climbing structures in their designs (Brett, Moore and Provenzo, 1993).

Since the designer playground movement of the 1960's, there has been more divergence in playground design between public playgrounds and private playgrounds. The main issue of this is safety concerns which have become a significant driving force of public playground design. At this point however, it is not entirely clear what impacts current playground design may have for the development of children.

Conclusion

From the above discussion, it is clear that public parks are a necessary and important component for our communities. Not only do parks provide much needed outdoor space for children which is often a favorite of theirs (Galambos Stone, 1970), but with more and more children growing up in urban areas, availability of nature is limited (Tai et al, 2006). This lack of access to nature can lead children to obesity, increased rates of attention deficit hyperactivity disorder and a desensitization to violence (Orr, 2002). Multiple studies have shown that availability to parks space increases physical activity levels (Cohen et al, 2006) and increases the likelihood of being a healthy weight (Potwarka, Kaczynski and Flack, 2008). For children, time spent in parks assists their physical development (Cohen et al, 2006, Epstein et al, 2006 and Potwarka, Kaczynski and Flack, 2008) as well as their social and emotional development (Tai et al, 2006 and Casey, 2007). The physical environment (i.e. design) and quality of parks also is an important factor to consider as noted in (Smoyer-Tomic, Hewko and Hodgson, 2004, Mota et al, 2005, and Veitch, Bagley, Ball and Salmon, 2006). As park standards in the United States are only an optional and variable consideration (NRPA, 1990), it is important to determine in our communities if sufficient public park space and amenities exist and also determine if the quality of such parks is

sufficient. The current research study will attempt to investigate these questions for one Phoenix Metro community, the City of Scottsdale.

Chapter 3

METHODOLOGY

Introduction

While previous research has indicated that demographic characteristics such as income and ethnicity play a role in available public open space, no tests of this have been conducted in the Phoenix metro region. As such, a case study was conducted for one local municipality, the City of Scottsdale, to determine if the results of previous studies were also applicable locally. While this study was primarily qualitative, some quantitative analysis was also conducted to determine any possible relationship between selected demographic characteristics and public parks and amenities in Scottsdale, Arizona.

The City of Scottsdale was chosen for the study area for several reasons. The first is that the city has a considerable amount of public open space in the form of parks. Scottsdale created and began implementing a park planning system in 1978, which lead to an increase in parks within the city (City of Scottsdale, 2001). Additionally, Scottsdale's park system was to be based on the number of recreational facilities provided (City of Scottsdale, 2001). The City of Scottsdale also has a range of demographics. Further, within their 2001 General Plan, Scottsdale acknowledged the intention to "continue to be involved in recreational opportunities that meet the needs of special populations - including children, seniors and people with disabilities," (2001, p. 109). Given the wording of the sentence, it is apparent the city believes it currently is meeting the recreational needs of children and it pledging to continue to do so in the future. Given this assertion and Scottsdale historic pledge for creating a park system based on facilities and amenities provided, the author desired to attempt to test these

statements and issues for accuracy. Is Scottsdale meeting the needs of children in terms of availability of parks? Are there any demographic characteristics that may impact this availability for children in Scottsdale?

Hypothesis

Selected demographic characteristics will impact the availability and quality of public park amenities for children within the City of Scottsdale.

Research Question

While considerable research has been conducted on the issues of socio-economic inequality regarding access to parks and their amenities, benefits of children playing and the risks of a sedentary lifestyle, there is little research discussing how these issues may be related. The connection between children playing, especially in parks, and reducing sedentary behavior is quite clear (Cohen et al, 2006 and Potwarka, Kaczynski and Flack, 2008). Research has also established a relationship between inequalities in park access and sedentary behavior (Powell et al, 2006). It seems logical that if children do not have access to parks and their amenities, they will obviously not be able to utilize parks for activity, which would potentially increase their risks for sedentary behavior and consequently, the developmental and health risks associated to such behavior. Little research has previously been done to understand the relationship between socio-economic variables and the availability of public parks and park amenities for children. Given this, the current research attempts to develop such an understanding, specifically asking, *"Is the quantity and quality of*

public parks and amenities for children impacted by socio-economic characteristics within the city of Scottsdale?"

Available Methods

In order to understand the relationship between socio-economic variables and availability of public parks and amenities, several research methods could be utilized. Below, each possible technique will be discussed along with its reasons for exclusion in the current research.

Interviews w/Scottsdale Employees

Interviewing employees of the City of Scottsdale was one research method considered for this project. By interviewing employees, an understanding of past and current policies regarding parks could be gained. This technique would also potentially allow for a greater understanding of what has worked well for the city as well as what has not worked in regards to how the parks are distributed throughout the city. The most significant benefit of interviewing city employees would be the development of an understanding of why and how decisions are made within the parks and recreation department and within the city of Scottsdale.

Several drawbacks exist regarding interviewing employees for the current research. The first is the issue of limited employee access. Being able to acquire access to interview multiple employees can be difficult, but under the current economic constraints, many city employees have extremely full schedules, often overseeing several different tasks at once. Such constraints make finding time within their schedules difficult for many employees. Another drawback is the

potential for bias. Current employees of any organization or municipality may be unaware of what issues are realistically facing them as well as their ability of address such issues. This leads to a third drawback to interviewing current employees which is a lack of accuracy or completeness in responses. While intentional or subconscious, current employees of an organization or municipality may be hesitant to provide complete or accurate answers to questions that may put their employer in a potentially negative position. This is especially true if there is any possibility of legal action as a consequence. While such hesitancy of fully accurate or complete answers may not occur, it is a necessary consideration for any researcher when contemplating interviewing employees of their organizations policies. Given the numerous drawbacks associated with interviewing employees, this method was not included for the current research study.

Interviews w/Park Users

Conducting interviews with people using the park was also an option for this research study. One of the primary benefits of interviewing people currently at the parks under investigation would be to gain insight on why the individuals chose that particular park, what they like about the park and also what they do not like or what they believe is absent from the park. The people who currently use the park are the most informative source of how well the park functions and/or what requires improvement.

Several drawbacks exist for conducting interviews with park users that made its use not feasible for this particular research. First, in order to conduct interviews with park users, people need to be using the park. While this seems obvious, not

all parks are well used making it very difficult to find park users to interview. This is especially true in the Phoenix metro area where weather plays a very large role in how much time people spend outside. Even the most attractive and well maintained park will not be used with the 115^{o} temperatures common in the area. A lack of park users may also be highly likely for parks that are not well maintained or attractive to people. For parks such as these, interviews with people regarding what they do not like about the park would be vital, but impossible if no one is present in the park. Another issue with conducting interviews with park users related to a lack of potential participants is timing. Not all parks are used at the same time of day and day of week, making it necessary to conduct multiple visits to each park to attempt to gain understanding of who uses the park and when. Multiple visits to each park requires significant time which was not possible for the current research. A final drawback to interviewing park users is the issue of finding enough participants. Few people come to a park being open to participating in interviews while there. Assuming there were a significant number of parks users at any given visit, it is unlikely if not almost impossible to interview each person. Some people will refuse and others will leave before being asked to participate. If not enough people are able and willing to participate in interviews, the final results will be less reliable and valuable for use in analysis. Allowing a sufficient amount of time to conduct the interviews would reduce the likelihood of this situation being an issue, but again, the current research did not allow enough time for such a research method. Future research would highly benefit from the interviewing of park users.

Photovoice and/or Interviews w/Children

A final possible research method considered but not used was the option of interviewing children. As this research was focused on the impacts to children, interviewing them for their opinions would be highly beneficial. Children are rarely given the opportunity to talk about what they like and do not like about the places in which they spend time, but doing so can be very valuable for researchers. Children know best what they enjoying do while at a park are the best source of why one park amenity appeals to them but another does not. Often asking a child a simple question will provide more of a wealth of information and insight to a researcher than hours of discussions with parents, teachers, designers and city employees ever would be possible of. Another option used jointly with interviewing children is Photovoice. The Photovoice method provides children with cameras to photograph places and things they like and do not like. This allows the children to show what is important to them and what is a problem in their eyes. This technique would be ideal to gain the insight as to what children see in a park and what is good and bad in a way otherwise not possible.

As with the above methods, interviewing children was not used in the current research for several reasons. The main issue is obtaining access to children for the interviews. Very few research studies involving children and/or play and parks actually occur with children in parks. Signed permission forms and photography waivers are just some of the requirements necessary before interviewing children can occur in an educational research setting. Needing to obtain such parental consent in advance makes it difficult to interview children in the actual park setting that is best for acquiring information on parks. It is also very difficult to approach parents in parks and ask for permission to interview

their children without making parents suspicious and concerned. Such issues are why similar research typically utilized schools as the location for finding children to participate. While another option, the same requirements are needed as well as finding a school willing to participate in the research study which can be difficult. Regardless of whether or not a school is used to identify participants, the process for obtaining approval of such research is a difficult and very time consuming task. Another issue with interviewing children is the possibility that children may not always understand the questions asked and/or may be inclined to answer in a way they think is correct. Such responses would then reduce the reliability of the process and be less useful in analysis. Despite the significant possible benefits to interviewing children, the drawbacks were too significant to ignore and this was not selected for use in the current research.

While of all the above discussed methods are beneficial, each in their own way, each also has multiple drawbacks. Main drawbacks overall include the issue of obtaining open and honest responses, finding enough willing participants and limited time for data collection regarding time consuming techniques. Future research regarding children, play and parks would highly benefit from the use of any one of the discussed methods. Better still would be the utilization of all three methods to provide the most complete and accurate picture.

Selected Method

The method used for the current research study was a combination of quantitative and qualitative methods. Data on each park within the City of Scottsdale was analyzed along with U.S. Census data using GIS. This was combined with observations of each park using a checklist created for the current

research (See APPENDIX B). The results of the analysis were then used to answer the research question. An in-depth discussion of each technique and data source used for this research is provided below.

Data Sources

Data for this research included both quantitative and qualitative information. Data was gathered from both secondary sources (U.S. Census and park amenity data) and directly by the researcher. Three main data groups were used for the current research: U.S. Census, Scottsdale park amenity data and park assessment data. Each is discussed below.

U.S. Census

In order to better understand the demographics of the city of Scottsdale, U.S. Census information was utilized. Information from both the 1990 and 2000 Census was used to understand how the demographics of Scottsdale changed over time. Several variables were gathered from the Census information including the total population of children ages 0-18, median household income, race/ethnicity and housing type (i.e. single family and multi-family). The Census information was gathered from Summary File 3 for both 1990 and 2000. It must be acknowledged that while the 2000 Census data is lagging given it is approximately 10 years old, the 2010 Census information was not yet available at the time of the analysis and no other more recent survey data (i.e. American Community Survey) gathers the necessary data at the appropriate level. Future research would highly benefit from the inclusion of 2010 Census data especially

considering possible demographic changes following the housing market boom and economic recessions during the years of 2000-2010.

Scottsdale Park Amenity Information

A compiled data set of parks information was also utilized for the research. The data was combined from three sources: a Scottsdale parks shape file, the City of Scottsdale website and current Scottsdale employees. The combined dataset was provided to the author from Arizona State University graduate students Bharath Sollapuram and Asiya Natekal, who originally complied the dataset in 2009. The parks and amenity dataset includes information on park acres, construction year, playground information and the quantity of multiple athletic accommodations including baseball and softball fields, soccer fields basketball courts and tennis courts. A full list of amenities is provided in Appendix B.

As of 2009, the City of Scottsdale had 34 parks in total. Given this research was using Census information for the year 1990 and 2000, only the parks which existed in those years were included. For the 1990, a total of 21 public parks existed in the City of Scottsdale and all were used in the analysis. Only one park, the Thomas Road Bike Stop, was excluded from the observation section of the study as it is only a bike stop and not a park in the traditional sense. For the year 2000, an additional 8 parks were included in the analysis for a total of 29 parks. As Scottsdale does not have an overly large number of parks, it was determined a 100% sample would provide the most comprehensive study of the Scottsdale parks for the current research. Using a 100% sample also provided a complete understanding of exactly what was available to children in Scottsdale in terms of park quantity and quality during each of the years in question.

It is important to mention the issue of sampling in research. While the current research is using a 100% sample, in a larger city with more parks, this would not be possible. Instead, a smaller sample of only representative parks would be necessary to conduct a similar research study. Based on what the specific research question would be, selected characteristics would need to be determined to establish criteria for choosing parks to include in the study. Such a method would allow for a sufficient number of parks to be included to generate comprehensive results, but would not be overly burdensome for data collection.

GIS Analysis

Given the nature of the park and U.S. Census data used for this research, using GIS for a spatial analysis was the most effective and easily understandable method available. Use of GIS allows for an understanding of the data as it relates to the city and to its surrounding areas. Such spatial analysis also allows for a visual assessment of areas with an especially high or low quantity of a particular amenity to be easily identified, an essential goal of the current research. The use if GIS in this manner also provides an easy way to compare and contrast the quantities of each analyzed amenity to determine if patterns exist among types of amenities and/or socio-economic characteristics such as income, race/ethnicity or housing type, a main focus of the research.

Unit of Analysis

The selected unit of analysis for the current research study was the census tract. The use of tracts was chosen for several reasons. One, census tracts are the smallest homogenous level of information provided by the census at which most

demographic data is made available. Using such homogenous sets best provides a clear picture of the characteristics of the unique areas within the study area. Second, and most important, a census tract is the most likely level to be used by a municipality for their own analysis regarding parks within their city because they generally encompass park areas. Using block group level data becomes too location specific and parks need to best serve a large group of people, over an extended period of time. Conversely, using a level larger than a census tract will also not be best to serve the needs of a municipality as larger levels do not allow for enough depth of understanding of the unique characteristics of an area to best provide for that areas needs. The more aggregated a dataset becomes, the more accuracy and depth that is lost. As stated above, parks should meet the needs of a large section of a population and larger data levels do not provide enough understanding to accomplish this requirement. Therefore, the use of census tracts for the analysis provides the best balance of size and homogeneity.

Selection of Tracts

One main intention of the current research was to study parks within the city of Scottsdale. While the use of U.S. Census tracts was determined to be the most effective unit of analysis for accomplishing this, the census tracts do not necessarily correspond to city boundaries. This is the case with the City of Scottsdale. Considering this, it was necessary to select which tracts would be included in this study area. Initially, the tracts were selected by using the "Centroid" feature in GIS to identify which tracts had their center within the city boundary. Next, a visual assessment was conducted in GIS to determine which census tracts fell primarily within the Scottsdale boundary that were not already

clear from the Centroid selection. Any tracts which visually appeared to have fifty percent or more of their area within the Scottsdale boundary were included. Any tracts with less than fifty percent were excluded from the study area and were not used in the analysis. After selecting the census tracts to be included, a total of 32 tracts were used for the 1990 analysis and 55 tracts for the 2000 analysis.

Visual Analysis of Maps

GIS was used to generate maps of Scottsdale indicating, by census tract, the amount of park space in acres and the number of particular amenities. Maps were also generated of the U.S. Census socio-economic characteristics. Each amenity selected for inclusion in the analysis was mapped for both the years 1990 and 2000 to determine the amount of each amenity within a census tract and to assess any changes over the 10-year period. Once the maps were generated, a visual analysis was conducted. Each set of maps (1990 and 2000) for each amenity was assessed for any areas with particularly low or high quantities in any single year and then also compared for any patterns or changes over time. This visual analysis provides an understanding of what census tracts, if any, have low quantities of any particular amenity. The amenity maps were then compared to the census maps to determine if any patterns of amenity quantities were occurring in census tracts with selected socioeconomic characteristics.

Park Observation/Assessment

To determine the current quality state of parks in Scottsdale, an observational assessment was conducted. Observations were made at each park included in

the GIS analysis using a checklist created by the author. Once the observations and checklist were complete, the parks were scored and then ranked. This ranking provides a method to determine the current quality of each Scottsdale park, to be used in the analysis for answering the research question.

Park Checklist

The park assessments were conducted by observation and answering a checklist. The checklist was created to assess the current state of various amenities and features of the parks. Using a combination of amenities analyzed with GIS and the authors' knowledge of parks, a checklist was prepared. The checklist included sections on the amount of play equipment (including climbing equipment, slides and swings), safety, shade, seating and the overall park setting (garbage, graffiti, general maintenance). The checklist also included whether the park seemed child and family friendly. The full version of the checklist is available in Appendix A.

Using the checklist, points were awarded for both possessing certain positive features and not possessing certain negative features. For instance, one point would be awarded to a park for having a drinking fountain(s) and zero points would be awarded for a park with visible graffiti. For each park, the points were then totaled providing a final score, which was used to rank the park. Three rankings were possible: poor, average or good. For the score 3 points were the minimum possible and 33 points the maximum. A description of each ranking is provided below. A further description and discussion of the parks and the ranking system is provided in Chapter 3.

- Below Average- Scores 3-12 points; these parks generally do not appear well maintained, play equipment is broken/rusted/dangerous, seating and shade are minimal or non-existent and overall do not seem child or family friendly.
- Average-Scores 13-23 points; these parks appear to have acceptable maintenance, play equipment appears safe, but possibly old/outdated/minimal, some seating and shade are available and overall are child and family friendly.
- Above Average- Scores 24-33 points; these parks appear very well maintained, play equipment is in very good condition/appears new, seating and shade are plentiful and overall is very child and family friendly.

The checklist and ranking provide a method to assess parks in a different way than by size and number of amenities. Observing the parks provides a way to determine how an individual park appears to be maintained, if it seems attractive aesthetically, if it is comfortable and if in general it is a good and safe park to visit with children. Observation of parks is the easiest way to discover the characteristics of an individual park that cannot be otherwise easily quantified such as cleanliness and availability of seating options and shade. Such characteristics are nonetheless important factors in determining what is available for use. A park with a new and very large play structure is nearly meaningless if there is no seating nearby for adults to supervise from. Similarly, a park with both ample seating and shade is less beneficial if the playground equipment is broken and rusted and unsafe for children to use. The checklist was used to assess such factors and characteristics.

Statistical Analysis

In order to quantitatively determine any possible relationship between the U.S. Census data and park quantity and quality, statistical analysis was also used. Basic statistical analysis was conducted comparing the Census data variables of income, ethnicity (White/Non-White) and housing type (Single Family/Multi-family) to the amount of public park space available by Census tract. To determine if and how much the Census variables impact public park space, an independent t-test and comparison of means was conducted. Additionally, for all Census variables determined to be significant through the t-test, correlation analysis was also conducted. This correlation analysis also included determining if the variables were auto-correlated which would eliminate the option of regression analysis. For any variables found not to be auto-correlated, regression analysis was conducted.

Limitations & Constraints

No research is without certain limitations, constraints and biases. This project is no different and several issues must be acknowledged that may have impacted the analysis and results.

Data

The first issue was the risk for double counting of amenities. While most parks were within a single Census tract, several parks were located within more than one tract. When this occurred, the amenities of that particular park were counted for both Census tracts. Within the GIS program, there is no way to determine which amenities are within a specific tract and which are within the other. As

such, the total quantity of each amenity cannot be determined solely from the resulting maps. Despite this issue, as each Census tract would have the amenities of a particular park available, for this analysis it was determined it was still valid to count those amenities as existing within a Census tract.

Several limitations and constraints also exist regarding the use of the 1990 and 2000 Census information. The first issue to mention is that the categories of data collected were not the same between 1990 and 2000 regarding race and ethnicity. This was especially an issue regarding the Hispanic population. For the 1990 Census, the category of “Race” included White, Black, Asian and Pacific Islander, American Indian and Eskimo and Other Race. Hispanic was another, separate category that may have also included those in any of the other categories, such as “Black and Hispanic” and was an optional category to respond to. This may have allowed some double counting and/or non-counting of individuals for the population totals, which may have influenced the counts for any Census tract. For example, a particular tract may have a low Hispanic population figure due to the fact that people responded only to the question of White, Black, etc and not also to being Hispanic. Unfortunately, there is no viable way to adjust for this, as there is no method to determine accurate figures for the Hispanic population in 1990 using the Census data. For 2000, this categorization was not an issue, as the Census asked respondents to answer White alone, Black alone etc and included Hispanic as an option for each race. As such, the data allows for a more accurate identification of each Census tracts accurate racial/ethnic populations. Considering the categorization differences, it was necessary to combine some of the categories from 2000 to allow for a more accurate comparison between 1990 and 2000. Table 2 give the official categories

for both 1990 and 2000 and Table 3 gives the combined categories of what was used for the current analysis.

1990	2000
White	White Alone
Black	Black Alone
Asian & Pacific Islander	American Indian & Alaskan Native Alone
American Indian & Eskimo	Asian Alone
Other Race	Native Hawaiian & Pacific Islander Alone
Hispanic	Other Race Alone
	2 or More Races
	Hispanic

Table 1: 1990 and 2000 Race Categories

1990	2000
White	White Alone
Black	Black Alone
Asian & Pacific Islander	American Indian & Alaskan Native Alone
American Indian & Eskimo	Asian Alone & Native Hawaiian & Pacific Islander Alone
Other Race	Other Race Alone & 2 or More Races
Hispanic	Hispanic

Table 2: 1990 and 2000 Race Categories Used in Analysis

The second issue regarding the Census information was regarding the Census tracts. Between 1990 and 2000 there were changes in not only the total number of tracts, but also in the boundaries of some of the older tracts. Due to this, not all of the tracts in 2000 completely matched the tracts in 1990. In 1990, there was a total of 32 Census tracts and in 2000 there was a total of 55 tracts. Many of the tract boundaries that existed in 1990 were the same in 2000, but for some areas, especially those in the northern sections of the city where considerable growth had occurred, the boundaries changed. Tracts that in 1990 were very large were broken into smaller tracts for the 2000 Census. While this change was generally not a significant issue for this analysis, it is still necessary to mention, as the comparison between 1990 and 2000 was not identical.

Data Accuracy

Another limitation and constraint necessary to mention for this study was the accuracy of some of the data, particularly the park amenity information. The park amenity information was gathered from multiple sources and combined to form a spreadsheet. The data was gotten partially from the official City of Scottsdale website and also from a GIS shapefile of park data provided by the city. This information was then given a final review by a Scottsdale staff member during the late summer of 2009. While all reasonable attempts were made to ensure full accuracy, it is possible some amenities were inadvertently excluded or included or that changes occurred between when the spreadsheet was reviewed and when the analysis was completed (summer-fall 2010). Additionally, it must be acknowledged that the spreadsheet was provided to the author by fellow ASU students Asiya Natekal and Bharath Sollapuram. These students gathered all of

the park amenity information and combined the data into the final spreadsheet used in the analysis.

GIS Limitations

Using GIS in the analysis also requires mention in the area of limitations and constraints. While capable of doing many different things, the GIS software also has its own limitations that can impact an analysis. For example, if a park is located within two different Census tracts and the associated demographics for the park want to be viewed, there is no way to see both tracts information nor is it possible to force a particular tract to link to the park. The GIS software does this automatically itself. Also, to select which tracts were included in the study area, the “Centroid” feature in GIS was used. This feature selects tracts whose center is located within the city boundaries. If for any reason however, the system does not perceive a tract to have its center within the boundary, it would be excluded despite possibly having the majority of the tract within the city. The reverse is also true that a tract may be included when not primarily being within the Scottsdale boundary. This resulted in some tracts needing to be manually included or excluded from the analysis. While this is the only easily identifiable issue regarding the use of GIS for this analysis, it should be acknowledged that it is possible other limitations exist that may not have been discovered during the resulting analysis that may have impacted the results.

Time

A final limitation and constraint to the current research study that must be acknowledged is time. Many research studies could benefit from additional time

to gather data or make site observations and this study is no different. Additional time to conduct the park assessments may have resulted in different findings for the analysis, but it was not possible to conduct multiple visits to every park within the city of Scottsdale. Deadlines were necessary for the completion of this study that limited the time that could be spent on site visits. While each park included in this analysis was visited and observed, each park was observed once. It is possible that the observations were conducted on an atypical day for elements such as garbage pickup or graffiti cleanup. Additional time may have discovered that low ranking parks were not as poor as initially appeared or that higher ranking parks were not as good as initially appeared. Future research would highly benefit from additional time and multiple site visits to each park.

Conclusion

Past research has into parks has utilized a number of different methods for the data gathering and analysis. Several options were considered for use in the current study, but the selected method of combining GIS, statistics and observational analysis were determined to be most appropriate. Despite not being chosen for immediate use, each of the previously discussed techniques provides information that is relevant for future research in order to more deeply understand the parks and the needs of the park users.

Chapter 4

ANALYSIS

Introduction

In order to determine any correlation between the availability of public parks and selected socio-economic characteristics, statistical analysis was conducted. The results of the analysis are presented below and are divided by year for the quantity analysis and followed by the quality assessment. Summarizing discussion follows each section.

1990

U.S. Census Results

In order to compare the top and bottom income groups, the 32 Census tracts in that existed within Scottsdale 1990 were divided into quartiles of 8 tracts each. The top and bottom quartiles were used for both comparison of means tests and independent sample t-tests to determine any statistically significant similarities and/or differences between the two groups. The results of each test are provided below.

The results of a comparison of means on the U.S. Census data indicate that for both the bottom and top income quartiles, there is a statistically significant difference for the variables of percent total White, percent total Hispanic, percent Single Family Homes and percent Multi-Family Homes. Additionally, as can be seen in Table 4, within the City of Scottsdale, Hispanic children are approximately ten times more likely to be in the bottom income quartile than the top (21% vs. 2%) and the top income quartile is more than twice as likely to live in neighborhoods with Single Family Homes than the lowest income quartile

(41% vs. 85%). Also, at $69,134 the mean income for the highest income quartile is approximately 2.5 times that of the lowest income quartile at $26,166.

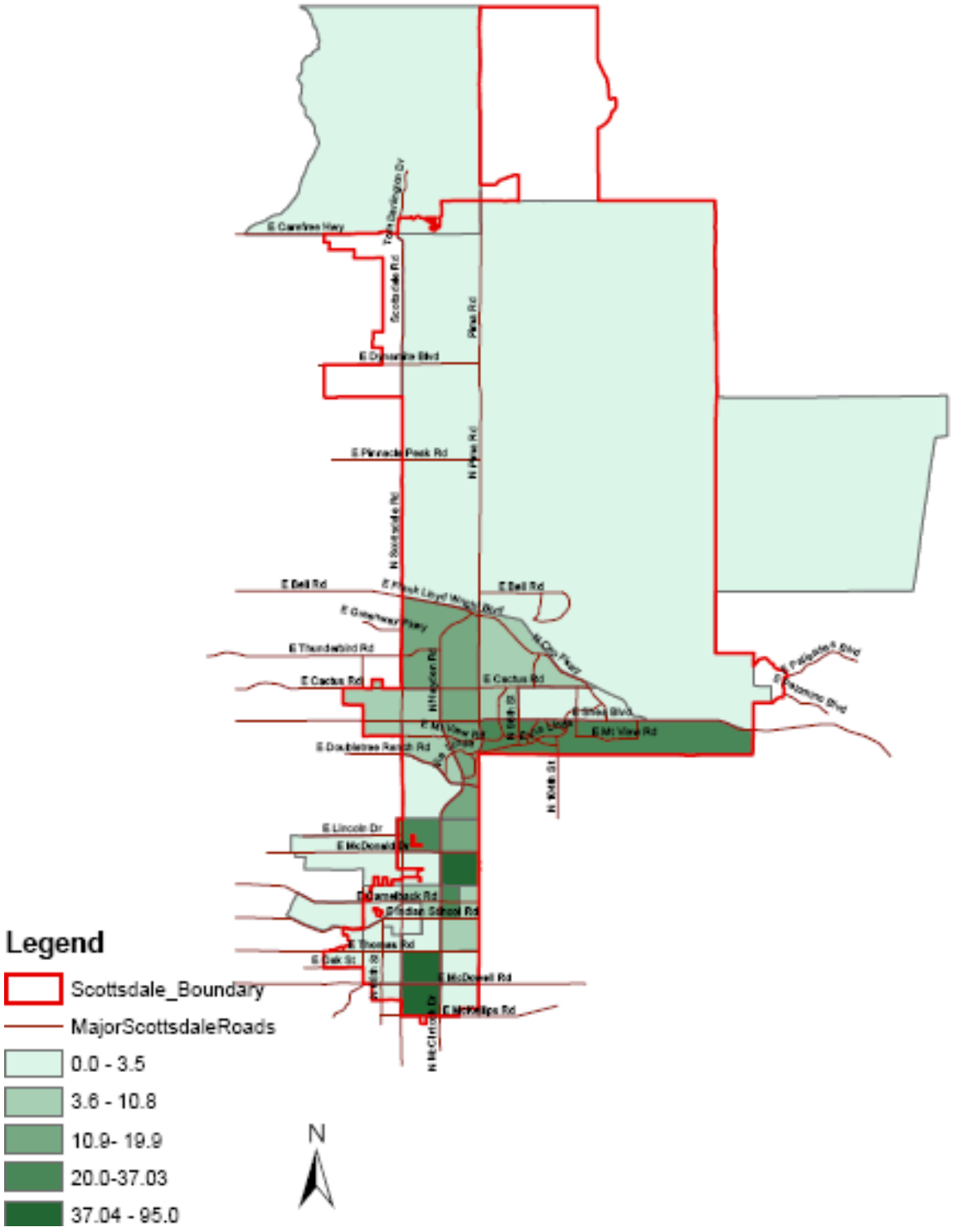
Socio-economic Comparison Statistics, 1990

	Quartile	N	Mean	Std. Deviation
Percent Total White	1	8	86.019	5.630
	4	8	96.451	0.968
Percent Total Hispanic	1	8	21.452	12.812
	4	8	2.749	0.521
Percent Single Units	1	8	41.005	23.662
	4	8	85.329	15.437
Percent Multi Units	1	8	58.995	23.662
	4	8	14.671	15.437
Sum Of Park Area	1	8	10.318	25.462
	4	8	9.579	11.500

Table 4: 1990 Census Means Comparisons Results for Socio-economic Variables

One of the most significant findings of this analysis is regarding the means comparisons for the lowest and highest income quartiles regarding the total park acreages. When comparing the means for these two income quartiles, the results indicate that the lowest income quartile has more total park acres than the highest quartile (10.31 acres vs. 9.57 acres). Map 1 indicates the total acres of park space each census tract had in 1990.

The results of the independent sample t-test can be seen in Table 5, indicating the results are statistically significant at the .05 level for all variables except the total park acres.



Map 1: Total Park Acres in Scottsdale in 1990

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percent Total White	Equal variances assumed	12.018	.004	-5.165	14	.000	-10.432	2.020	-14.765	-6.100
	Equal variances not assumed			-5.165	7.413	.001	-10.432	2.020	-15.155	-5.710
Percent Total Hispanic	Equal variances assumed	15.453	.002	4.126	14	.001	18.703	4.534	8.980	28.427
	Equal variances not assumed			4.126	7.023	.004	18.703	4.534	7.990	29.416
Percent Single Units	Equal variances assumed	3.286	.091	-4.437	14	.001	-44.323	9.989	-65.747	-22.900
	Equal variances not assumed			-4.437	12.045	.001	-44.323	9.989	-66.078	-22.569
Percent Multi Units	Equal variances assumed	3.286	.091	4.437	14	.001	44.323	9.989	22.900	65.747
	Equal variances not assumed			4.437	12.045	.001	44.323	9.989	22.569	66.078
Sum Of Park Area	Equal variances assumed	.743	.403	.075	14	.941	0.739	9.878	-20.447	21.925
	Equal variances not assumed			.075	9.742	.942	0.739	9.878	-21.349	22.828

Table 5: 1990 Census Data Independent Sample T-test Results

For the linear regression analysis, the park acreages (“Sum of Park Area”) was used as the dependent variable and the independent variables were race/ethnicity, housing type and income. The results of linear regression analysis

indicate that when controlling for other variables, only two of the selected variables were significant: income and percent multi-family housing (Table 7). When controlling for race/ethnicity and housing type, a negative and significant (at the .10 level) relationship exists between income and park acreage. When controlling for race/ethnicity and income, the percent multi-family housing and park acreage has a negative and significant (at the .05 level) relationship. Given that the results indicate a negative relationship, regarding income and park acreage, the results of the previous statistical tests are supported: as income goes down, available park acreage increases and as income goes up, the available park acreage decreases. The same relationship exists between park acreage and the percent multi-family housing units; as the percent of multi-family units increases, the available park acreage decreases and as the percent of multi-family housing units decreases, the available park acreage increases.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.445	.198	.079	22.327

Table 6: 1990 Regression Model Summary

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	260.177	188.750		1.378	.179		
	Percent Total White	-2.083	1.916	-.472	-1.087	.287	.158	6.333
	Percent Total Hispanic	-.542	1.067	-.225	-.508	.616	.151	6.642
	Median Household Income in 1989	-.001	.000	-.421	-1.740	.093	.507	1.973
	Percent Multi Family Units	-.693	.306	-.676	-2.267	.032	.334	2.993

Table 7: 1990 Regression Analysis Results

While the regression model has a relatively low rate of R-Square (only .198 or approximately 20%), the results do support the findings of comparison of means for park acreage indicating that when comparing the highest and lowest income quartiles, the lowest income neighborhoods have more acres of park available. As the model only explains 20% however, it is essential to note that other variables, which are currently unknown, are responsible for explaining the remaining 80%.

2000

U.S. Census Results

The 55 Census tracts from 2000 were divided into quartiles, similar to 1990, but with groups of 14 each for the top and bottom quartiles. Analysis was conducted on the top and bottom quartiles for both comparison of means tests and independent sample t-tests to determine any statistically significant similarities

and/or differences between the two groups. The results of each test are provided below.

The results of a comparison of means on the U.S. Census data indicate that for both the bottom and top income quartiles, there is a statistically significant difference for the variables of percent total White, percent total Hispanic, percent Single Family Homes and percent Multi-Family Homes. While there were changes in the results from the 1990 analysis, as can been seen in Table 8 it is still evident that Hispanics are approximately 7 times more likely to be in the lowest income quartile than the highest (29% vs. 5%) and the lowest income quartile is over 10 times as likely to live in neighborhoods with Multi-Family housing than the highest income quartile (57% vs. 5%). From 1990 to 2000, there also was a significant increase in income for both the highest and lowest income quartiles; the mean income for the lowest quartile in 2000 was $38,435, an increase of approximately 45% and the mean income for the highest quartile in 2000 was $106,392, an increase of approximately 54% over the 10 years.

Socio-economic Comparison Statistics, 2000

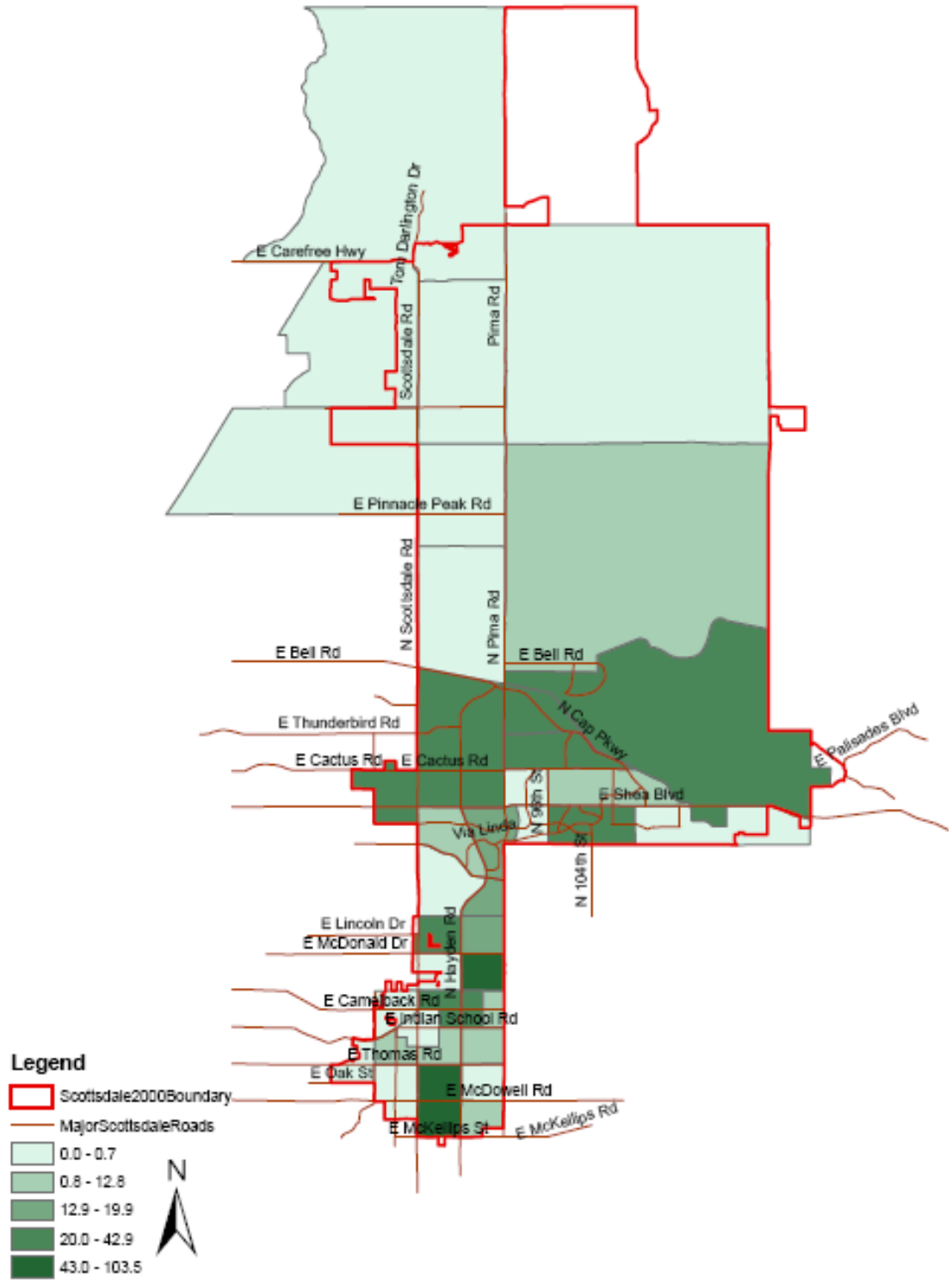
	Quartiles	N	Mean	Std. Deviation
Percent Total White	1	14	75.596	11.626
	4	14	93.493	2.104
Percent Total Hispanic	1	14	29.162	16.042
	4	14	4.911	1.653
Percent Single Units	1	14	42.626	26.713
	4	14	94.259	9.448
Percent Multi Units	1	14	57.721	27.478
	4	14	5.846	9.390
Sum of Park Acres	1	14	20.434	32.917
	4	14	6.159	12.273

Table 8: 2000 Census Means Comparisons Results for Socio-economic Variables

The comparison of means for 2000 also found significant differences regarding total park acres. For the year 2000, the results indicate that, similar to 1990, the lowest income quartile has more park acres than the highest income quartile. Unlike 1990 however, where the means comparison was less than 1 acre in difference, in 2000, the lowest income quartile had approximately 3 times the total park acreage available with the lowest income quartile having 20.4 acres and the highest income quartile having 6.1 acres. Map 2 indicates the total park acres for each census tract in 2000.

Table 9 shows the results of the independent sample t-test for the 2000 U.S. Census data, indicating statistically significant results for all variables at the .05 level excluding the total park acres.

For 2000, the same variables were used as the dependent and independent variables as in 1990. For the year 2000, results of the linear regression analysis indicate only a single significant variable, income (Table 11). It was found that the total percent single family home and percent multi-family home variables were auto-correlated, so the percent single family home variable was removed. Once this variable was removed from the analysis, when controlling for housing type and race/ethnicity, the results indicated a negative and significant (at the .05 level) relationship between income and total park acreage. This finding is the same as that of 1990: as income goes down, the park acreage available increases and as income increases, the available park acreage decreases.



Map 2: Park Acres in Scottsdale in 2000

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Percent Total White	Equal variances assumed	13.382	.001	-5.668	26	.000	-17.897	3.158	-24.388	-11.407
	Equal variances not assumed			-5.668	13.850	.000	-17.897	3.158	-24.677	-11.118
Percent Total Hispanic	Equal variances assumed	25.768	.000	5.627	26	.000	24.251	4.310	15.392	33.111
	Equal variances not assumed			5.627	13.276	.000	24.251	4.310	14.960	33.543
Percent Single Units	Equal variances assumed	18.133	.000	-6.818	26	.000	-51.633	7.573	-67.199	-36.066
	Equal variances not assumed			-6.818	16.202	.000	-51.633	7.573	-67.670	-35.595
Percent Multi Units	Equal variances assumed	18.417	.000	6.684	26	.000	51.875	7.761	35.922	67.827
	Equal variances not assumed			6.684	15.996	.000	51.875	7.761	35.422	68.327
Sum of Park Acres	Equal variances assumed	9.364	.005	1.520	26	.140	14.275	9.389	-5.025	33.574
	Equal variances not assumed			1.520	16.546	.147	14.275	9.389	-5.576	34.126

Table 9: 2000 Census Data Independent Sample T-test Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.362	.131	.061	20.456

Table 10: 2000 Regression Model Summary

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	6.121	64.059		.096	.924		
	Percent Total White	.398	.644	.178	.617	.540	.209	4.792
	Percent Total Hisp	.264	.442	.161	.597	.553	.240	4.173
	Percent Total Housing Unit Multi Family	-.253	.174	-.312	-1.451	.153	.375	2.669
	Median Household Income in 1999	-.00037	.000	-.489	-2.445	.018	.435	2.297

Table 11: 2000 Regression Analysis Results

Similar to the results of the 1990 regression analysis, the regression model for the year 2000 has a relatively low rate of R-Square (only .131 or 13%), but the results do support the findings of the comparison of means for park acreage indicating that when comparing the highest and lowest income quartiles, the lowest income neighborhoods have more acres of park available. Again, as the model explains only 13%, other variables explain the remaining 87%.

Park Checklist Results

A total of 27 parks were observed for the current research study. All the parks were built in or before the year 2000, in order to observe and assess only those

parks available in the years included in this study (1990 and 2000). The park checklist scores were totaled and the quality of the parks was assessed. A discussion of the results is below.

Similar to the statistical analysis, the parks within the highest and lowest income quartiles were compared to determine what differences, if any, exist in park quality between the highest and lowest income groups in Scottsdale. A total of six (6) parks exist within the highest income quartile and nine (9) parks exist in the lowest income quartile. A list of parks in both income quartiles is in Table 12 and Table 13 has the rankings for each park quality category.

Census Tract	Park	Quartile	Score
04013217300	Lafayette Park	1	9
04013218200	Papago Park	1	10
04013218200	Vista del Camino/McKellips Lake Park	1	15
04013217600	Osborn Park	1	17
04013217002	Agua Linda Park	1	20
04013218300	Apache Park	1	23
04013217500	Paiute Park	1	24
04013217202	Indian School Park	1	27
04013217002	Chaparral Park	1	27
04013216825	Rio Montana Park	4	19
04013216816	Northsight Park	4	22
04013216813	Rotary Park	4	22
04013216825	Horizon Park	4	23
04013216816	Cactus Park	4	24
04013216828	La Mirada Desert Park	4	27

Table 12: Highest and Lowest Income Quartile Parks and Scores

Park Quality	Score (in points)
Above Average	24-33
Average	13-23
Below Average	3-12

Table 13: Park Categorization Rankings

In 2000, 33% of all Scottsdale parks were located within the lowest income group. Conversely, only 22% of the total parks were within the highest income group. These figures support the earlier statistical findings that the lowest income quartiles have more park space available. Of the nine parks located within the lowest income quartile, a total of two (2) parks or 22%, scored in the "Below Average" category, four (4) parks (44%) were "Average" and three (3) parks or 33% were categorized as "Above Average" (Table 14).

Park Quality	# of Parks	Percent
Above Average	3	33%
Average	4	44%
Below Average	2	22%

Table 14: Lowest Income Quartile Park Categorization

For the six parks located in the highest income quartiles, a total of two (2) parks or 33%, scored in the "Above Average" category and four (4) parks (67%) scored in the "Average" category (see Table 15). No parks located within the highest income quartile scored in the "Below Average" category.

Park Quality	# of Parks	Percent*
Above Average	2	33%
Average	4	67%
Below Average	0	0%

Table 15: Highest Income Quartile Park Categorization *Rounded

While the actual number of parks within each income quartile is supported by the previous statistical analysis (highest income quartile has less park space available and lowest income quartile has more park space), the percentages provide a different result. Despite having more parks available, the overall quality

of parks located within the lowest income quartile is lower than the park quality in the highest income quartile.

Chapter 5

DISCUSSION

Introduction

While the previous chapter presented the results of the analysis of this study, this chapter will focus on the significance of those findings and any possible impacts regarding the planning of public parks.

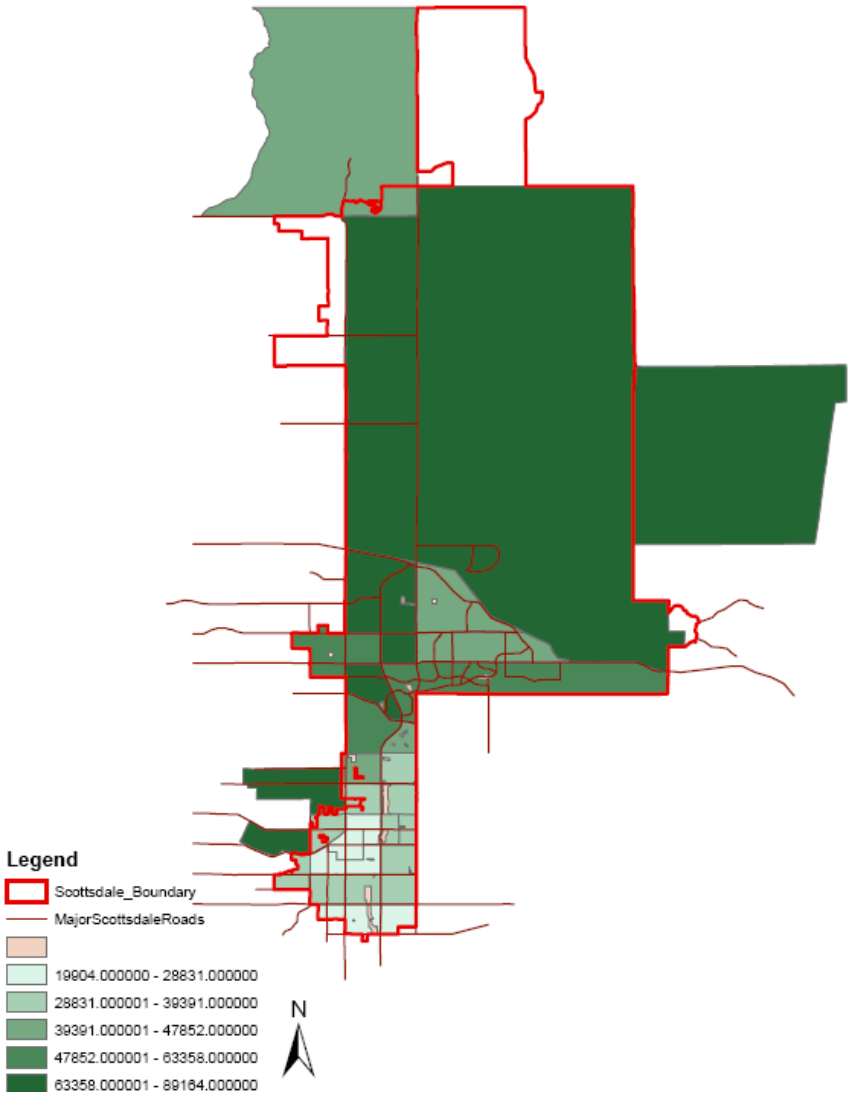
The main question studied in this research project was *"Is the quantity and quality of public parks and amenities for children impacted by socio-economic characteristics within the city of Scottsdale?"* To address the first issue of quantity of public parks, the quantity of public park space for children in Scottsdale is impacted by socio-economic characteristics, most notably income. Additionally, the quality of parks is also impacted by the socio-economic characteristic of income. To better understand the results of the public park quantity analysis, the years of 1990 and 2000 will first be discussed individually.

Quantity

1990

The results of the analysis on the public park quantities in 1990 indicate that of the variables analyzed, income was a primary factor in determining the amount of available park space. The percent of multi-family housing within a tract was also found to be significant, but only through the regression analysis. While much of the past research has indicated that lower income neighborhoods are more likely to have less parks space available to them (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004), the results of the current study do not correspond to previous research. Based on the statistical analysis of public park acreage within the City of Scottsdale, it was

found that lower income Census tracts have more park space available. In 1990, this additional park acreage was approximately one (1) acre more for the lowest income quartile compared to the highest income quartile. While one acre is not a considerable difference, the statistical analysis found the difference to be significant and it does answer the research question, that yes, the quantity of public parks for children is impacted by selected socio-economic characteristics. The characteristic of the percent of multi-family homes was also found to be statistically significant for 1990. The relationship was negative however, indicating that as the percentage of multi-family homes within a Census tract increased, the amount of public park space available decreased. This result also provides additional support to the answer to the research question that socio-economic characteristics impact the quantity of park space. While not found to be statistically relevant in the current analysis, there is likely to be a relationship between the variables of income and multi-family home percentages within a Census tract. As no relationship was found within this study, no further discussion on the potential relationship impacts will occur.

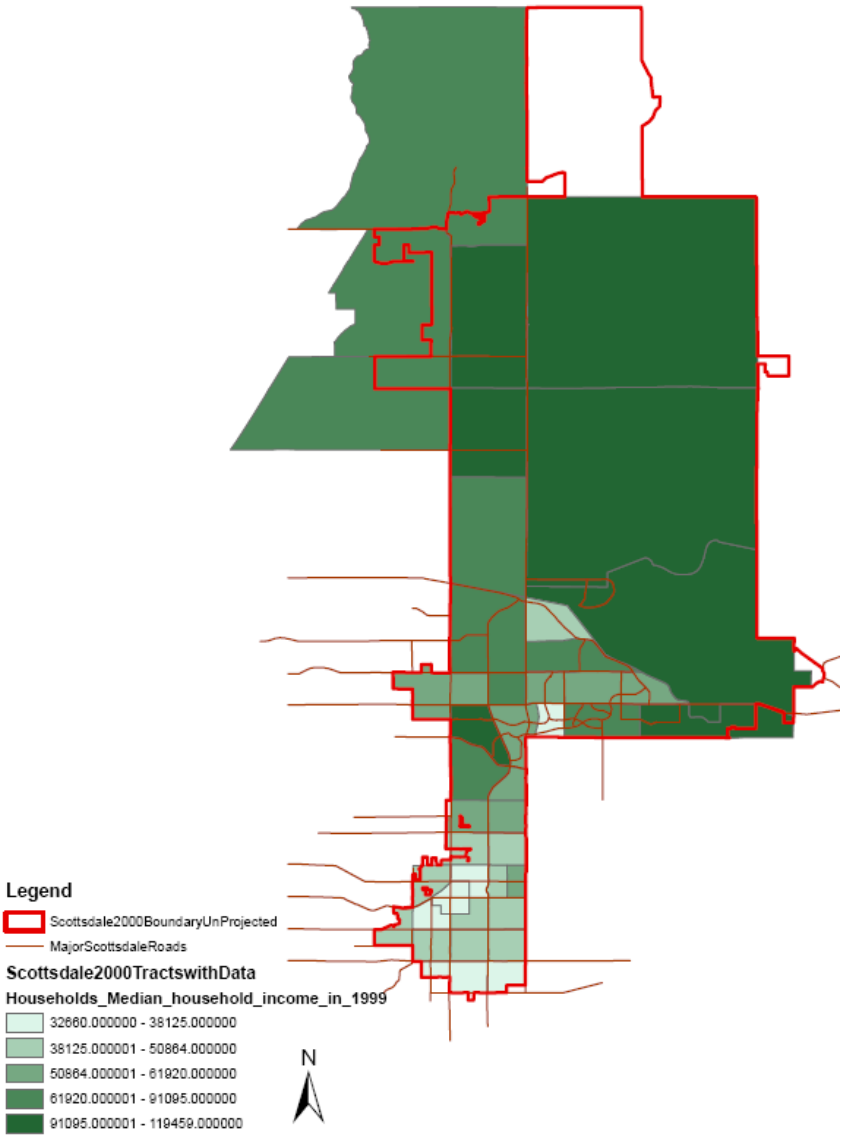


Map 1: 1990 Median Income in Scottsdale

2000

The results of the analysis for the year 2000 indicate similar results as found in 1990, namely that income was a significant factor in determining public park acres. In 2000 however, of the variables tested, the only one found to be relevant was income. The previous relationship that existed in 1990 between multi-family housing and park acreage was no longer valid in 2000.

In the year 2000, the difference in means of available park acres was 14 acres between the lowest and highest income quartiles. This was a considerable increase from the one acre difference found in 1990. This difference was also found to be statistically significant though the regression analysis. Just as the results of the 1990 analysis found socio-economic characteristics to impact the quantity of park space, the year 2000 analysis also found a single analyzed characteristic to impact the quantity of public park acreages: income.



Map 2: 2000 Median Income in Scottsdale

Quality

In addition to the quantity of parks, the quality of the parks in Scottsdale was also assessed. A brief survey was utilized to assess the condition of the play equipment, the availability of seating and shade and the general overall appearance of the park, including the prevalence of trash and graffiti. The survey results were then totaled and ranked to determine the quality of any given park. The results of the analysis of the park quality indicated that differences exist between the lowest and highest income quartiles. While the lowest income quartile had a total of nine (9) parks, on average the overall quality was slightly lower than the six (6) parks in the highest income quartile (19.9 for the lowest quartile verses 22.8 for the highest quartile). In addition to having a slightly higher overall quality average, the highest income quartile also had no parks which ranked in the “Below Average” category whereas the lowest income quartile had 2 parks with scores in the “Below Average” range. More simply, the lower quality parks were in the lower income neighborhoods. The higher quality parks however, were not exclusively in the higher income neighborhoods. The overall findings regarding quality lend further support to the results of the quantity analysis that income impacts parks within the City of Scottsdale.

Fortunately, the overall quality of the parks in both the highest and lowest income quartiles would be categorized as “Average” and was generally decent in quality. Notices differences existed between parks which were ranked as “Below Average” and the parks ranked as “Above Average.” In order to highlight some of the differences in park quality, a discussion of several parks with rankings from each of the three categories is below.

“Below Average” Category

One park that was typical for this category was Papago Park. Papago Park had one of the lowest scores for park quality, a 10, and also was located within one of the lowest income quartiles. Initially, the park did not appear to be so poor, but further observation of the park changed that first impression. The park had two picnic tables; one was chained to a tree and unable to be moved and the other was too dirty to be used (Image 1). As can be seen in the photos (Images 2, 3 and 4), some of the playground equipment was rusting and broken, providing opportunities for children to get hurt. On the positive side, the park did have several swings in good condition, a basketball court and a several trees to provide shade (Photos 5, 6, and 7). Overall, Papago Park had all the amenities to be a higher quality park, but was not maintained sufficiently enough to achieve a higher score.

Figure 1: Dirty Picnic Table with Trash

Figure 2: Rusting steps on playground

Figure 3: Rusted joint near bridge on playset

Figure 4: Rusted edge on platform

Figure 5: Overall shot of playground

Figure 6: Well-maintained basketball court

Figure 7: Swing set

“Average” Category

Vista del Camino Park is an example of a park that scored within the “Average” category and was located in one of the lowest income quartiles. This park was considerably larger than some of the other parks and had more amenities including a splash pad area for children, a larger playground and multiple covered picnic tables (Photo 8).

While the park had significant turf areas that were well maintained (see photo 9) and a significant amount of shade, there were other issues with the park which negatively impacted its quality score. The playground was large, with a significant amount of equipment there was a large amount of garbage around the playground and in the sand, including metal caps to beer bottles (Photo 10). The playground equipment also had several areas with noticeable graffiti and insects as can been see in Photos 11 and 12. The sprinklers also were not properly adjusted and when on, got approximately half the play equipment wet, making it unusable at selected times. One otherwise good feature of the park was the water feature which runs through the center of the park. What should be an attractive amenity for the park however, was also a safety risk as one area located directly between the child’s splash pad and playground had a relatively large drop-off into the water, providing both a falling hazard and drowning hazard (Photos 13 and 14). The water feature itself also had a negative impact on the quality score as there was considerable algae and trash in the water (Photo 15). Despite the drawbacks to Vista del Camino Park, there was a noticeable quality improvement from Papago Park and it was overall a decent park to visit.

Figure 8: Overall shot of park with ramadas

Figure 9: Landscaping at park

Figure 10: Cap from beer bottle on steps of playground.

Figure 11: Graffiti on playground equipment.

Figure 12: Spider

Figure 13: Tripping hazard.

Figure 14: Algae filled water.

Figure 15: Trash filled water.

“Above Average” Category

In the “Above Average” category, La Mirada Park was one of the highest ranking parks with a score of 27. It also is located within one of the highest income quartiles. The park did not have any real turf areas, but still had considerable vegetation and ample shade including a large shade cover over the playground (Photo 16). The play equipment was well maintained with no evidence of rust or broken pieces as was common at other parks within the study. The park amenities included several different pieces of play equipment, a splash pad and basketball court (see Photos 17 and 18). Unlike the basketball court at Papago Park, which was quite small and had no lighting or seating, the court at La Mirada was large, with two hoops, benches along the sides and well light for evening play. The only negative aspects found while visiting the park was several pieces of garbage and one possible falling hazard (Photo 19 and 20). While not a primary amenity for attracting children, the park also had a sizable desert walking trail with several covered picnic tables. Overall La Mirada Desert Park is a noticeably higher quality park than many others included within this research project and is a significantly higher quality park than Papago Park and several other lower scoring parks in Scottsdale.

Figure 16: Nice shade over playground equipment

Figure 17: Overall view of playground

Figure 18: Basketball court

Figure 19: Trash in landscaping

Figure 20: Tripping hazard

Discussion

As discussed in previous chapters, spending time outdoors and in play are essential for the proper development of children. This can be seen in the research of Cohen et al (2006) and Potwarka, Kaczynski and Flack (2008) regarding physical development and Kuo and Sullivan (2001) and Casey (2007) regarding children's emotional and social development. Unfortunately, past research has also indicated that lower income neighborhoods and minority populations often do not have sufficient access to public parks (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004). Considering the disturbingly increasing trend in childhood obesity as noted in two different CDC reports (2008 and 2008b), it seems necessary to study the relationship between selected socio-economic characteristics such as race/ethnicity and income and the availability of public parks for children.

The current research study set out to explore the relationship between selected socio-economic characteristics (race/ethnicity, income and housing type) and the amount and quality of public parks where children are concerned, within the City of Scottsdale, Arizona. The expected hypothesis for the current research study was that selected socio-economic characteristics would impact the quantity of public park acreages available for children within the City of Scottsdale. This hypothesis would correspond to the previous research done regarding parks (International City/County Management Association, 2005 and Powell, Slater and Chaloupka, 2004). The results of the analysis on the quantity of park space between the years of 1990 and 2000 indicate that, selected socio-economic characteristics do impact park availability. The only characteristic found to the relevant for both data sets was income, but the specific results were not necessarily anticipated. As discussed previously, past research, including studies conducted by the Trust for Public Land (2004), Wolch et al (2005) and Powell et al (2006), indicates that often lower income areas have less park space available to them, and the current results indicate the exact opposite. As income decreases, the acres of public park space available increases within Scottsdale. While this presents an atypical situation regarding public park distribution as based on past research that would generally seem positive (that lower income tracts have more park space) the results nevertheless still indicate an inequity within Scottsdale's park system. Furthermore, given the subtle but noticeable differences in park quality, it is clear there are inequities within the Scottsdale park system. The current findings are somewhat similar to the study conducted by Smoyer-Tomic, Hewko and Hodgson in 2004 which found parks in Edmonton, Canada to be equitably distributed, but still with quality differences. Considering

this, it is necessary to discuss the potential positives and negatives to such a distribution system as Scottsdale's.

It is possible to present the position that if inequity must exist, it is better for the lower income populations to have the greater share of an amenity rather than the higher income populations. This argument is difficult to fully support however as one population still has an unequal share of a particular amenity, in this case, park space. A more easily supported position is that regardless of income, populations with more multi-family homes should have more park space than populations with more single family homes. The reasoning for this is that those populations with single family homes have private yard space to utilize that populations residing in multi-family housing, such as apartments, do not have. Given they are lacking private space available, populations in areas with high percentages of multi-family housing should have more public parks available to them. As they type of housing available is often highly connected to income, with lower income groups gravitating towards multi-family housing, it would seem that providing additional park space to areas with high amount of multi-family housing would also in turn provide high amounts of park space for lower income populations. This type of park distribution is not seen in the City of Scottsdale however. While in 1990, multi-family housing was a relevant variable in determining the amount of park space available, the relationship was actually negative indicating that areas with greater percentages of multi-family housing had fewer parks available. This is counter to the aforementioned theory.

It is clear from the current analysis that the distribution of public parks within the City of Scottsdale is different than in some other areas. While it is unfortunately common to find that lower income populations have less public park space

available to them, in Scottsdale, they have more park space. While this may seem to be a positive indication that the Scottsdale method should be replicated elsewhere, further discussion and analysis is necessary before such a recommendation can be made.

First, it must be acknowledged that in this study, the only socio-economic characteristics analyzed were housing type, income and race/ethnicity. While income was the only factor determined to be relevant for both years, the regression model indicates that such variables explain less than 20 percent of the factors. The remaining 80 percent of the variables that determine the amount of public park space are still unknown. It is possible that only a few select variables are responsible for this resulting figure, but it is just as easily plausible that there are a considerable number of other factors that determine the amount of park space available. As no other variables were analyzed in this research project, further research must first be conducted to attempt to determine those other factors.

Second, further research is needed regarding the policy used by Scottsdale in determining where parks will be located and which parks will be updated. While the current research study included observation on the current quality of the parks in Scottsdale, before recommending Scottsdale's method for greater use, it is necessary to understand how the City decides park maintenance schedules, when and where to locate new parks and what amenities to include in each park. As it was outside the scope of the current research, it is not possible to speculate why some parks appeared during observation to be better maintained than others. It is possible the observations were conducted on an unusual day or after greater than normal usage (after a holiday weekend or several parties for

instance). Additionally, it is possible that for the better maintained parks that the observations were conducted shortly after maintenance occurred resulting in an atypical situation. Without knowing the park maintenance schedules, such questions currently cannot be answered but certainly are necessary factors to consider. The current park quality can be considered an indicator, but greater analysis is needed on the City's policy before recommendation of greater applicability.

One result that can be drawn from the current research study is that Scottsdale has achieved different results from their park distribution system than have other cities. This is likely due to the fact that Scottsdale actively chose to design their park system into the city as a whole, rather than add parts as development and growth occurred. Typically, total population is the primary factor in determining where and when parks are needed and what amenities the park should have. The current research indicates that Scottsdale's different method, designing parks in advance based on what the city wants to have for the future, gives improved results. Further, utilizing such a method allows for areas with greater need to have more parks. Neighborhoods with large figures of multi-family housing, such as apartments, typically have higher populations of children and have less outdoor space available to use. Designing the park system would allow the city to locate additional or larger parks in such neighborhoods. This would be a shift in perspective from total population to population density being the primary issue when locating parks. This would also be a way to ensure that the areas with large quantities of children have sufficient park amenities and park acres available to utilize.

Recommendations for Future Research

The current research study generated somewhat unexpected, but potentially positive results. While the finding that lower income populations have considerably more public park area available than higher income populations can certainly be considered a positive finding (rather than having less park area available as is so common), additional research is absolutely necessary to understand why this unusual situation has occurred. Several different directions should be explored in additional research.

First, the age of the housing and parks should be considered as that is potentially a relevant characteristic not included within the scope of the current study. There is reason to believe that the age of the parks and housing units would result in a significant relationship. In the current research, income was considered and it was found that lower income tracts had more park acres available. The majority of the parks located in the lowest income quartiles however are approximately 30-40 years old. Including the age of the parks and housing would likely find that the housing and parks were initially constructed at approximately the same time and therefore present a more significant relationship.

Along similar lines, the changing demographics of the City of Scottsdale and its various neighborhoods also should be further researched. Scottsdale has a relatively long history of being perceived by many as an affluent community. If the historical demographics of the city's residents were analyzed, it is possible that the changing demographics of Scottsdale may also be a relevant factor in determining the amount of public park space available. A hypothesis resulting from the current research is that while the lower income populations were found to have more park acres available (especially in 2000), this may be more the

result of the more current lower income tracts historically having been affluent when the parks were constructed (i.e. the parks were built for higher income populations who later moved out and lower income groups moved in and "inherited" the parks). Additional research on the changing demographics of the City of Scottsdale is necessary though to assess the validity of this theory. Future research would also highly benefit from interviews with employees and officials of the City of Scottsdale. This would allow for deeper understanding of current practices regarding the park distribution and maintenance as well as more understanding of the cities policies and priorities. If possible, interviews with former city employees and officials may also shed light on why and how certain decisions were made regarding the parks policy for Scottsdale. As this was not included in the current research, none of these potential factors were able to be considered in terms of answering the current research question. Such future research may be exceedingly helpful for the better understanding of policy of Scottsdale, especially in regards to determining if a similar method should be recommended for greater utilization in other municipalities.

An additional recommendation resulting from the current research is to interview the park users. This is really the only technique available to understand why people may or may not use a selected park and what they feel is good and bad about the parks. While the current research attempted to be objective, only those who frequently utilize the parks under study really understand them. A park that may have received an otherwise low score during observation may be a highly used park (thus its "worn" appearance) and a higher scoring park may be avoided for otherwise unknown reasons. Interviewing the people in the parks would provide a deeper level of understanding about the individual parks that

was not able to be included in the current research, but that would be significant for overall park knowledge and understanding for parks in general.

Finally, one significant way in which to deepen the current research and something that is highly recommended by the author is to spend more time observing each park. One visit to each park included in the research was sufficient for the current study, but did not allow for a significant understanding and familiarity of each park. Future research should include multiple visits to each park at different times and days of the week to better understand who is using the park, how the park is used and why the park is used. Understanding such 'whys' and 'hows' is the best method to determine what the needs of the people are. The current research study attempted to understand if selected socio-economic characteristics impact the amount of public park space available, but it does not include an assessment of how much space is needed or what type of space is needed for differing populations and groups. Without an understanding of what a populations needs are, it is difficult to determine if those needs are being met. This is the primary question future research must attempt to address.

Future park research would benefit highly from more investigation on how Scottsdale distributes parks within their community. While most communities add parks into their system as growth and development occurs, Scottsdale designed their parks to be part of the overall city. Past research has clearly indicated that the more common and traditional approach of adding parks based on total population does not result in very equitable park systems. The current research study indicated that designing parks as part of the city, instead of adding them afterwards, results in far higher levels of equity. While no other cities were found

to utilize such a design technique for their park system, future research into this topic would be beneficial, especially if similar equitable results were found within other communities that designed their parks.

One final noteworthy issue to discuss is the difference in perspective of children and adults. The current research study attempted to analyze the quality of parks, and while it did so with children in mind, it was from an adult perspective. It is entirely possible and highly probable that children would have a different perspective of what makes an “above average” or high quality park. Talking with children to gain their opinions on what they like and do not like and what they believe makes a park good would be highly beneficial for parks research. While safety may be a primary concern for a parent, a child may be more interested in the challenge the play equipment may hold for them. One significant step in combating the health problems facing children is increased physical activity. Getting parents to take their children to the park is only one part of the solution; once there, the children need to play, otherwise the benefits to their development are lost. Without a proper understanding of what children perceive as important in parks, no genuine progress can be made in creating parks that will appeal to both adults and children.

Conclusion

This research study has provided some relevant information regarding the research of public parks and children. The study has identified areas that correspond to previous research (the quality of parks is impacted by socio-economic characteristics) as well as areas that directly conflict with previous research findings (lower income neighborhoods in Scottsdale have more park space available). The reasons for such differences in the past research from the

current findings regarding Scottsdale must be more fully researched to be better understood. The potential for a more equitable method for the distribution of public parks certainly may exist within the City of Scottsdale, but without additional investigation, such benefits may be lost. Considering the essential benefits that public parks can provide for the development of children and the potential health crisis currently being faced, it seems apparent that society cannot afford to ignore the issue and it must be acknowledged that parks are an item all children need and deserve and have a right to access.

Chapter 6

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APPENDIX A

PARK OBSERVATION SURVEY FORM

Park Name:		
Date:		
Time:		
Weather:		
	Score	**Scoring Codes**
Playground Equipment		
# of pieces of equipment:		
Swings:		
Slides:		
Climbing structures:		
Other:		
Approximate target age range:		
Exposed hardware/wood/etc?		Y=+0 N=+1
Broken equipment?		Y=+0 N=+1
Type of surface material (wood chips/ sand/rubber "padding"/etc :		
Sharp points/edges/etc:		Y=+0 N=+1
Tripping/Falling hazards (tree stumps/ concrete footings/etc:		Y=+0 N=+1
General Park Features		
Shade:		1=Minimal, 3=Good, 5=Ample
Functional Shade (near seating/playground/etc):		1=Minimal, 3=Good, 5=Ample
Benches/Seating:		1=Minimal, 3=Good, 5=Ample
Drinking Fountains:		Y=+1
Restrooms:		Y=+1

a. Are there beer or liquor bottles or cans visible?		Y=+0 N=+1
b. Are there cigarette/cigar butts or discarded cigarette packages visible?		Y=+0 N=+1
c. Are there needles, syringes, or drug-related paraphernalia visible/nearby?		Y=+0 N=+1
d. Is there garbage, litter, or broken glass?		Y=+0 N=+1
e. Is there graffiti?		Y=+0 N=+1
f. Are there broken windows on nearby buildings?		Y=+0 N=+1
g. Any vacant lots or abandoned buildings?		Y=+0 N=+1
h. Neighborhood/crime watch signs (e.g., drug-free zone)?		Y=+1 N=+0
i. Security warning signs?		Y=+1 N=+0
j. No trespassing/beware of dog signs?		Y=+0 N=+1
k. Does the park seem to be generally well maintained?		Y=+1 N=+0
l. Does the area seem child/family friendly?		Y=+1 N=+0
Other Comments:		
Total Park Score:		
Minimum Points	3	
Maximum Points		

APPENDIX B

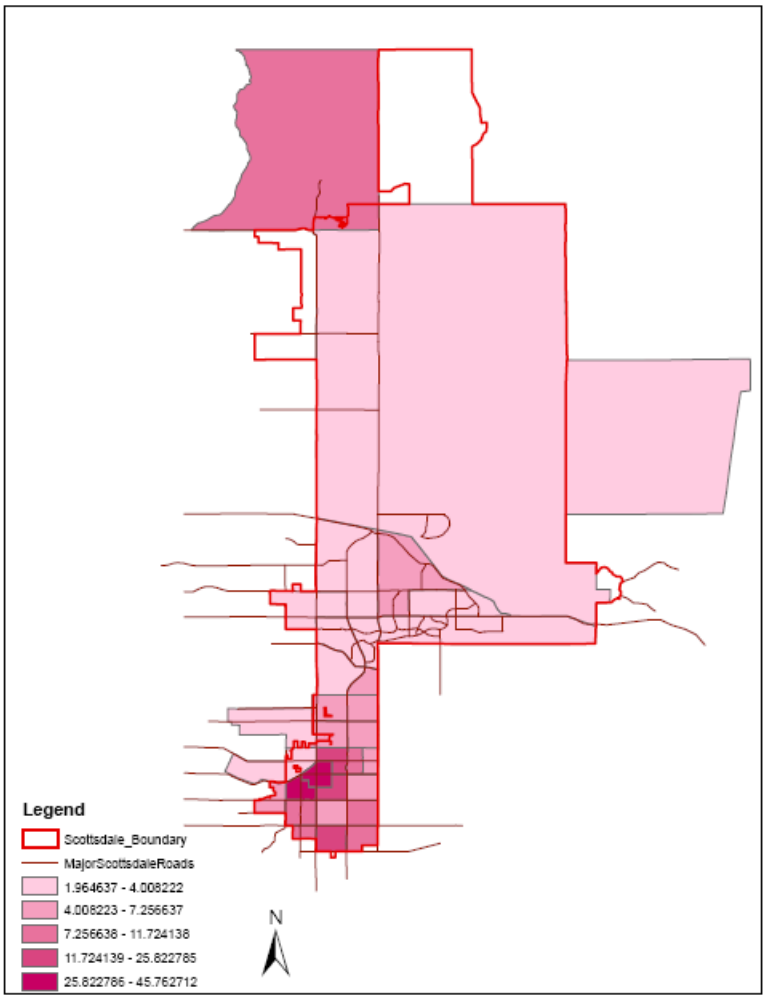
FULL PARK AMENITIES LIST

Full Park Amenities List		
Trail	Turf Garden	Built Structures
Dog Park	Multiball Field	Soccer
Basketball	Softball	Volleyball
Baseball	Play Ground	Tennis Court
Water Body	Play Equipment	Other Facilities
Picnic Area	Racquet Ball	Type Park
Restroom	Skate Park	Construction Year
Splash Park	Parking	Operating Hours
Ramada	Lighting	Upgrades Last 5 Years

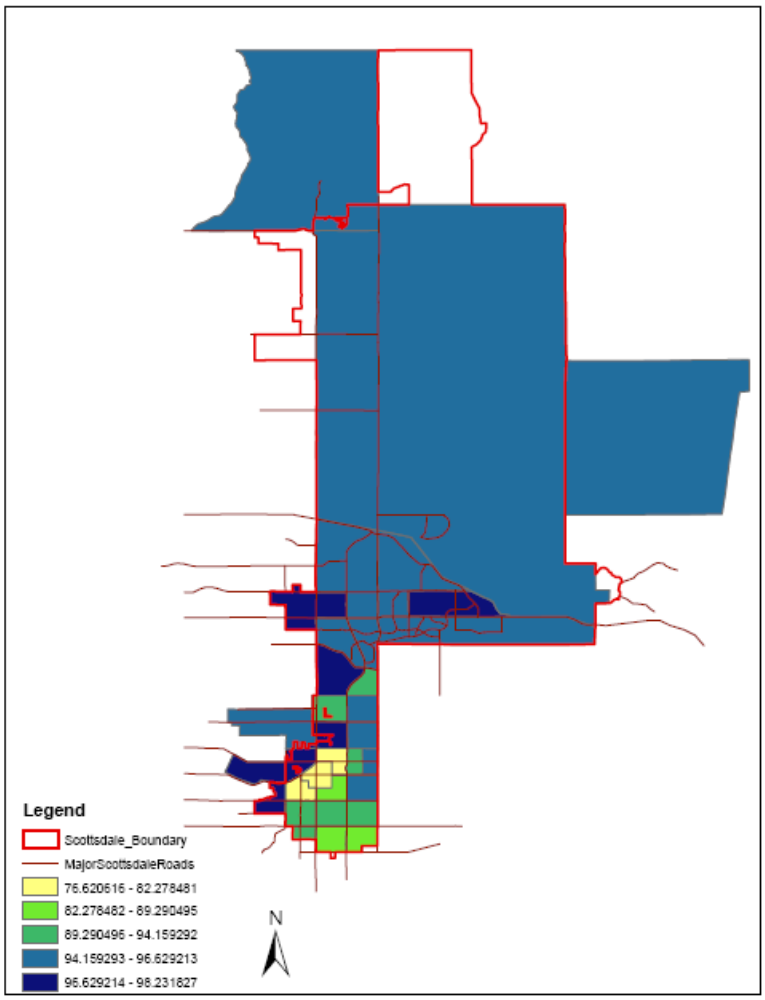
APPENDIX C

PARK AMENITIES MAPS

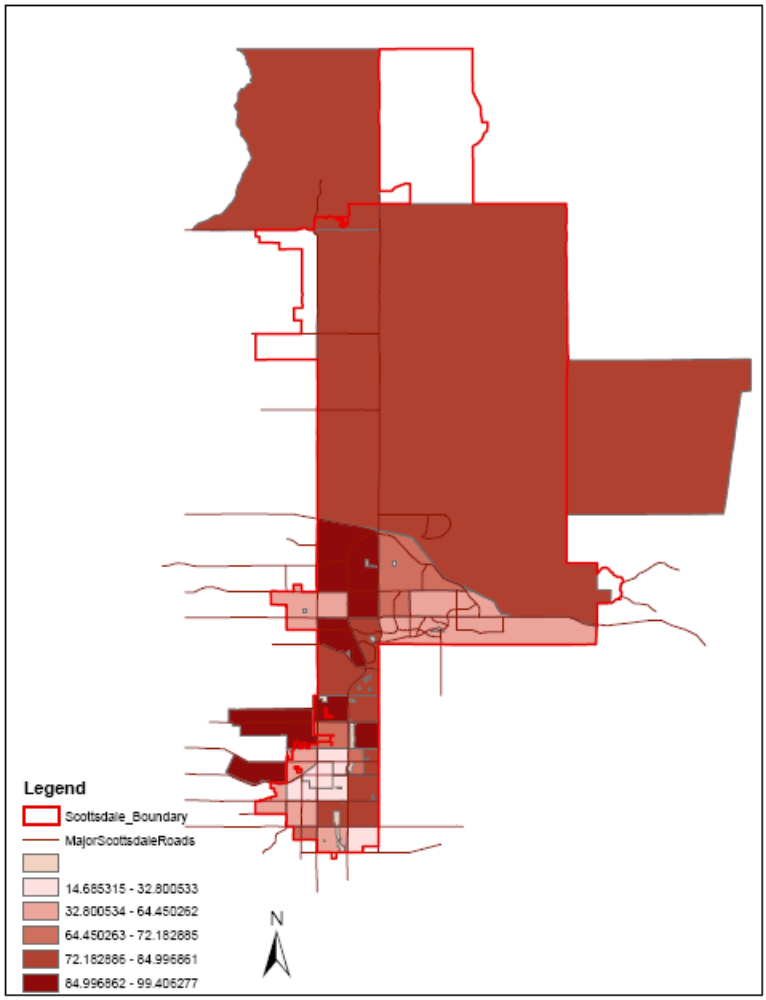
Percent Hispanic Population Scottsdale1990



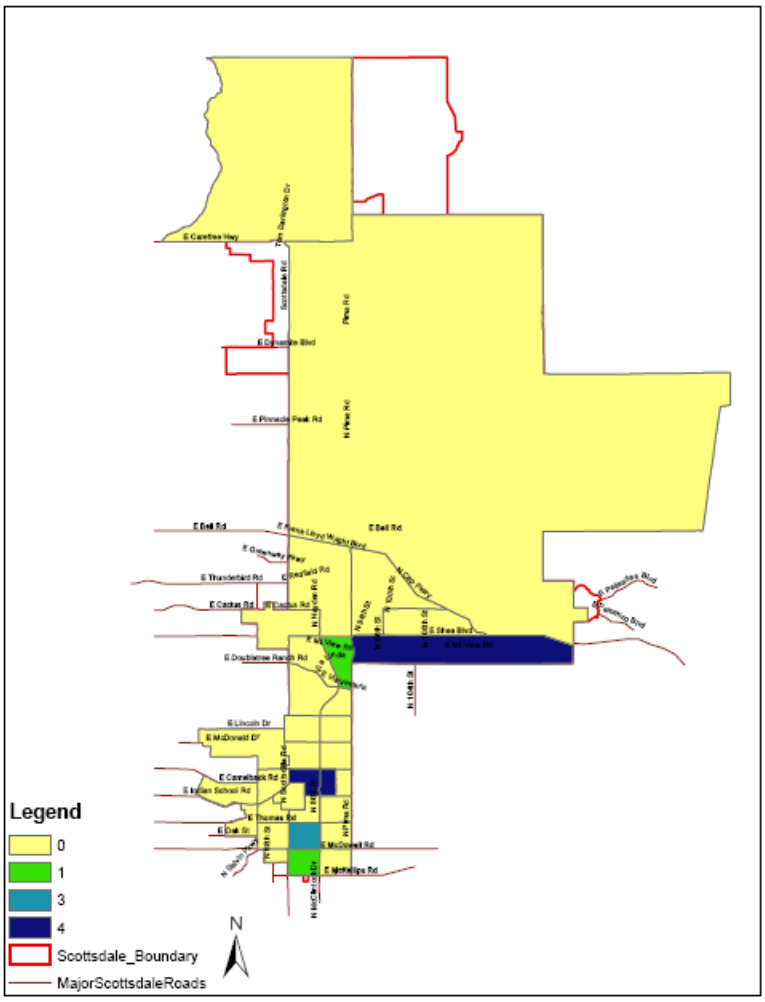
Percent White Population Scottsdale1990



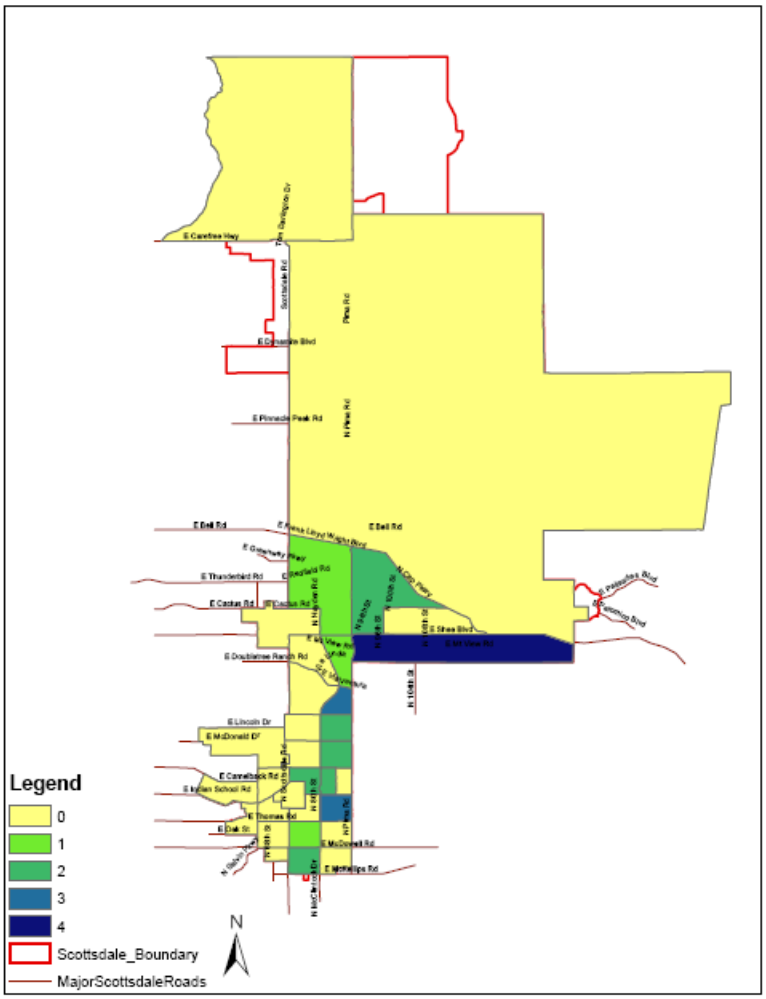
Percent Single Family Homes 1990



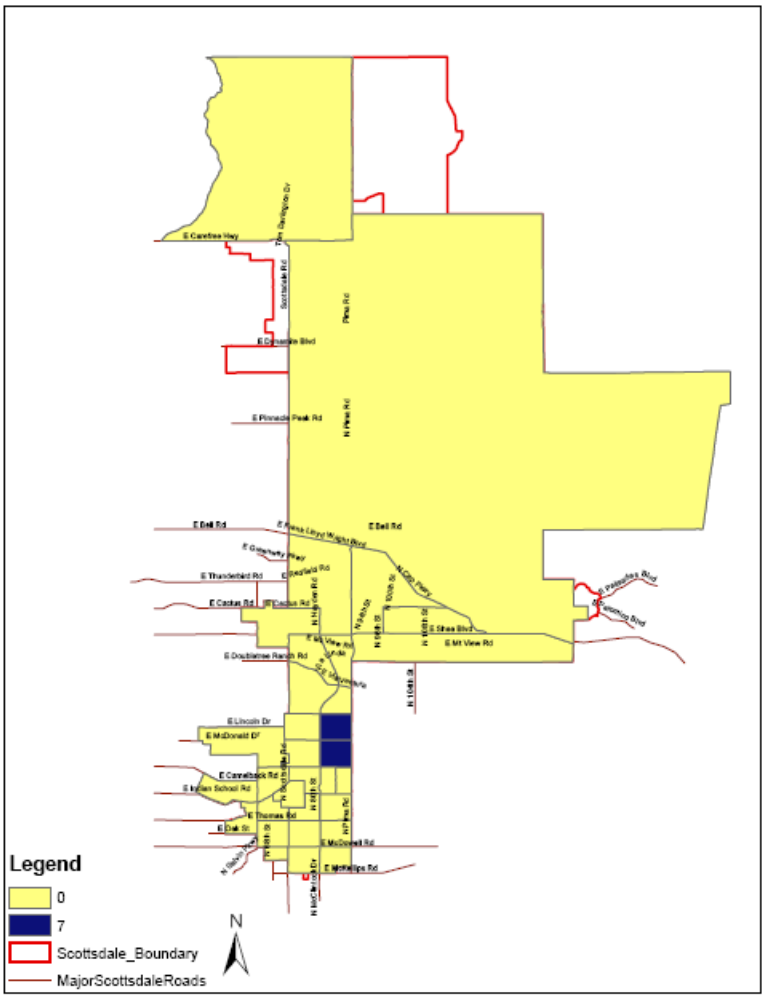
Baseball & Softball Fields per Tract Scottsdale1990



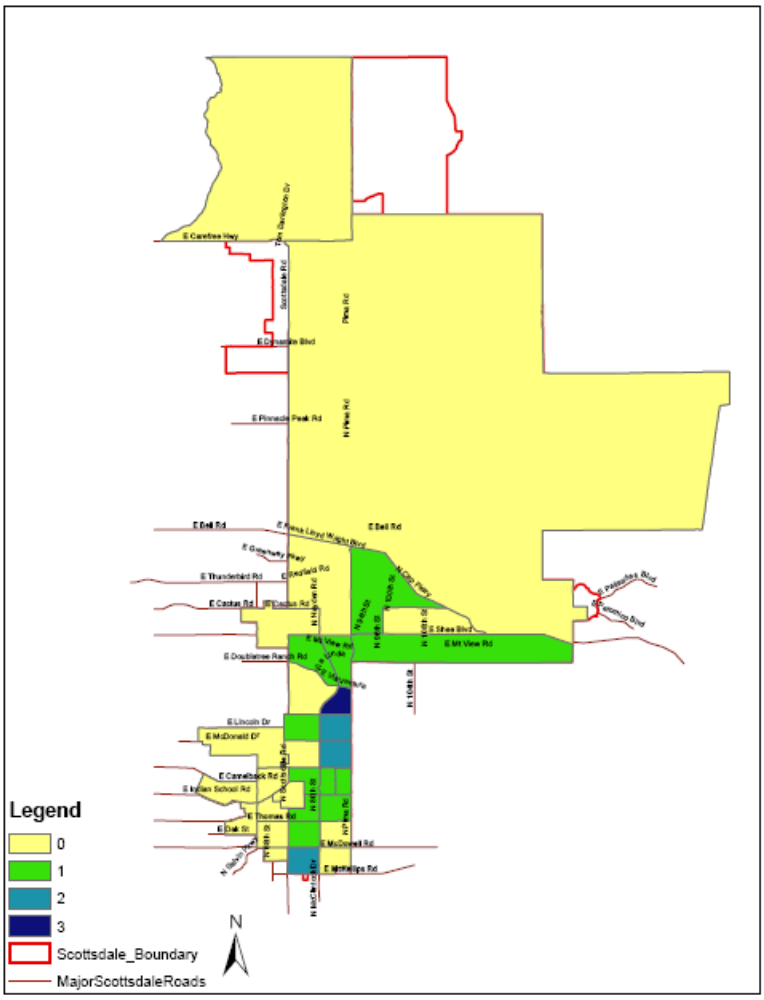
Basketball Courts per Tract Scottsdale1990



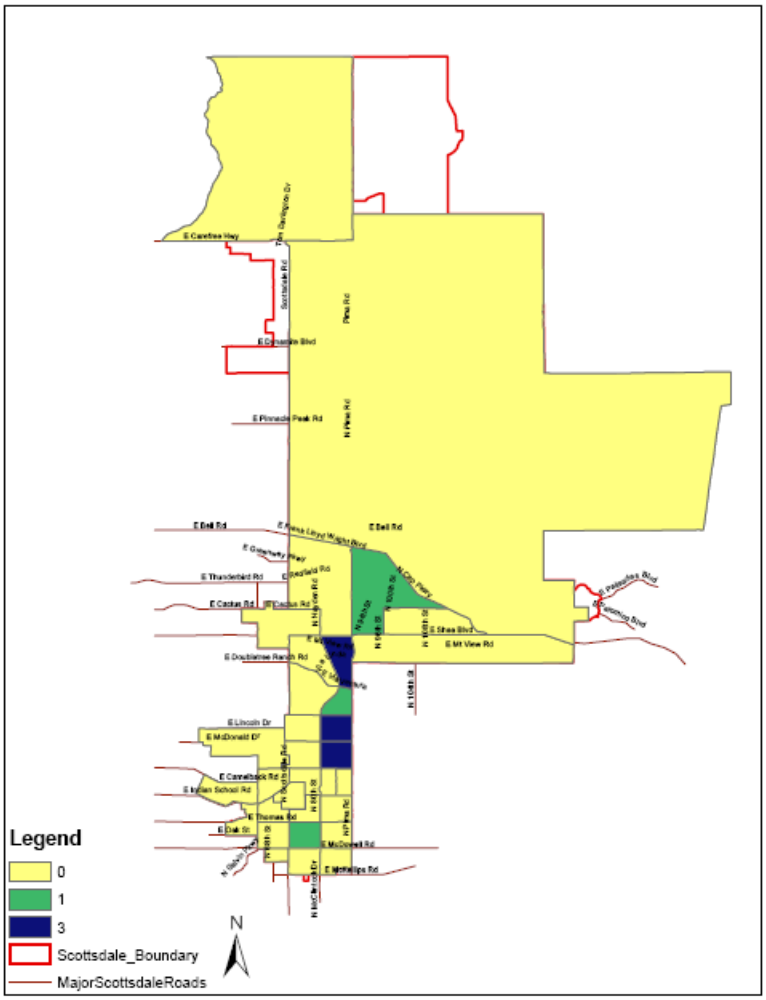
Multi-Purpose Ball Fields per Tract Scottsdale1990



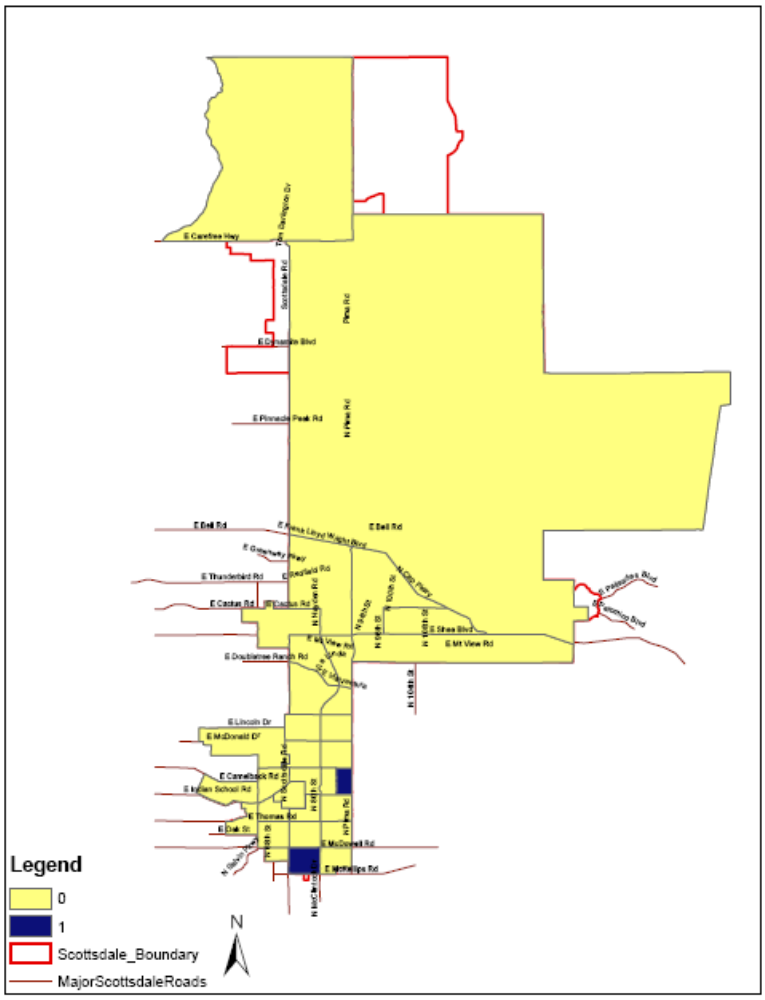
Playgrounds per Tract Scottsdale1990



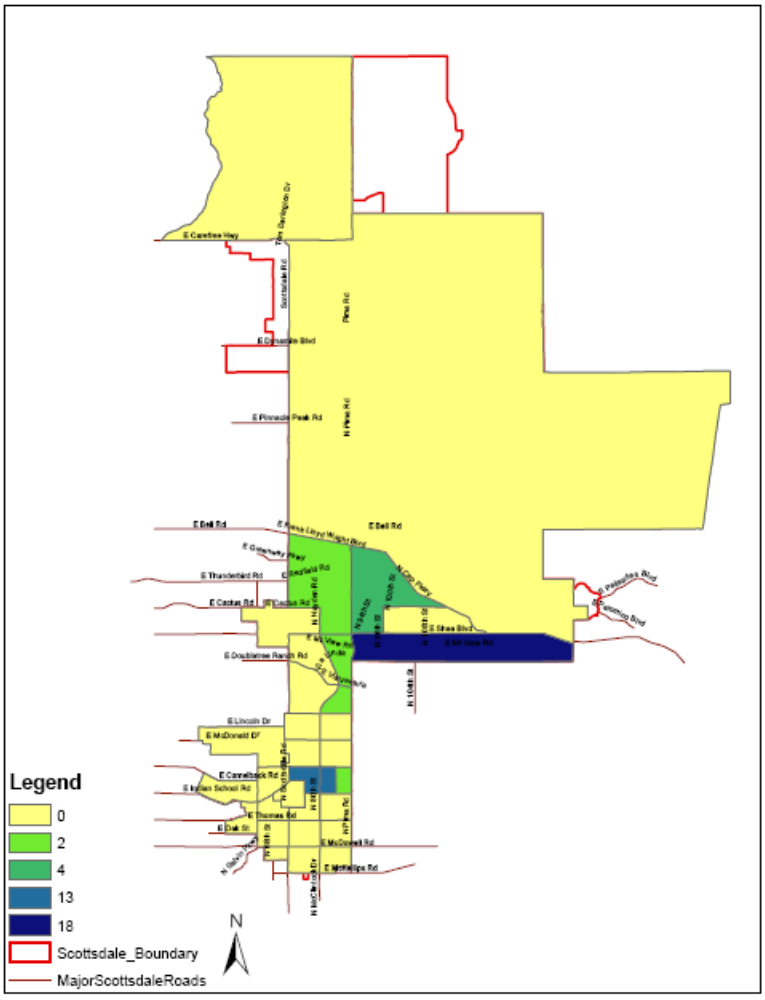
Soccer Fields per Tract Scottsdale1990



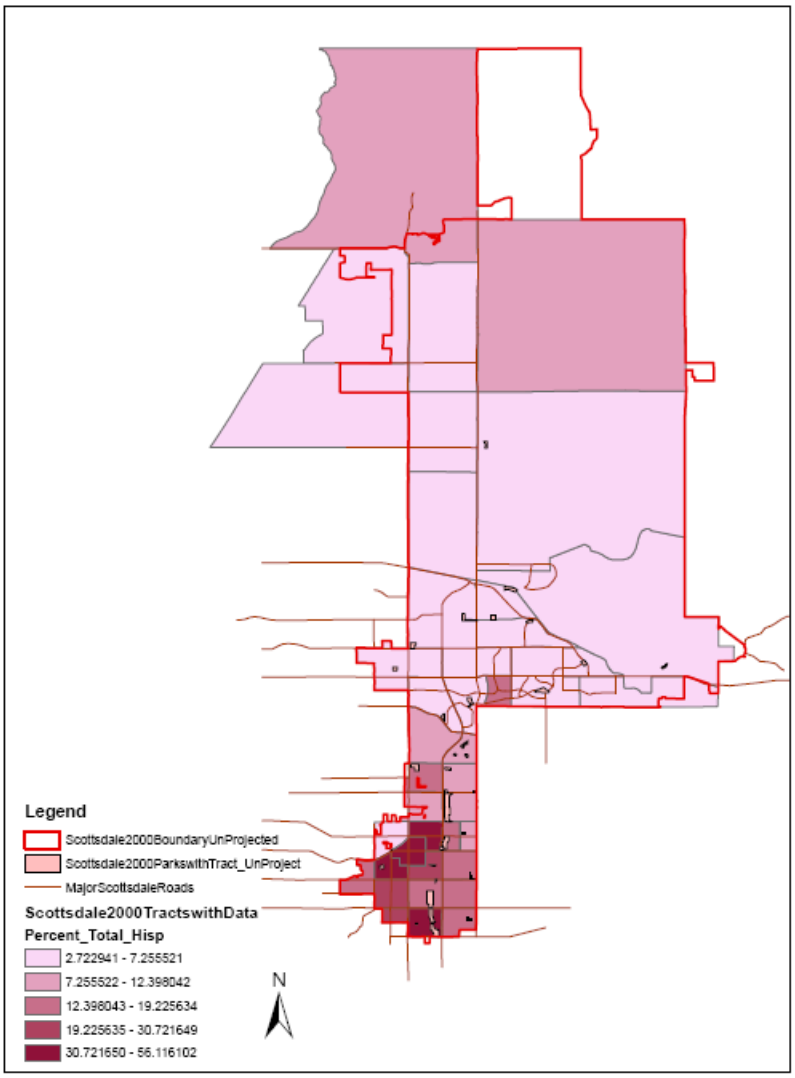
Splash Parks per Tract Scottsdale1990



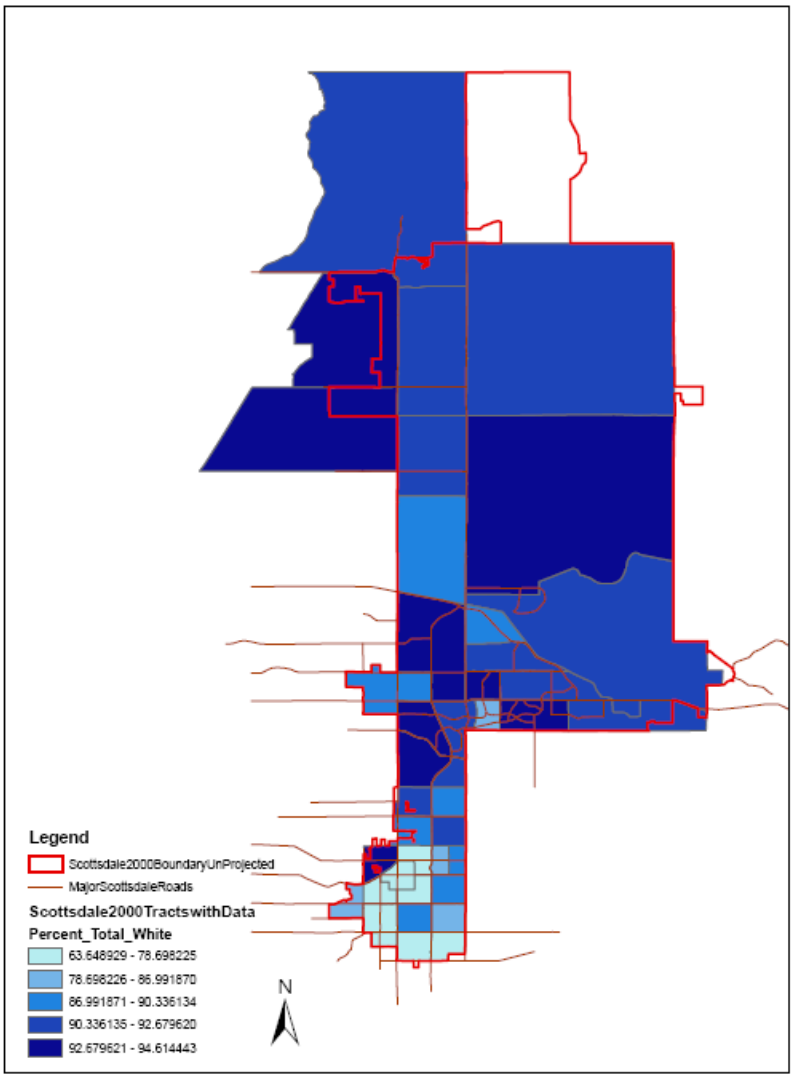
Tennis Courts per Tract Scottsdale1990



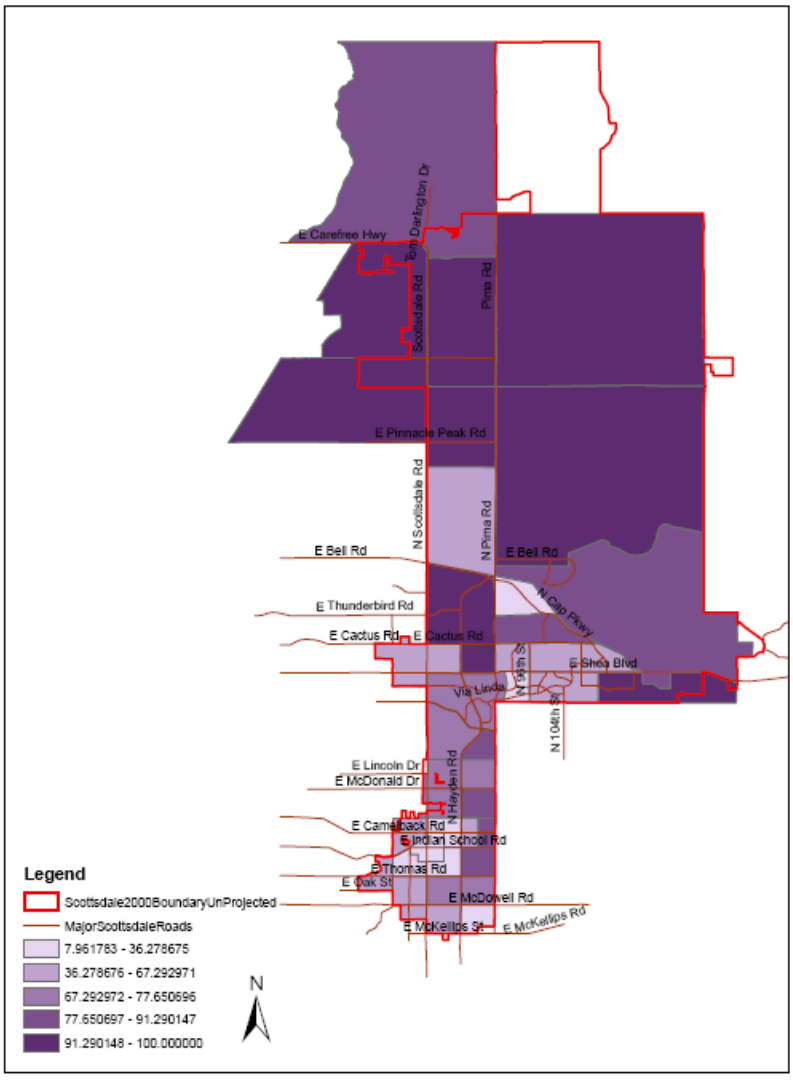
Percent Hispanic Child Population Scottsdale 2000



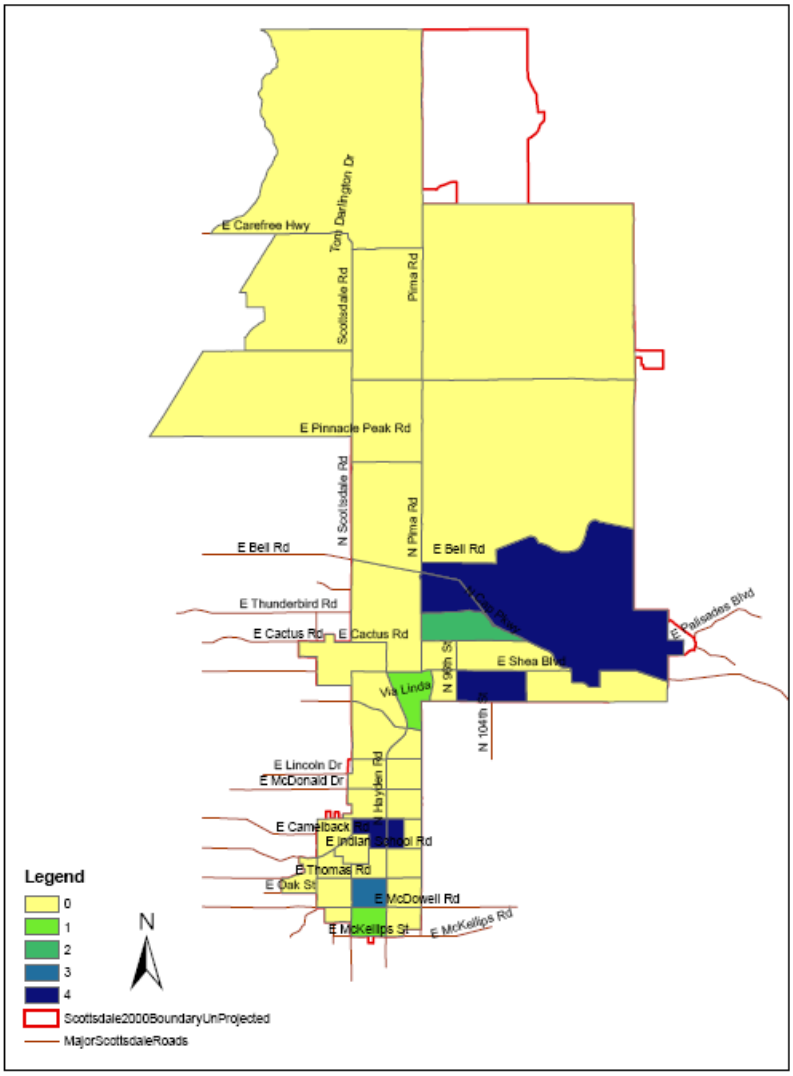
Percent White Child Population Scottsdale 2000



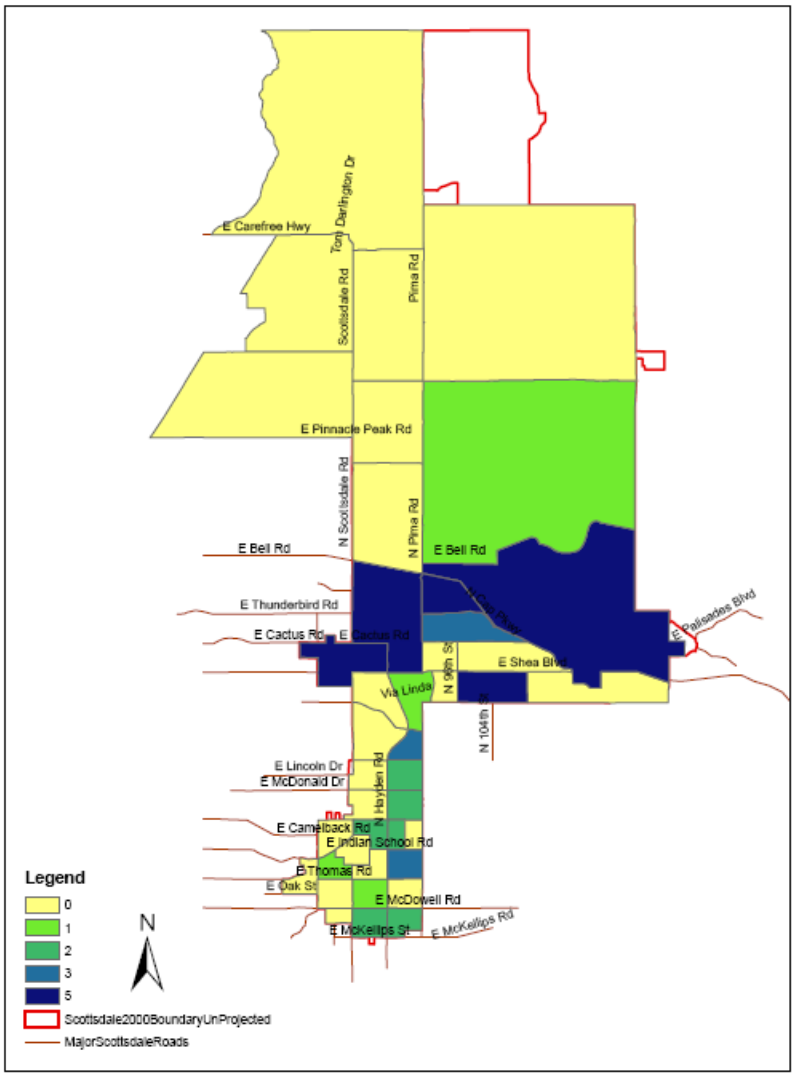
Percent Single Family Housing Scottsdale 2000



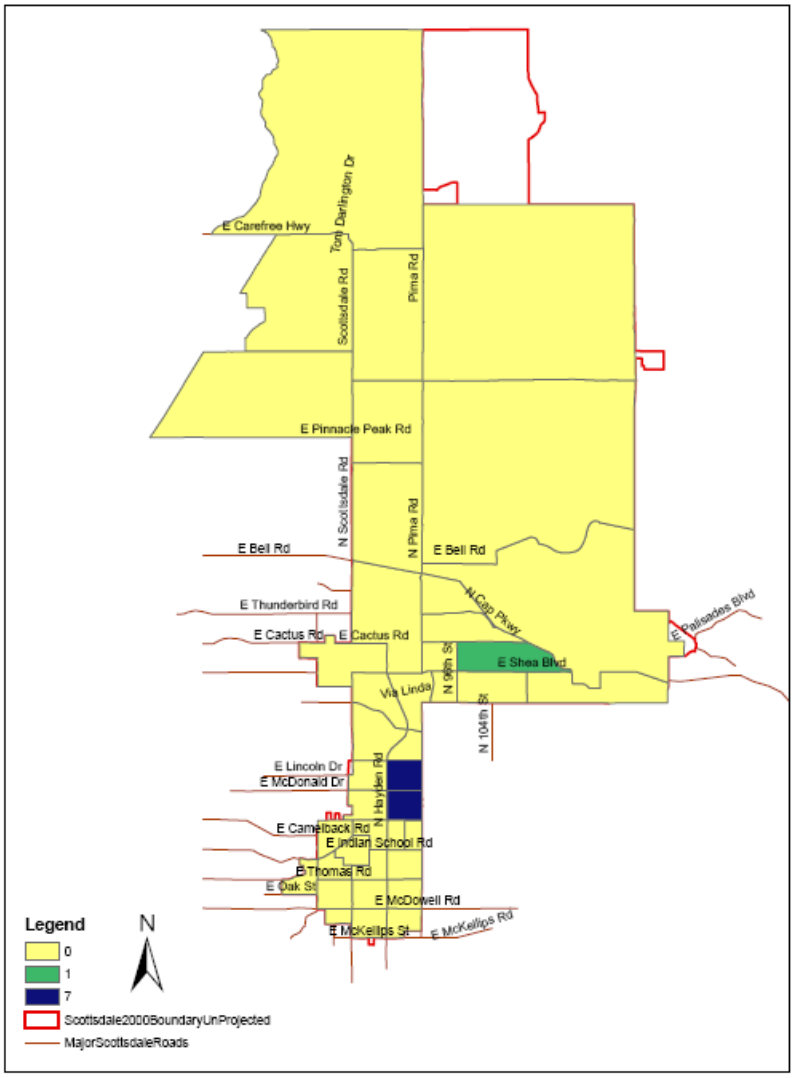
Baseball & Softball Fields per Tract 2000



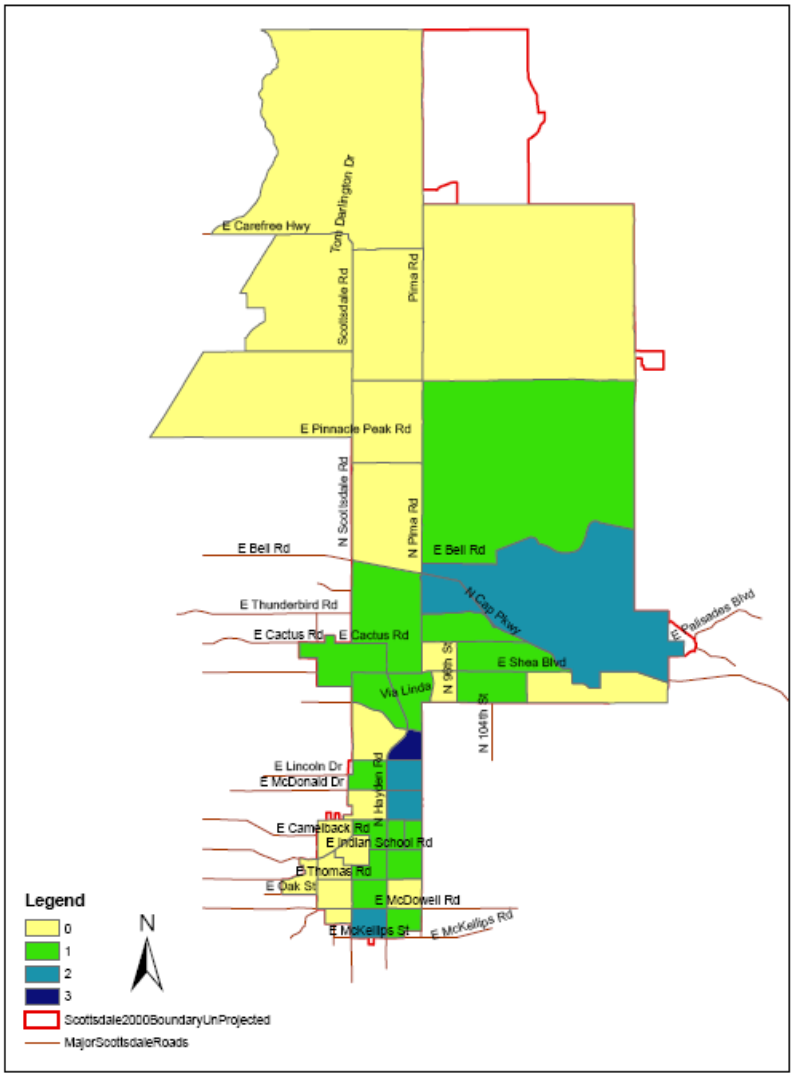
Basketball Courts per Tract 2000



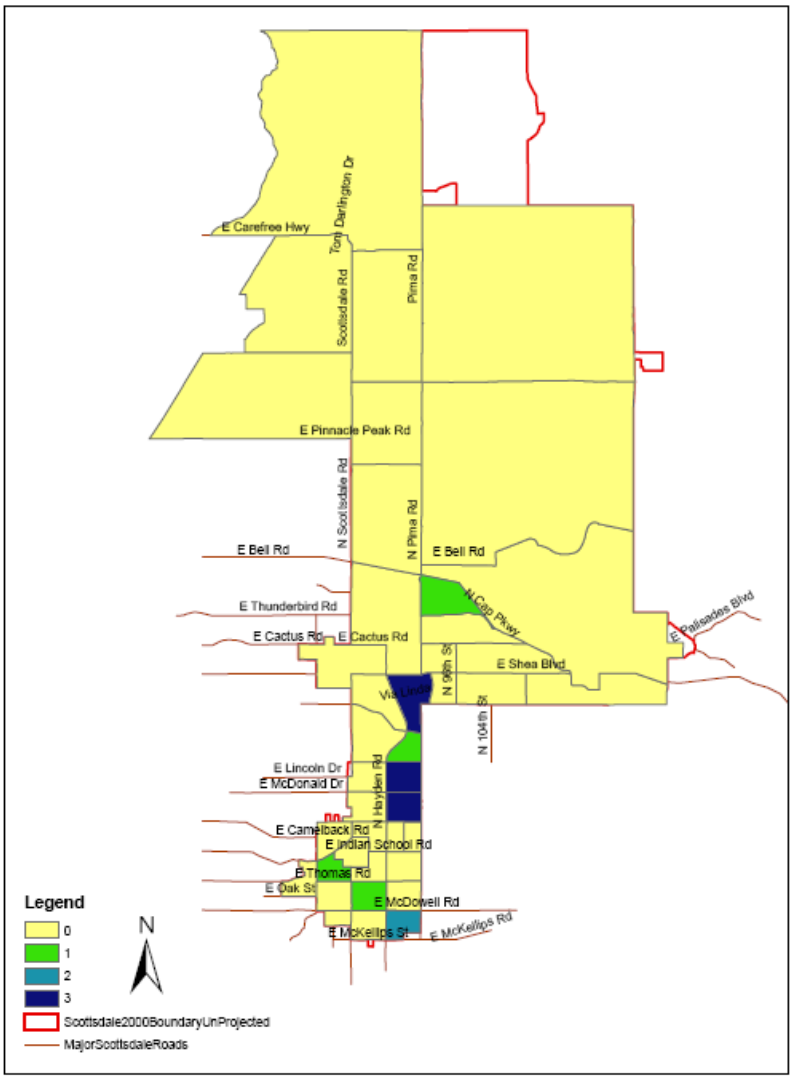
Multi Purpose Fields per Tract 2000



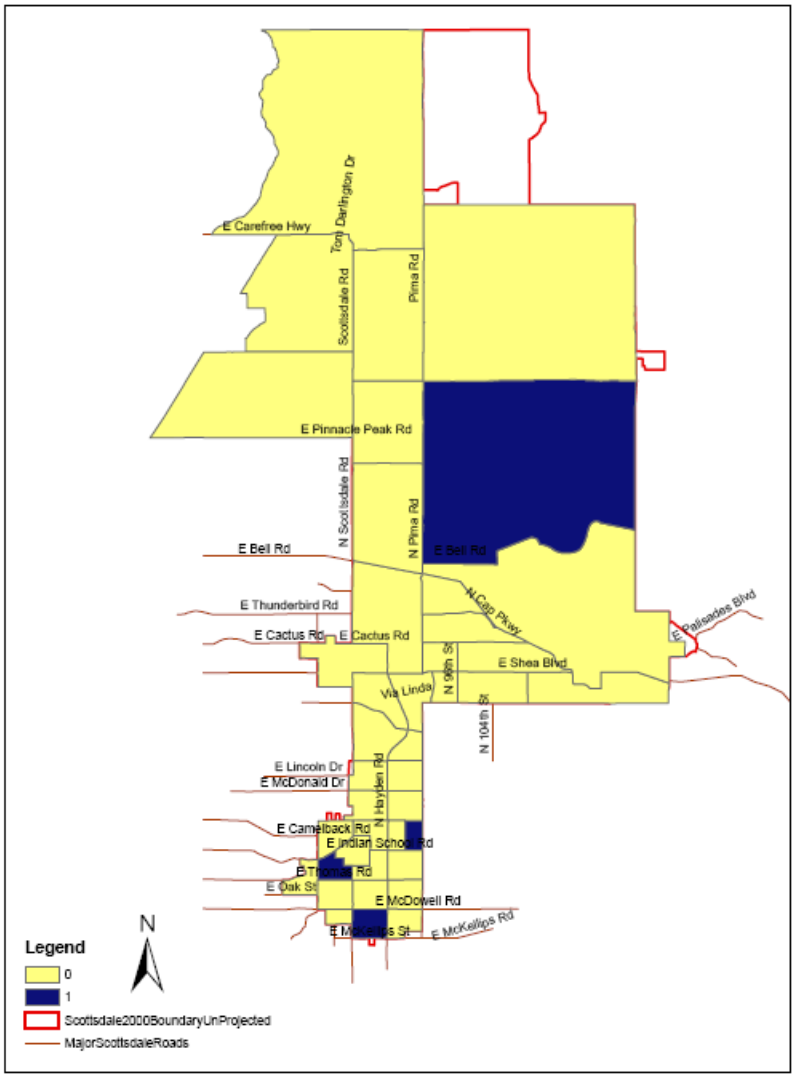
Playgrounds per Tract 2000



Soccer Fields per Tract 2000



Splash Parks per Tract 2000



Tennis Courts per Tract 2000