Child-Friendly Cities and Neighborhoods:

An Evaluation Framework for Planners

by

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A Thesis Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Urban and Environmental Planning

Approved May 2011 by the
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ARIZONA STATE UNIVERSITY

December 2011

ABSTRACT

The increasing isolation and segregation of children in American cities and suburbs is of special significance. This has meant a loss of freedom for children to explore their neighborhood and city as they get older, their exclusion from varied contacts with diverse adults in a variety of settings, and their consequent inability to learn from personal experience and observation, so essential to social and emotional development. The purpose of this study is to measure the differences in child-friendliness between neighborhoods with different income levels by developing an indicator framework that can be used by planning departments and other local authorities based on available data. The research also focus on what other factor (besides income) influences child-friendliness in a city at the neighborhood level. If a relationship does exist, how big is the difference in terms of child-friendliness between low-income and high-income neighborhoods, and what indicators play the most important role in creating the difference? Neighborhoods in the city of Glendale, Arizona serve as case studies to aid in refining the assessment method, and show the potential for how cities can become more child-friendly. The neighborhoods were selected based on income, same size and different location.

DEDICATION

This thesis is dedicated to those who have children
and care about their future.

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INTRODUCTION

In the twentieth century, during the agricultural and industrial revolutions, there was fast growth of population and high birth rates everywhere around the world. The number of children increased dramatically worldwide. However, there are regional differences in birthrates, for example, on average Europeans opt to have one or two children at most, Asians have between two and three, and sub-Saharan Africans have more than five children (UNICEF, 2002).

At the same time, population growth has caused another global trend – urbanization. Urbanization is an ongoing process that affects increasing numbers of people as cities grow around the world. During the twentieth century, the world's urban population grew more than tenfold, and the average size of the 100 largest cities increased more than eightfold. The proportion of people living in urban areas grew from less than 15 percent in 1900 to an estimated 48 percent by 2002 (UN, 2008). As a result, in 2002, close to half the world's children—about one billion—lived in urban areas (UNICEF, 2002). They live in sprawling mega-cities and in provincial towns; they live in cities that have existed for centuries and cities that were created a few years ago.

It is known that there are important links between the survival, protection, development and participation of children, and the state of the areas in which they live. Urban areas can offer children more opportunities than rural areas, and children who grow up in urban areas are generally considered better off in terms of health, housing, education, and access to a wider range of cultural resources and amenities. Cities can offer these advantages, but is the modern city a perfect environment for children? Or have planners and developers forgotten about this

population, focusing instead only on profitable issues? Can we make cities more nurturing for future generations?

Urban design and planning decisions are based on the premise that cities exist primarily for economic purposes. The destruction of the continuous urban fabric through architectural ideologies and planning policies has led to the creation of fragmented and chaotic cities. There are architects who claim that their work mirrors the chaos of modern life, and some even celebrate this fact (Lennard & Lennard, 2000). Most city centers have been depleted of diverse activities except for commercial and administrative functions. These areas, often busy only from nine to five, become unsafe wastelands at dusk, unsuitable for the presence of most people. In creating the modern city, children were not on the minds of architects, planners, and most city leaders (Lennard & Lennard, 2000). Children, however, need a coherent and decipherable physical urban environment.

The United States of America is the third most populous country in the world; the 2010 U.S. Census reported 308,745,538 residents (US Census Bureau, 2010). It is a very urbanized population, with 82% residing in cities and suburbs as of 2008 (Central Intelligence Agency of the US, 2010). People under 20 years of age made up over a quarter of the U.S. population (27.3%)(US Census Bureau, 2009). The Census Bureau projects a U.S. population of 439 million in 2050, which is a 46% increase from 2007 (301.3 million)(UN, 2007). Therefore, the United States will be one of the countries with the highest population of children.

Currently, the increasing isolation and segregation of children in American cities and suburbs is of special significance. This has meant a loss of freedom for children to explore their neighborhood and city, as they get older, their exclusion from varied contacts with diverse adults in a variety of settings, and their

consequent inability to learn from personal experience and observation, so essential to social and emotional development. Instead, children have been inducted into an alternate "life on the screen", initially with television, and now increasingly to life on the computer and with electronic games (Hofferth & Sandberg, 2001; Lennard & Lennard, 2000).

In the twentieth century, during active urban development and urbanization, there was more attention to the special needs of children in urban areas. As of today, UNICEF's Child-Friendly City Initiative (UNICEF, 2010b) is the most widely known program, and supports local governments in creating more child-friendly environments in cities around the world. The Child-Friendly City Initiative of UNICEF is committed to the fullest implementation of the Convention on the Rights of the Child at the level where it has the greatest direct impact on children's lives. The Convention, in turn, deals with the child-specific needs and rights. The Child-Friendly City Initiative requires that governments act in the best interests of children. At the same time, it is a strategy for promoting the highest quality of life for all citizens.

The practical outcomes from the initiative were a package of assessment and monitoring tools, as well as an associated set of children's rights indicators (UNICEF, 2004b) that can be modified for use in any community by the full range of actors, from the general public, including children, to government agency officials. This document is based on children's rights and how local government perceives them. However, the list of child-friendly city features, such as basic services for children; protection from exploitation and violence; walkability; presence of green spaces for plants and animals; and unpolluted environment, should be addressed at the level of city planning and development.

As a result, there is a lack of practical tools that can be used by planners around the world to make the physical environment of cities more child-friendly (Woolcock & Steele, 2008). A child-friendly city initiative needs to be fundamentally "a practical not theoretical process"(Newell, 2003). As was mentioned at Outcomes and Directions Statement of Australia's conference on Child-Friendly Cities in Sydney in 2006, "assessing and improving practices can only be sharpened when there is greater clarity on objectives and measures" (Head & Gleeson, 2006). One way of achieving this clarity is by using an indicator framework. Indicators are a "set of rules for gathering and organizing data so they can be assigned meaning" (Innes, 1990).

Metropolitan neighborhoods in the United States have become increasingly segregated by income over the past thirty years. About two-thirds of American metropolitan areas witnessed increasing segregation of the rich from the poor over the last three decades. Over 85 percent of the metropolitan population lives in an area that was more segregated by income in 2000 than in 1970. The relationship between segregation growth and population growth is U-shaped, with both rapidly growing and stagnating metropolitan areas experiencing rising income segregation. Income sorting affects the distribution of role models, peers, and social networks (Watson, 2005). Sociologists such as Wilson (Wilson, 1987) hypothesize that the lack of neighborhood exposure to mainstream middle-class role models and social networks is a major contributor to social problems.

The purpose of this study is to measure the differences in child-friendliness between neighborhoods with different income levels by developing an indicator framework that can be used by planning departments and other local authorities based on available data. Neighborhoods in the city of Glendale,

Arizona serve as case studies to aid in refining the assessment method, and show the potential for how cities can become more child-friendly.

Research Question

Is there a relationship between income level and child-friendliness in a city at neighborhood level? Are low-income or high-income neighborhoods more child-friendly?

Null Hypothesis: There is no relationship between income level and child-friendliness in a city at the neighborhood level.

Alternate Hypothesis: There is a relationship between income level and child-friendliness in a city at the neighborhood level.

If the null hypothesis is true, then what other factor (besides income) influences child-friendliness in a city at the neighborhood level? If a relationship does exist, how big is the difference in terms of child-friendliness between low-income and high-income neighborhoods, and what indicators play the most important role in creating the difference?

Method and Unit of Analysis

The six dimensions proposed by Children's Environments Research Group from the City University of New York and UNICEF (Giusti, Hart, & Wridt, 2010) were the basis for the framework of 23 indicators:

- Home Environment

- Health and Social Services

- Educational Resources

- Safety and Protection

- Work, Play and Recreation

• Community Life

To test the tool developed in this research, an evaluation framework was implemented in Glendale, Arizona a city in the Phoenix Metropolitan Area, using four case study neighborhoods. The neighborhoods were selected based on income, size similarity and different location.

Organization

This research is divided into five major chapters. The first chapter explains the background and purpose of the study, including the research question and hypothesis. Then, chapter two provides a background of children's problems in urban areas; a history of research about children in cities; an explanation of the concept of child-friendly cities, the peculiarities of children's perceptions of the urban environment, and trends of child-friendly urban development in modern American cities; and finally, a review of existing evaluation methods for child-friendly cities. Chapter three provides a description of the study area and the evaluation framework, as well as methods adopted to measure the concepts described in the previous chapters. Then, the results of the case studies are reviewed, analyzed, and discussed in the fourth chapter. The thesis concludes with recommendations for improving child-friendliness within the study area.

Chapter 2

CHILD-FRIENDLY CITIES OVERVIEW

Children's problems in Cities

Urban areas can offer children more opportunities than rural areas, and children who grow up in urban areas are generally considered better off in terms of health, housing, education, and access to a wider range of cultural resources and amenities (UNICEF, 2004c). Modern children in developed and developing countries probably face fewer problems in urban areas than previous generations: the advent of antibiotics and an improved understanding of the causes of disease have improved public health conditions, and education has become more universal. However, urban areas present very specific challenges and these challenges, in turn, have significant and often disproportionate impacts on children and youth, undermining their rights and their well being. Therefore, in both developed and developing countries, children still face lots of problems in urban areas that need to be solved. Nevertheless, when we talk about developing or developed countries we need to understand that within these groups there are varying conditions that cause differences between children's issues.

However, developed countries usually do not face the same problems as developing countries. People have appropriate housing with running water and sanitation. National and local authorities try to control the level of air pollution in cities and prevent spreading of hazardous chemicals from industrial or domestic waste. Streets usually do not have instant dangers to life.

In the twentieth century, developed countries were oriented to industrial development. The main idea was to achieve a high level of industrial production and create good infrastructure for transporting products. Highway construction

and limited open spaces in cities became popular as part of the modern approach to planning (Talen, 2005); urban planners did not consider human factors, and especially children, in the planning process.

Opportunities for play are restricted in high-income countries, where spaces for recreation in urban areas are often limited or, increasingly, involve a financial cost. At the same time, motor vehicles make streets hazardous for play and open areas are used for parking. That is why in countries where infectious and parasitic diseases are well-controlled, unintentional injury ranks as the leading cause of death for children, accounting for almost 40 per cent of deaths in the one to 14 age group (UNICEF, 2001).

The homogeneity and monotony of most North American suburbs is matched by the miles of high rise slabs surrounding many European and North American cities. Suburbanization in developed countries creates some problems for children as well. The distance between home and school and the growing use of the car mean that, outside school hours, many children are isolated in their homes and separated from their peers. Children cannot be independent; they do not have an opportunity to learn about their surroundings while walking to school, socializing with friends, and so on. Also, this isolation may be heightened by parents' concern for the safety of their children in urban areas. Social segregation among children from different neighborhoods is another result of these conditions. Children do not have equal opportunities and it causes even more problems in the future.

The presence of children so characteristic of traditional cities has considerably diminished. In the center of most cities, children are not visible. One can spend a great deal of time, not only in modern American cities, but also in

some historic European cities, without encountering children. They have no place, nor are they welcome in the world of commerce. The segregation of children in the city's periphery and suburbs is often justified by the contact with "nature" that such locations offer. Even this is frequently illusory as green areas are asphalted for development (Lennard & Lennard, 2000).

Now in developed countries there are poor neighborhoods that have the same features as neighborhoods in developing countries. For example, in Washington DC in 1997, infant mortality rates, broken down by ward, show considerable variation – from a rate of 2.8 per thousand in a high income area to a rate of 16 per thousand in one of the poorer wards, that it is similar to developing countries (District of Columbia Department of Health, 1997). That's why we can assume that poor neighborhoods need to have the same attention as neighborhoods in developing countries.

In many North American cities it is difficult for children to get around by themselves. Children's need for autonomy and mobility were sacrificed to accommodate the car (Lennard & Lennard, 2000). Traffic planners believed that to move working adults efficiently required wide traffic arteries, impassable and dangerous for children. Children's autonomy, mobility and access to their city's resources have thus been increasingly diminished.

Children's obesity is another problem. For example, in the United States, 16 per cent of children are obese and a further 15 per cent are likely to become obese (Hedley et al., 2004; Neumark-Sztainer, 2005). However, not only car causes this problem. Children do not eat proper food anymore: schools and colleges are full of fast-food restaurants. Moreover, motion activity is restricted

not only because of cars domination but also because children do not have places to organize their activity; instead they spend time in front of television.

However, some countries, mostly European countries, are really concerning about the children's problems in urban areas and now there are a lot of studies and projects that are supposed to improve living conditions for children in cities.

Preconditions for Idea of Child-friendly Cities

Systems of planning, including spatial development, reflect the current styles and regimes of governance. Urban planning in Western countries has adopted the basic model of representative planning by experts and a few selected key groups. During the Industrial Revolution, many social considerations were ignored in urban development. Developers were focused on economic benefits and growth, rather than the needs of individuals(Lennard & Lennard, 2000). Consequently, there has been little room for underrepresented actors, such as young people or women (Horelli, 1997). Even today, we can see the same trends in urban development in some countries. However, there are lots of studies concerning children's living conditions in cities; the emphases of these studies have varied in recent decades.

Pre-1970s: Early Studies of Children in the Urban Environment.

During this time period, scholarly research was primarily discipline-focused, and it concentrated on the children's physical and mental health, development, and interaction with their surrounding environment. Interest in children emerged in the 19th century, and focused on housing conditions, poverty and children's labor. Christian advocates recognized that children needed to be

sufficiently schooled to ensure the inculcation of moral rectitude (Sipe, Buchanan, & Dodson, 2006). However, beyond the moralistic concerns with children's welfare, and the anxieties about the future outcomes for a society in which deficient children became deficient adults, there were few serious attempts to understand the condition of urban children. The comprehension of children as complex and socially-vulnerable citizens within broader society was not well-developed at this time.

Only in the early twentieth century have systematic and socially-theorized attempts to comprehend the experience and condition of children began to emerge. One of the first attempts to systematically investigate and present material on urban children's welfare was Bremner's work, which was presented at a 1911 exhibition in Chicago (Bremner, 1979). Parks and playground development were other displays at the Chicago exhibition. This concern with planning for children was partly a reflection of the social position of women, who took up the role of child advocates to engage with urban and environmental policy, claiming they had 'natural' expertise (Gatley, 2005). Concern with the psychological and social dimensions of children's play had begun to grow, including the significant role of children's interaction with the urban environment. This concern formed a critical part of Perry's Neighborhood Unit in the 1920's, and was also incorporated into designs of the late 1930's (Frank, Engelke, & Schmid, 2003).

Just as today there is growing attention to child obesity, some research in the 1930's was concerned with underweight children and generally bad health conditions (McNeill, 1931). In addition, sociological studies of urban children became methodologically more complex during the 1930's and 1940's. Children's

behavior relative to socio-economic conditions was studied by Bernard (1939), Macdonald, Carson and Havighurs (1949).

In the early 1960's the National Institute of Child Health and Human Development in the United States (NICHHD) was established within the National Institutes of Health. It was set-up to investigate social and behavioral development of children, including learning and biological processes; the project leaders quickly realized that architects, engineers and environmental planners were needed as collaborators (Aldrich, 1979); it was first time when researches from different field were involved in study of children.

The first studies to understand how children interacted with the urban environment emerged in the mid 1960's in the United Kingdom. This government-funded research focused on children's play, incorporating playgrounds, roads and neighborhood conditions within housing estates (Marcus & Moore, 1976). *Planning for Play* by Lady Allen of Hurtwood in the late 1960's describes types of children's activities, where they preferred to do them, and the design implications of their activities (Hurtwood, 1968).

In general, prior to 1930, the focus of much research was on children's playgrounds and creating nurturing urban environments through the provision of parks, playgrounds and other facilities. Playgrounds were seen to provide a necessary space for children to develop physically, emotionally and socially with other children. Sociological interest in children within the urban environment developed in the mid 1930s, with several publications dealing with issues of acquiring skills and knowledge and whether these processes varied by socio-economic status. Research examining the relationship between urban children and their environment, including effects on mental development, independence

and interactions and perceptions of surrounding environments, did not begin to develop until the 1960s

1970s to the 1990s: Multidisciplinary Approaches.

In 1968 a United Nations Educational, Scientific and Cultural Organization (UNESCO) was established. Soon after, UNESCO began a ten-year program that aimed to increase the understanding of people-centered solutions to environmental problems (Chawla, 2002). Kevin Lynch, an urban designer and advocacy planner, was assigned to lead this interdisciplinary approach, involving social researchers, natural scientists, architects, planners and other urban environmental practitioners. The aim of the project was to look at "the way small groups of young adolescents use and value their spatial environment" (Lynch, 1977). The project was eventually named *Growing Up In Cities.* Lynch was interested in children's use of space, including local streets, courtyards and staircases where children would meet and play informal games. Other areas of his interest were children's "time budgets," the amount of time children had to freely organize their own activities, and barriers to movement through the city, such as personal fear, dangerous traffic, a lack of spatial knowledge, the cost of public transport and parental controls. Part of the research involved asking children to draw maps of their neighborhoods, which were found to differ depending on the child's environment. This research program proved to be an important contribution to scholarly understandings of the condition of children within urban areas. Lynch inspired other researchers to undertake comparable studies, including Moore and Young, who studied children's home territories, place affiliation and pathways that were used to travel around the neighborhood (Moore & Young, 1978), and Ward, who explored children's relationship with their urban

environment and promoted children's participation in urban planning (Ward, 1978).

In the 1980's more attention was given to children in the physical urban environment, and the mental and social effects of the environment on children's development. Berg and Medrich focused on concerns such as how land uses influenced children's play patterns, the impact of the physical environment on access to playground and children's social interaction (Berg & Medrich, 1980); Monchaux claimed that children's needs in urban areas have historically been assumed rather than proved, and that decision makers need to have a greater understanding of the factors that are important in children's engagement with the environment (Monchaux, 1981). Homel and Burns looked at environmental differences between inner-city and suburban children, and attempted to understand how children perceived the quality of their surrounding environment (Homel & Burns, 1989). The main change in the 1980s was the attempt to incorporate children's ideas and perspectives into policy documents.

Accessibility issues for children had been raised in the 1970s and 1980s; these became increasingly important in the early 1990s. Children and youth in cities had progressively been cut off from safely using and enjoying their neighborhoods since the 1970s (Cahill, 1990; Gaster, 1991). Gaster identified increasing crime, automobile traffic and the deterioration or destruction of parks, playgrounds and schoolyards as factors contributing to this change.

The 1990s and After: the Latest Studies.

The 1990s provides evidence of the growing emphasis by several disciplines on children's health. There has been an overflow of research on children's health, particularly physical health. During of the car boom, the urban

planning and transportation literature has investigated the relationship between the built environment and transportation mode choice, including walking and bicycling (Cervero & Duncan, 2003). Research in medical and public health journals advocates increased walking and bicycling as good forms of physical activity to improve public health (Dora, 1999). For the first time public health practitioners have also begun working with researchers in urban planning and related fields (Frank, Engelke, & Schmid, 2004).

Many researchers on children's health and the built environment have placed the blame for declining children's health on urban sprawl (Burchell & Mukherji, 2003; Frumkin, 2002). Also many studies have sought to identify the cause of increasing rates of childhood obesity in Western countries. While much of the research has examined the relationship between the built environment and health, several other interrelated factors have also been studied. Cummins and Jackson (Cummins & Jackson, 2001) argued that the causes of the current obesity epidemic are complex, with inadequate physical activity being a crucial factor.

The idea of children's participation in planning process became more popular. Driskell (2002) has argued that young people should be included in community development processes, because children are intimately familiar with the local environment, and are usually the most knowledgeable on how the local environment and development decisions will impact on their own lives and that of their community. Children's participation in community development can be beneficial for both children - as they learn new skills - and adults - as they develop a better understanding of children's perspectives of the local environment.

At the same time, the United Nations started to pay more attention to children's problems in cities. That is why United Nations on Conference of Human

Settlements (Habitat II) in Istanbul, Turkey in 1996 provided powerful motivation

to attend to children's problems in urban areas, expressed in the Istanbul

Declaration on Human Settlements and the Habitat Agenda:

> As human beings are at the centre of our concern for sustainable
> development, they are the basis for our actions as in implementing the
> Habitat Agenda. We recognize the particular needs of women, children and
> youth for safe, healthy and secure living conditions. (UNCHS, 1996)

The concept of child friendliness is grounded in the United Nations

Convention on the Rights of the Child, a Convention that mandates active

participation of children in civic life and promotes local systems of good

governance committed to children's rights (UNICEF, 2004b). The term 'child-

friendly cities' was coined as part of a UNICEF document entitled Children's

Rights and Habitat (UNCHS) which stated that:

> The needs of children and youth, particularly with regards to their living
> environment have to be taken fully into account. Special attention needs to
> be paid to the participatory processes dealing with the shaping of cities,
> towns and neighborhoods; this is in order to secure the living conditions of
> children and of youth and to make use of their insight, creativity and
> thoughts on the environment. (UNCHS, 1996)

Therefore, Child friendliness as a concept has been spreading over the last

decade at the global, national, regional, community and neighborhood levels. It is

the central theme in the child friendliness movement which views the wellbeing of

children as the ultimate indicator of a healthy sustainable community (UNICEF,

1992, 1997). The child friendliness movement is a response to growing concerns

about "the health and wellbeing of young people in Western countries in the face

of increasing urbanization" (Gleeson & Sipe, 2006).

What is a Child-Friendly City?

A conceptual paper was written for the International Child-Friendly Cities

Secretariat by Peter Newell in 2003, in preparation for the European cities

workshop held at the Innocenti Research Centre. The paper states that building a

child-friendly city is:

> the process of implementing the Convention on the Rights of the Child led
> by local government in an urban context. The aim is to improve the lives of
> children now by recognizing and realizing their rights - and hence
> transform for the better urban societies today and for the future. Building
> child-friendly cities is a practical, not theoretical, process which must
> engage actively with children and their real lives. (Newell, 2003)

As of today, UNICEF's Child-Friendly City Initiative(UNICEF, 2010b) is

the most widely known program of this type, and supports local governments in

creating more child-friendly environments in cities around the world. According

to UNICEF (UNICEF), in a child-friendly city, good governance entails giving

visibility to the child in the city development agenda and granting children an

opportunity to participate in the decision-making process (UNICEF, 2004c). A

child-friendly city requires basic elements to ensure that it is able to fulfill the

following principles:

- Good access for all children to affordable, quality basic health services,
  clean water, adequate sanitation and solid waste removal;
- Local authorities to ensure that policies, resources allocations and
  governance actions are made in a manner that is in the best interests of
  the children and their constituencies;
- Safe environments and conditions that nurture the development of
  children of all ages with opportunities for recreation, learning, social
  interaction, psychological development and cultural expression;
- A sustainable future under equitable social and economic conditions, and
  protection from the effects of environmental hazards and natural
  disasters;
- Children have the right to participate in making decisions that affect
  their lives and are offered opportunities to express their opinions;

- Special attention is given to disadvantaged children, such as those who are living or working on the streets, sexually exploited, living with disabilities or without adequate family support;
- Non-discrimination based on gender, ethnic background or social or economic status. (UNICEF, 2004c)

From the perspective of the Convention on the Rights of the Child, a child-friendly city pursues its obligation to realize the whole range of human rights for all of its children (Riggio, 2002). UNICEF's Child-Friendly City Initiative is committed to the fullest implementation of the Convention on the Rights of the Child at the level where it has the greatest direct impact on children's lives. The Convention, in turn, deals with child-specific needs and rights. The Child-Friendly City Initiative requires that governments act in the best interests of the child. At the same time, it is a strategy for promoting the highest quality of life for all citizens as children are the most vulnerable population. A Child-Friendly City guarantees the right of every young citizen to:

- Influence decisions about their city;
- Express their opinion on the city they want;
- Participate in family, community and social life;
- Receive basic services such as health care, education and shelter;
- Drink safe water and have access to proper sanitation;
- Be protected from exploitation, violence and abuse;
- Walk safely in the streets on their own;
- Meet friends and play;
- Have green spaces for plants and animals;
- Live in an unpolluted environment;
- Participate in cultural and social events;
- Be an equal citizen of their city with access to every service, regardless of ethnic origin, religion, income, gender or disability. (UNICEF, 2004b)

There is no single definition of what a child-friendly city is or ought to be. In fact the documents go to great length to say that cities can never achieve child-friendly status because they will always be transforming and responding to the changing local and global context (Sipe, et al., 2006). In some cities, especially in

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developed nations, emphasis tends to be on environmental and physical issues such as improving recreation spaces and green spaces and controlling traffic to make streets safe for young citizens. In low-income nations, the focus is frequently on increasing access to basic services, such as clean water, shelter, and food. There are no standard models of what a child-friendly city looks like, and while the emphasis around child friendliness differs between institutions, the common denominator is to make cities, communities and neighborhoods better places for children and youth.

What is a Child-friendly City according to children?

Children's environmental experience is different from that of an adult (Matthews, 1992). Investigations of adults' recollections of childhood places have shown that childhood experiences appear to be much more about texture and variety than specific functions, the tactile rather than the visual. People seem to recall most fervently the "forms, colors, and motions, the sights and sounds of the external world of nature" (Cobb, 1977; Lukashok & Lynch, 1956; Moore, 1986). Francis (1988) also found a difference in attitude toward the environment between adults and children. Adults ask "What does it look like?" or "Is this a nice, good-looking place?" whereas children ask "What can I do here?" or "Is this a place to have fun?" That is why the presentation of Child-friendly city among children and adults can be totally different.

To define this difference some studies have been conducted regarding children's perception of the urban environment. All studies of children's environmental preferences were divided into two groups: what children like and what they dislike or fear in urban areas. Most studies have focused on the positive aspects of designed or natural environments, looking at places children prefer or

like. In order to get a complete picture of special places for children, it is also important to learn more about the places children dislike or even fear. These types of places are also a realistic part of the children's world. Additionally, a single place can be both liked or feared depending on the circumstances. Understanding both favorite and feared places can also help designers to be more sensitive as they create children's environments.

The first group of research focuses on places that are often used by children, or that children mention in interviews as being attractive. One study in which children were asked to draw their favorite places to go after school and on weekends (Moore, 1986) found that children exhibited a wide variety - 52 different types of places. According to the results, there are several categories of urban places that are attractive for children.

The first category is places that are full of activity, such as streets, sidewalks, or shopping centers, or places that support varied activities, such as hide-and-seek, fantasy play, construction play, or play with manipulable materials like water, snow or sand (Francis, 1982; Gray & Brower, 1977). These places are experienced as attractive because of the possibilities for active use of the place. So, the value of a place, or its special character, is determined by its potential value of affording different activities. Playground areas are one of these places. As can be expected, such environments especially designed for children are experienced as attractive places by a majority of children (Andel, 1990). However, studies of the playground preferences of children reveal that playground environments created by adults often severely limit the children's views, particularly in the way that they remove children from play opportunities in the surrounding, more stimulating

world of adults. As Matthews (1992) concludes, "highly formalized and partitioned environments are unattractive to most children".

The second category of places that have been found to be attractive to children are those where interaction with other children or adults is possible (Muscovitch, 1980; Zerner, 1977). Research shows that the presence of other children is a main factor in a child's decision as to whether a certain place is nice, boring, or even dangerous (Andel, 1990).Alexander (1967) found that children felt it important for there to be a sufficient number of potential friends in their direct home environment. However, in some cases the presence of other children can be negative if play is disrupted, or if they are bullied by nasty children.

The third category are places with sufficient variety in the environment and there are diverse possibilities for use, such as a differentiated path structure; ambiguous places such as streets and back alleys (Bell & Kennedy, 1972; Coates & Sanoff, 1972); or places with a variety in design(Zerner, 1977).

Places with natural elements, such as grass, trees, gardens, and parks are the fourth category. Studies have found that children exhibited a high preference for natural places, such as parks and open spaces (Alexander, 1967; Berg & Medrich, 1980; Francis, 1988; Hart, 1979). Children expressed desires for more parks to play in, for swimming halls, and more grass. This dimension reflects an interest that schoolchildren have in nature, and in being outdoors to play and be around other children (Nordström, 2010). In addition, research has shown that natural elements, such as grass, trees, gardens, and parks can help restore attention and relieve stress in fatigued children (Tennessen & Cimprich, 1995; Wells & Evans, 2003).

The final category of places shown to be attractive to children are ones that are safe, intimate, enclosed, and hidden (Zerner, 1977), as well as exciting and dangerous places (Hart, 1979; Muscovitch, 1980). Generally, children feel safe at home and in school, but feel unsafe when they are outdoors alone, playing in their neighborhood or traveling to school; however, research shows (Hart, 2010) that children prefer un-planned landscapes, wild green spaces, and hidden areas. Sometimes children find safety and security in these places, which is important to children in both a physical and a social sense.

There are several studies that focus on places that children dislike, however usually children prefer to mention places that they like. Therefore, in Andel's(1990) study, almost half of the "boring places" were streets and, to a lesser extent, squares and playgrounds. The main reasons for this boredom were nearby traffic, hindering of the children's play, or the presence of nasty children. Other, more varied reasons included the presence of litter, mess. Streets were also seen by children as the most dangerous places, mainly because of the amount and speed of car traffic and the risk of being involved in a traffic accident.

From all these studies, it is possible to see some of the ways in which children are influenced by the setting in which they live. Neighborhoods themselves are artifacts of the adult world, largely built around grown-up needs. Children are obliged to find ways of "fitting in," and adapting to the environment that they live in. In many respects, only their energy, imagination, and perseverance make it possible for children to define an acceptable environment in which to play and explore.

Assessment of Child-friendliness in Cities

UNICEF's concept of a Child-Friendly City is not based on an ideal end state or a standard model. It is a framework meant to assist any city in becoming more child-friendly in all aspects of governance, environment and services. This framework document outlines what are termed the "building blocks" for a Child-Friendly City – structures and activities of government which are necessary to engage children's active involvement, ensure that children's rights are protected in all relevant decision-making, and promote equal rights of access to basic services. UNICEF's program allows any city to be awarded a "child-friendly" status. The application process for a city involves evaluating the current situation using existing tools for self-assessment, creating a plan for improvements, and confirming the progress with a final evaluation. This process demands political commitments – which are fundamental – as well as concerted action throughout government. The building process is synonymous with implementation of the Convention on the Rights of the Child in a local governance setting. The nine elements include:

1. Children's participation;
2. A child-friendly legal framework;
3. A city-wide Children's Rights Strategy;
4. A Children's Rights Unit or coordinating mechanism;
5. Child impact assessment and evaluation;
6. A children's budget;
7. A regular State of the City's Children Report;
8. Making children's rights known;
9. Independent advocacy for children. (UNICEF, 2004b)

The building block that this research focuses on is the development of a situation analysis to ensure regular monitoring and assessment of children's conditions, as well as assessment of the city's capacity to respond to children's needs. To become a UNICEF Child-Friendly City, the situation analysis can be

produced at the beginning of the application process to identify gaps and issues to address, or it may be initiated during or at the end of the process for monitoring and assessment purposes.

Indicators developed for the certification and awarding of Child-Friendly City status facilitate the elaboration of a situation analysis by providing a snapshot of children's life in the city or town. Questionnaires and other assessment tools, produced within award guidelines, are also useful in the process of developing a situation analysis. Currently, questionnaires are the most popular approach. Questionnaires and quizzes may be used to:

- develop a situation analysis of children's living conditions and the services available to them in the city/town/community;
- get a snapshot of the situation of children and progress made in a city, town or community at any moment of the "child-friendly process";
- monitor and evaluate performance of a child-friendly city by the city/community itself or by an external committee/jury in the case of a certification system. (UNICEF, 2010a)

Indicator precedents.

One way of achieving clarity in a child-friendliness assessment is through the use of an indicator framework. Indicators are a "set of rules for gathering and organizing data so they can be assigned meaning" (Innes, 1990). Traditionally, indicators have been divided into three quite different types: economic, environmental, and social. Economic indicators have been the most dominant in different studies, and have typically addressed national elements such as employment, production, growth and inflation (Grant, 1999). Environmental indicators refer predominantly to elements that relate to ecosystem processes and functions such as water, energy, and the assessment of environmental impacts (Muller, Hoffman-Kroll, & Wiggering, 2000). Social indicators have emerged more recently to assess social conditions and changes as well as shifts in urban

conditions. Social indicators are often tied to notions of well-being for both individuals and society (Carley, 1981), and these indicators have proven to be more difficult to develop and measure (Innes, 1990).

Indicators vary in nature and type, and there is no universal model of what constitutes a "good" indicator (Coulton, Korbin, & Su, 1996). They evolve from different disciplines that tend to "approach the problems of measurement and tracking from different perspectives"(Hoernig & Seasons, 2004). For example, indicators could be strictly quantitative and based on measurable data sources. In the case of the physical environment and child friendliness, indicators could be developed by studying the size of amenities like parks through land-use records.

However, they can also be qualitative and based on community perceptions of child-friendliness in relation to the physical environment, considering subjective understandings of safety, aesthetics and levels of hygiene and cleanliness. Coulton & Korbin (2007) argue that irrespective of the type of indicator used, they must be calculated or assessed with reasonable accuracy, and the data must be easily available and cost effective. Importantly, they suggest that indicators "have to be practical and should have implications for action – whether it is to drive change or preserve the status quo"(Coulton & Korbin, 2007).

Because of the complexity of addressing the physical environment in relation to child-friendly communities, a comprehensive indicator framework is needed, and one purpose of this research is to address this issue.

Much of the work on indicators of children's well-being that has emerged from the academic literature (and relates most closely to the themes in this study), focus on the neighborhood level. These indicators are most commonly identified as integrated indicators that measure a range of issues, including sustainability,

health, and quality of life. One example can be seen in the work by Save the Children and the Human Sciences Research Council on Core Indicators for Monitoring Child Wellbeing (Ward, Merwe, Dawes, & Bray, 2007). This work provides a series of 14 core indicator sets for monitoring children's wellbeing. It offers a "rights-based approach to child wellbeing indicators that establish what children need to survive; to be healthy and protected; to develop their potential; to be economically secure; and to participate in society"(Ward, et al., 2007). References to the physical environment revolve around access to services necessary to meet children's health, education, recreation, and safety needs.

Similar indicator set on children's wellbeing can be found in the work of Coulton and Korbin (2007) titled "Indicators of Child Wellbeing through a Neighborhood Lens." The authors propose both direct and indirect measures of environmental conditions at the neighborhood level that could be expected to affect wellbeing. Examples of indicators related to the physical environment using administrative data include: housing conditions (e.g. the number of family housing units in poor condition); green space (e.g. the number of square miles in parks); and access to health services (e.g. weighted average travel time from centre of the neighborhood). Indicators based on neighborhood perceptions include: facility availability, usage and quality; neighborhood quality, change and disorder; and neighborhood identity.

In Australia, indicators on children's wellbeing also conform to the integrated model with a particular focus on health and quality of life (Woolcock & Steele, 2008). At the national level, the Australian Institute of Health and Welfare has developed a key indicator framework of children's health, development and wellbeing that seeks to respond to the following questions:

- How healthy are Australia's children?
- How well are we promoting healthy child development?
- What factors can affect children adversely?
- How safe and secure are Australia's children?
- How well are Australia's children learning and developing?
- What kind of families and communities do Australian children live in?

(Woolcock & Steele, 2008)

At the community level, these themes are reflected in the work by the

Australian Early Development Index (AEDI), "Building Better Communities for

Children." AEDI is based on a teacher-completed checklist of children's

development, and the results are intended to provide communities with a basis for

reviewing the services, supports, and environments that influence the lives of

children in their first five years. Yet within both these indicator frameworks,

references to the physical environment are few and relate predominantly to issues

associated with neighborhood safety, play and physical activity, parks, and

community programs.

Another tool was developed by The Children's Environments Research

Group (CERG) following the United Nations Convention on the Rights of the

Child; it addresses children of all ages from birth to age eighteen, and is based on

questionnaires. Standard questionnaires include several parts that characterize

the home environment, health and social services, community life, safety and

protection, educational resources, and access to work, play and recreation(Giusti,

et al., 2010). Each question has multiple-choice answers: not true, sometimes

true, usually true, true, do not know, and not applicable. There are several key

groups within the questionnaire:

- children (8-12 years old) – 50 questions;

- adolescents (13-18 years old) – 56 questions;

- parents (three groups of children 0-7, 8-12 and 13-18 years old) – 47 questions;

- community service providers – 84 questions.

The final results of the assessment are generalized to help to evaluate the city in terms of the six aforementioned dimensions. Then, the city can define its priorities for a development strategy. The CERG assessment has been implemented in many different countries to evaluate the child-friendliness of urban areas. However, there are many different approaches to assess child-friendliness that were created by city municipalities in different countries to achieve child-friendly status, and to develop the proper conditions for children's needs. Usually such assessments are dedicated to social aspects.

Summary

From this review, we see that children's problems have become more important to the development of cities, especially gaining more prominence during the twentieth century. It is obvious that the problems of children in the developing and the developed world are different. For this reason, it is important to see what aspects of child-friendliness have been overlooked in developed countries, and how it is possible to make cities better places for children through urban planning in any country. UNICEF's Initiative gives a general overview of what a child-friendly city is from a global prospective. However, all points that are mentioned as features of a child-friendly city also have the potential to make cities more livable for all citizens.

It is important to find a way to assess child-friendliness in cities in order to prioritize and target improvements. This review recognizes the most important elements of child-friendliness that have been considered in previous research, and that are still relevant today. These elements are included in the assessment developed through this research, and the results lead to possible solutions for how the case study city, Glendale, Arizona, can become more child-friendly.

In general, modern, developed countries tend to think of their cultures as child-oriented and particularly sensitive to the needs of children. But the findings of this research suggest that when it comes to the built environment of inner cities, children's needs are largely unrecognized, unmet, or disregarded. It is not necessarily desirable to plan neighborhoods around the needs of any single group of people, but, because neighborhoods play such an important role in children's daily lives, they demand special attention. As a matter of policy and planning practice, we should be no less responsive to children's needs just because they seen to be able to "make do."

What should concern us is that the constraints of the neighborhood environment can deprive children of a basic right of childhood—the right to experience and explore the world around them safely, spontaneously, and on their own terms.

This review of the literature has also demonstrated that an integrated indicator framework, that takes into consideration children's wellbeing in relation to the physical environment and children friendly communities, is lacking. This type of framework has received little attention within a literature that has instead tended to focus predominantly on children's health and emotional wellbeing. The challenge is to develop a framework that focuses specifically on child-friendly communities and the physical environment, while also acknowledging the holistic, multi-sectoral, and interdisciplinary nature of this endeavor. Such a framework would provide a useful and practical tool for local government and communities.

Chapter 3

STUDY AREA AND METHODOLOGY

Study area demographics

Glendale is a suburban city in Maricopa County, Arizona. It is considered part of the greater Phoenix metropolitan area, and is located about nine miles (14 km) northwest of Downtown Phoenix. It is Arizona's 4th largest city, and during the past decade it has been one of the fastest growing cities in the nation (Figure 1). Maricopa County grew at a rate of 11.11% between 2000 and 2008 (US Census Bureau, 2000a, 2009), and is projected to continue growing in the coming years.
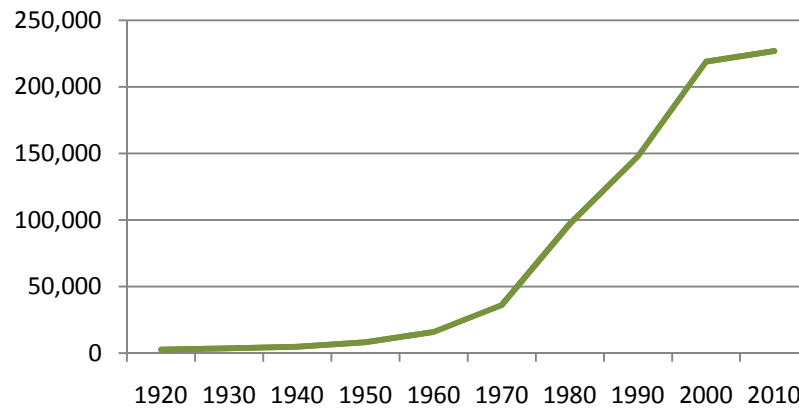
Figure 1. Population growth in Glendale from 1920 to 2010

As of the census 2000, there were 218,812 people, 75,700 households, and 54,352 families residing in the city. The population density was 3.9 thousand people per square mile (1,517.3/km²). There were 79,667 housing units at an average density of 1,430.7/sq mi (552.4/km²)(US Census Bureau, 2000a). In 2010 population was 226,721with 90,505 households (US Census Bureau, 2010).

The social well-being of a place is influenced by the incorporation of diverse people and cultures into daily community life. Over the years, Maricopa

County has not only grown significantly in terms of size, but also in its demographic diversity. The racial composition of Glendale, as of 2010, was 51.5% White, 5.6% Black or African American, 1.2% Native American, 3.8% Asian, 15.57% from other races; and 35.5% of the population were Hispanic or Latino of any race (Figure 2) (US Census Bureau, 2009).

Also in 2000, the median income for a household in Glendale was $45,015, and the median income for a family was $51,162. Males had a median income of $35,901 versus $27,736 for females. The per capita income for the city was $19,124 (US Census Bureau, 2000a).
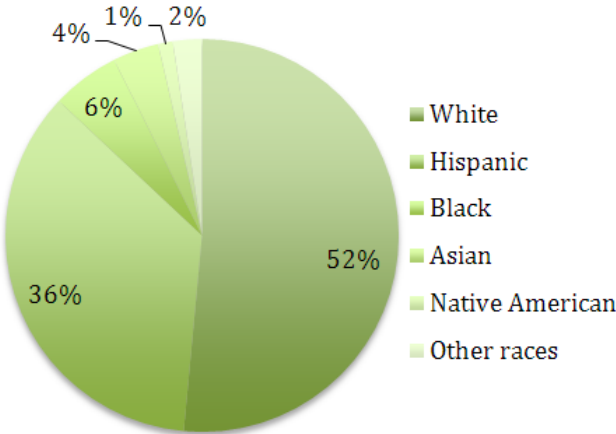
Figure 2. Racial ethnic composition in Glendale, AZ (US Census Bureau, 2009)

Age demographics as of the 2000 census (Figure 3) in Glendale showed 30.1% of the population under the age of 18, 10.8% from 18 to 24, 31.9% from 25 to 44, 19.9% from 45 to 64, and 7.4% who were 65 years of age or older. The median age was 31 years. According to 5-year estimates from the 2005-2009 American Community Survey (5-year ACS), the 29.4 percent of the population were under 18 years of age (Figure 4).
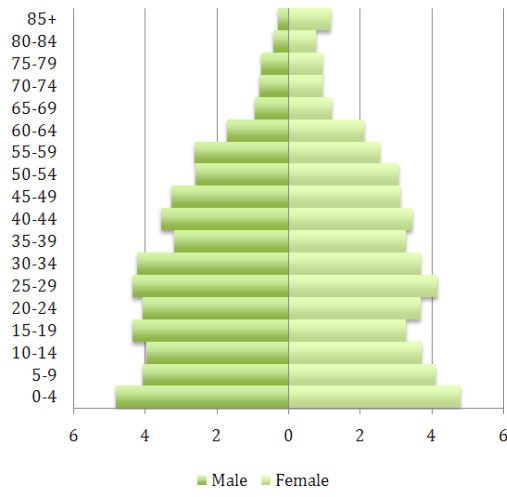
Figure 3. Age structure of Glendale population (US Census Bureau, 2000a)
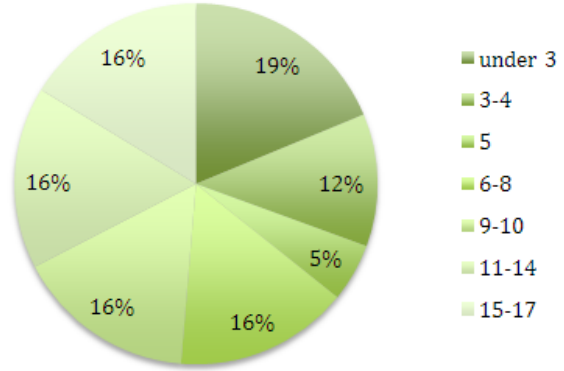
Figure 4. Age structure of children's population of the city (US Census Bureau, 2009)

Children's population spread relatively even (Figure 5). Usually it does not exceed 2000 children per census tract (US Census Bureau, 2009).

For family structures in Glendale, the 5-year ACS estimated a total of about 57000 families, where 39570 (69.6%) were married couples, 5139 (9%) were male householders without a wife, and 12172 (21,4%) were female householders without a husband. Only 29149 (51.4%) families had children, where 19057 (65,4%) of parents were married couples, 2461 (8.4%) were male householders without a wife, and 7631 (26,2%) were female householders

without a husband (Figure 6). Therefore, about 34.6% of children in Glendale lived with only one parent.
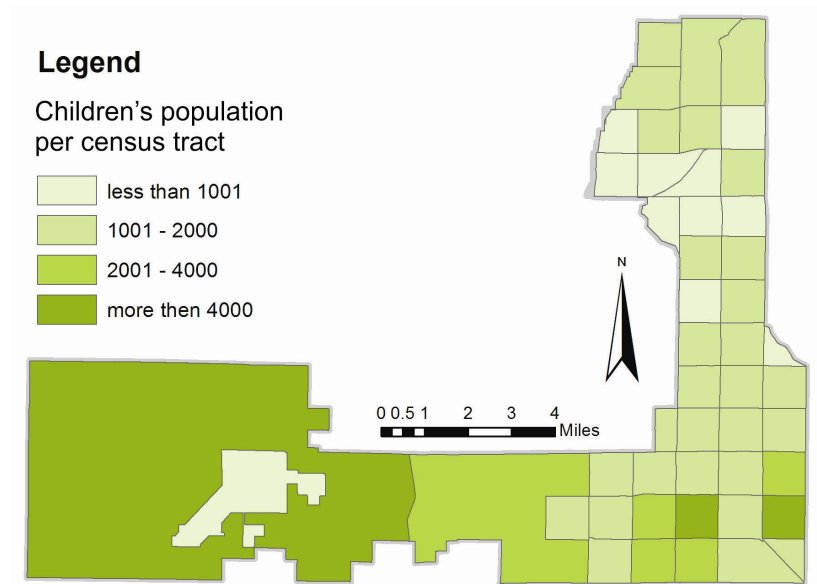
Figure 5. Distribution of children (US Census Bureau, 2009)

About 87 per cent of children lived with their parents, 7 percent with grandparents, 2 percent with adoptive parents, and about 4 per cent with other relatives (Figure 7)(US Census Bureau, 2009).
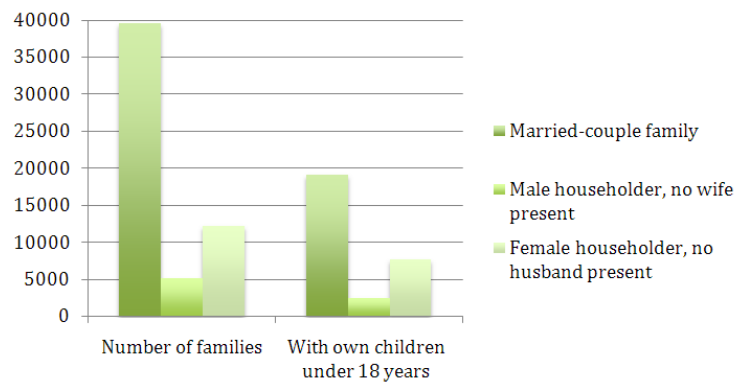
Figure 6. Number of families in the city (US Census Bureau, 2009)

In terms of economic status, about 8.8% of families and 11.9% of the population as a whole were below the poverty line, including 15.3% of those under age 18. About 29 per cent of families with children in Glendale were living

below the poverty line (US Census Bureau, 2009). Figure 8 shows that female householders who live without a husband were the largest householder group with children living below the poverty line.
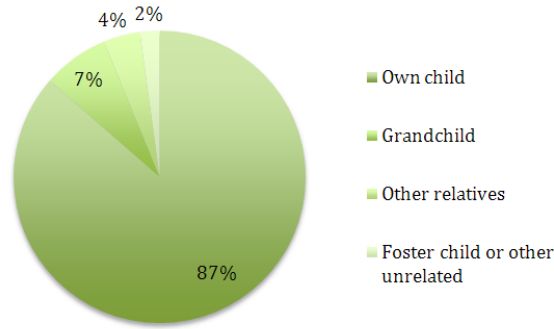
Figure 7. Householder relationship to children under 18 years (US Census Bureau, 2009)
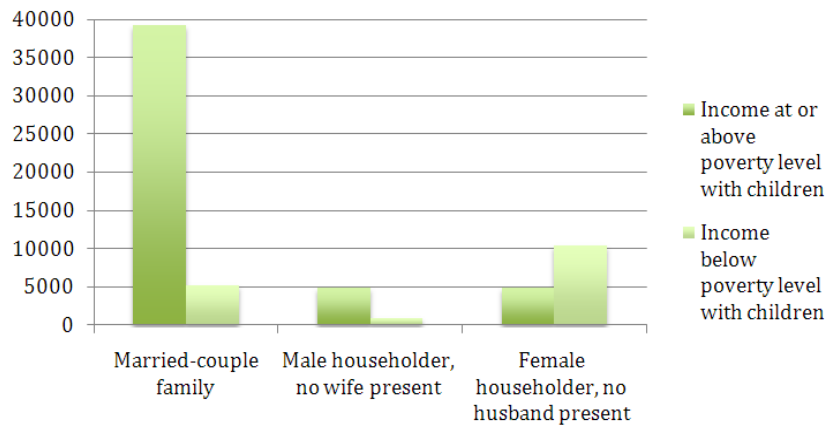
Figure 8. Poverty status in the past 12 months of families by family type by presence of related children under 18 years by age of related children (US Census Bureau, 2009)

Figure 9 shows the median income of families with children. Neighborhoods in the southeast part of Glendale have the lowest incomes, where families earn less than $50,000 per year. On the other hand, neighborhoods in the northeast have the highest income levels. Generally, the remaining areas have mid-range incomes (US Census Bureau, 2009).

Overall, census figures show that Glendale has been a city with a high percentage of children, and is predicted to continue growing. At the same time,

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many children have been living with only one parent or with other relatives. A high number of children have lived below the poverty line in low-income neighborhoods.

Case study neighborhoods

The impact of neighborhood conditions on the health of children and families is experiencing a resurgence of interest. Environmental and community psychologists have identified physical and social aspects of neighborhoods that are important determinants of individual behavior (Coulton, et al., 1996; Holahan & Wandersman, 1987; Taylor, 1988).
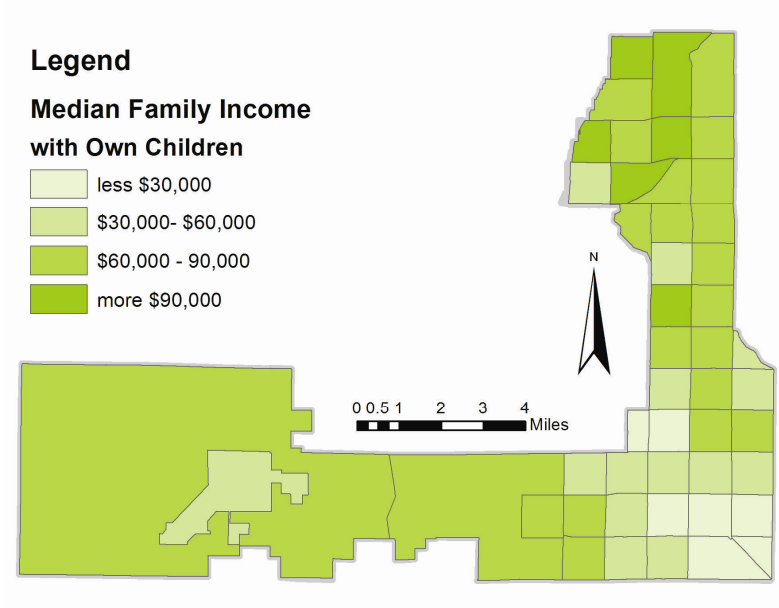
Figure 9. Median Family Income with own children

In many places in the United States, children cannot move around the city independently. As a result, they are not very mobile and spend relatively little time away from the area in which they live, so neighborhoods play a special role in children's daily lives. For children, the neighborhood is more than a physical setting, it defines a social universe (Berg & Medrich, 1980). Children, like the

elderly, have a particularly heavy investment in the neighborhood environment (Foote , Abu-Lugud, & Winnik, 1960; Lynch, 1977; Suttles, 1975), which is why the neighborhood level was chosen as the unit of study for this research.

In general, a neighborhood is a geographically-localized community within a city. Neighborhoods are often social communities with considerable face-to-face interaction among members. The Glendale Neighborhood Partnership (NP) is an agency associated with the City of Glendale's Development Department, which is in the process of creating a database of the city's neighborhoods and their characteristics. Currently, there are 191 neighborhoods and HOA's registered within Glendale's six City Council Districts (Figure 10). Neighborhoods in the database are established through residents' initiative. The benefit of designating a neighborhood is that it allows the residents to apply for support from the city government for various projects to improve the urban environment at the local level.
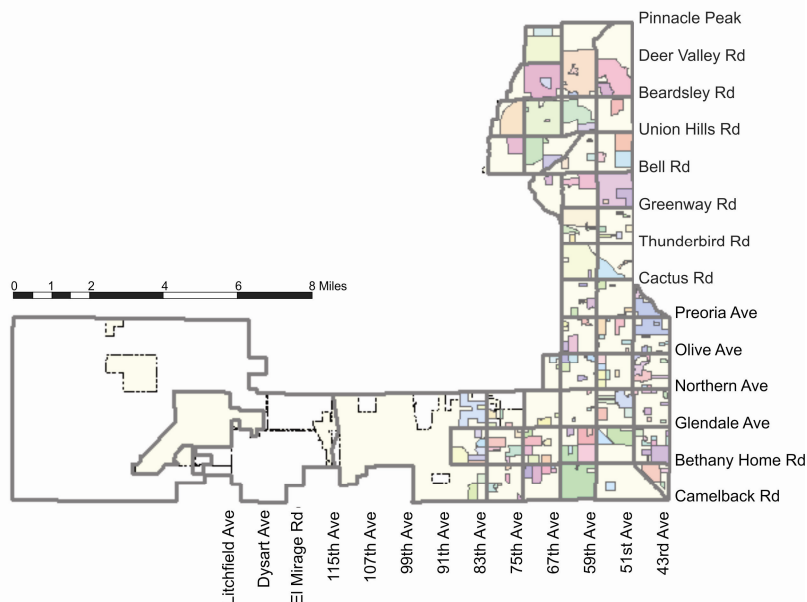
Figure 10. Neighborhoods of the city (City of Glendale, 2010e)

In order to assess child-friendliness in areas with different income levels, four neighborhoods were selected from the Glendale NP database as case study areas. Selection was based on three criteria;

- Income level;

- Size of neighborhood;

- Location of neighborhood.

As the main goal of the study is to define the difference in child-friendliness in neighborhoods with different income levels, the selection of case studies addressed different median family incomes with children (Figure 8). To this end, all neighborhoods were grouped into four quartile groups based on the median family income of the neighborhood based on 2009 5-year ACS estimates at the tract level. The final case study selections, then, include one neighborhood from each quartile.

Because all neighborhoods are formed based on citizens' initiatives, they vary in size. Some neighborhoods are the size of a whole census tract, while others are only a group of several households. For choosing case studies, only neighborhoods larger than 0.1 sq mile were considered.

In order to include neighborhoods from different parts of the city, a neighborhood's location was also part of the selection criteria. After prospective case study neighborhoods were narrowed using the first two criteria of median family income and size, the remaining neighborhoods were mapped. At this point, the researcher chose neighborhoods that would represent geographically diverse areas of the city of Glendale.

Based on these criteria, the Heart of Glendale, La Buena Vida, Daybreak Neighborhood and Manistee Ranch HOA were selected as case study

neighborhoods (Figure 11). This approach allows in-depth investigation of areas that are an adequate size for measuring children's needs, activities, and accessibility.
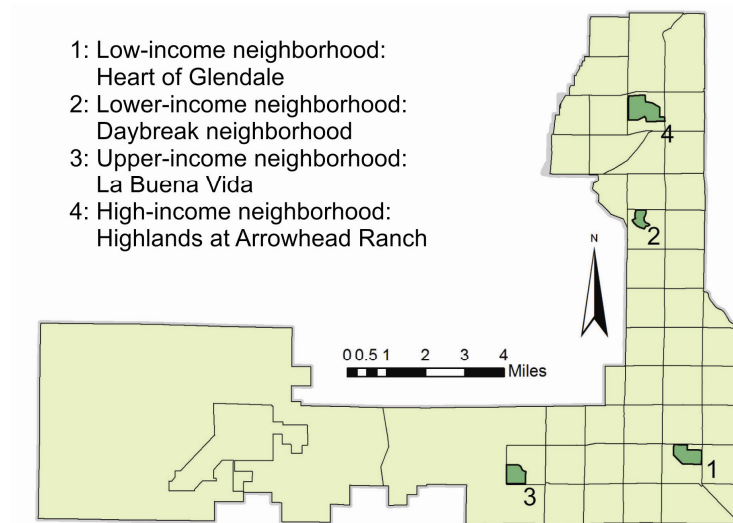
Figure 11. Case study neighborhoods

Low-income neighborhood: Heart of Glendale.

The Heart of Glendale is one of the oldest neighborhoods in Glendale; it was first built at the beginning of the twentieth century. The average income of a family with children is $22,480 (US Census Bureau, 2009). It is 0.276 square miles. Heart of Glendale is located in the Ocotillo City District in the southeast of the city, with Glendale Ave. to the north, Grand Ave to the south, 51st Ave. to the east, and 57th Ave. to the west. It is adjacent to downtown Glendale.

There are 313 households within 302 single-family units and 11 multi-family apartment buildings in Heart of Glendale (City of Glendale, 2010d). The neighborhood also hosts these three schools: Isaac E. Imes School, El Barrio, Clavelito, Landmark Jr. High School; as well as as these four parks: Myrtle Park, Sonorita Park, Thunderbird Site, Rone Lane, and Murphy Park.
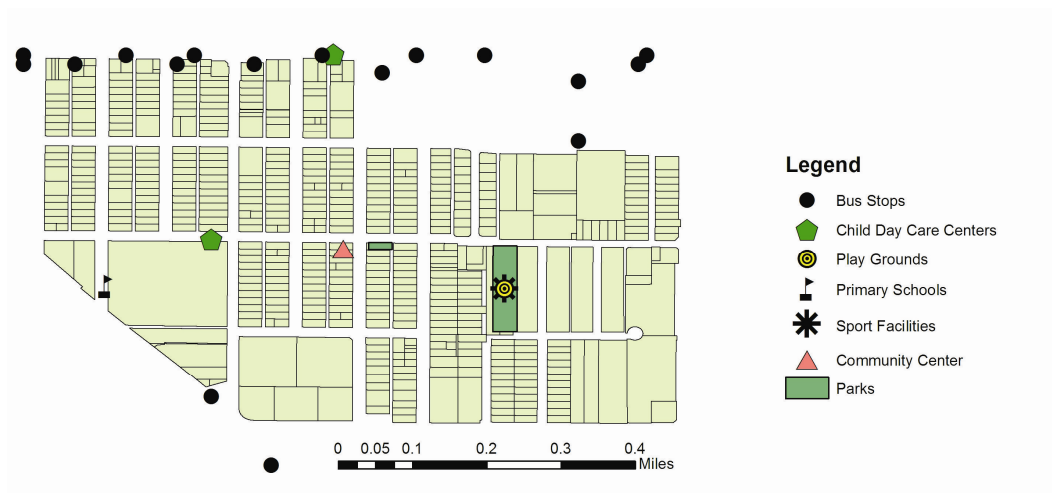
Figure 12. The Heart of Glendale

Critical issues mentioned on the Heart of Glendale fact sheet are crime, drug houses, trash dumping, run-down rental homes, and a lack of street lights (City of Glendale, 2010d). There are no Block Watch programs, but there are monthly board meetings at the local community centre.

Figure 13. The Heart of Glendale: neighborhood houses and Clavelito Park

Lower-middle income neighborhood: Daybreak Neighborhood.

Daybreak Neighborhood was built in 1984. The average income for a family with children is $51,406(US Census Bureau, 2009). It is 0.12 square miles. Daybreak Neighborhood is in the Sahuaro City District in the northeast part of Glendale. It is bordered by Greenway Road to the north, Thunderbird Paseo Park to the south, 63st Ave to the east, and 67st Ave to the west.

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Figure 14. Daybreak Neighborhood

There are 321 households total in Daybreak Neighborhood, living in 320 single-family units and one multi-family complex (City of Glendale, 2010a). The schools located in Daybreak Neighborhood are Pioneer Elementary and Cactus High School. A major feature of the area is Thunderbird Paseo Park. There are no board meetings or Block Watch programs in Daybreak Neighborhood.

Figure 15. Daybreak neighborhood: neighborhood houses and Thunderbird Paseo Park

Upper-middle income neighborhood: La Buena Vida.

La Buena Vida was built in 1988. It is located in the northeast in the Yucca City District. The average income of a family with children is $66,922 (US Census Bureau, 2009). It is 0.21 square miles. The extent of La Buena Vida is

defined by Maryland Road on the north, Bethany Home Road on the south, 87st Ave on the east, and 91st Ave on the west.
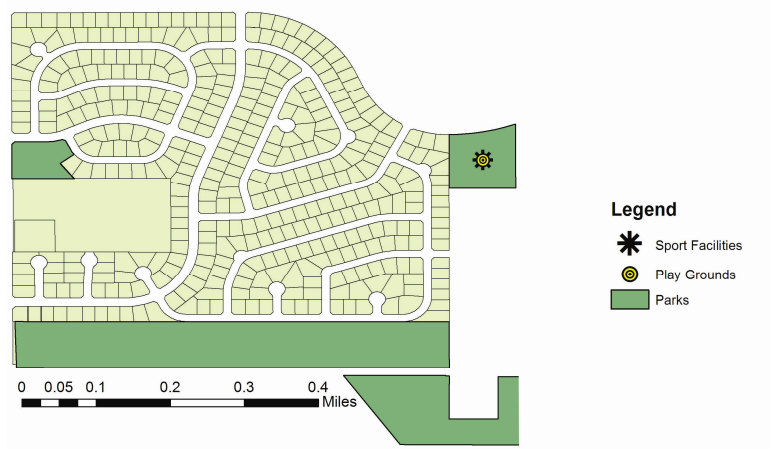
Figure 16. La Buena Vida

There are 405 households in this neighborhood, and all of them are single-family units. Mirage Elementary School is the only school in this neighborhood, and it is located next to the only park, Desert Mirage Park. There are no board meetings or Block Watch programs (City of Glendale, 2010c).

Figure 17. La Buena Vida: neighborhood houses and Desert Mirage Park

High income neighborhood: Highlands at Arrowhead Ranch.

The Highlands at Arrowhead Ranch was built in 1996. The average income of a family with children is \$105,160(US Census Bureau, 2009). It is 0.435 square miles. It is located in the northern part of Glendale in the Cholla

City District. It is bounded by Beardsley Road. on the north side, Wescott Drive on the south side, 59st Ave. on the east side, and 67th Ave. on the west side.

There are 870 households in Secluded Acres and Estates, and all of them are single-family units. The Highlands at Arrowhead Ranch neighborhood includes Highland Lakes Elementary School, Dos Largos Park, and has a Block Watch program, but no board meetings (City of Glendale, 2010b).

Figure 18. Highlands at Arrowhead Ranch

Figure 19. Highlands at Arrowhead Ranch: neighborhood houses

Methodology

There different methods to assess child friendliness and, as was mentioned in chapter 2, assessments are usually based on questionnaires. The aim of this study is to address the neighborhood level using data that is generally available to planners and designers. Therefore, an evaluation framework was

created to assess child-friendliness based on existing data. This tool could be used by planners to find out what changes should be made in the near future to improve the urban environment for children both at the neighborhood and city levels.

According to definitions from both UNICEF (UNICEF, 1992) and the US Census (US Census Bureau, 2000b), a child is a person below the 18 years of age. However, this is a very broad definition, given that children of different ages have different needs and a different relationship to the urban environment. Lennard (2000) says that four-year-old children should be able to explore the immediate neighborhood where they live, and make short trips on their own to a friend's house down the street. This means that their block must be safe for them to negotiate by themselves. By ten years old, children have a great curiosity about the larger social world of their town or city, and should be able to make longer trips on their own, by foot, bicycle or public transportation. Clearly, the extent to which children have mobility and are not dependent on others to take them where they wish to go is strongly influenced by the degree to which their city is accessible by foot, bicycle and public transportation. For this reason, it is important to first define an age group of children to focus on in this research.

UNICEF distinguishes three groups of children by age: less than 8 years, 8-12 years, and 13-18 years. Children of early ages cannot be independent from their parent, so their activity is limited to the block on which they live. Adolescents (13-18) are independent of parents and some are able to drive a car, which is a very important factor in American cities. Children of 8-12 years of age are the most appropriate group for this research, because they are not completely dependent on their parents, and they can move about their neighborhood

independently. The US Census groups children's age groups differently: under 5, 6-8, 9- 10, 11-14 years, and 15-17 years. Forty eight per cent of children in Glendale are between 6 and 14 years old. In this age range, children should start to interact with their surrounding world independently. Therefore, this research focuses on children between the ages of 8 and 14, considering their needs for full-fledged social development.

The evaluation framework used for this research is based on an assessment that was introduced by UNICEF, CERG and the Bernard van Leer Foundation (Giusti, et al., 2010), created to correspond with the International Convention of Child's Rights, and includes six main dimensions:

- home environment;

- health and social services;

- educational resources;

- safety, protection and mobility;

- play and recreation;

- community life.

To assess each aspect of child-friendliness, each dimension in the evaluation framework includes several indicators, which are important for benchmarking and tracking progress in urban planning and development. In total, the adapted version of UNICEF's evaluation framework that is used in this study includes 23 indicators (See Table 1).

The choice of indicators is based on data that is usually available at the city level. Based on this, evaluation can be used by different city municipalities to assess child-friendliness in the city using case study neighborhoods.

Table 1.
The Evaluation Framework

Evaluation dimension	Indicator
Home Environment	1. Presence of space at home
Health and Social Services	2. Distance to urgent care
Educational Resources	3. Distance to primary school 4. Distance to middle school 5. Distance to child day care services 6. Distance to additional educational services
Safety , Protection and Mobility	7. Overall crime rate 8. Child-related crime rate 9. Incidence of traffic accidence 10. Street speed limits 11. Block watch program 12. Distance to bus stops 13. Presence of bicycle lanes
Access to Play and Recreation	14. Distance to parks 15. Distance to playgrounds 16. Distance to sport facilities 17. Distance to public swimming pools 18. Distance to community/recreation centers 19. Distance to big parks with recreational trails, rivers and lakes
Community Life	20. Board meetings 21. Race diversity 22. Age diversity 23. Percentage of educated people

As the goal of the research is to compare areas with different levels of income in terms of child-friendliness, it is reasonable to demonstrate differences by score using the indicators. In the final score each dimension has equal weight despite an unequal number of indicators.

Dimensions of the Evaluation Framework.

Home Environment. Children spend a significant time at home, so the home environment is the first element of the UNICEF assessment. However, the UNICEF assessment is also designed for use in a variety of countries, and gives attention to basic needs such as drinkable water, fresh air, heating, and

electricity. In developed countries like the United States, there are usually facilities that provide children with these elements in the home environment, so these basics were excluded from the Evaluation Assessment. However, there are indicators that UNICEF uses for the Home Environment that are also important in developed countries. For the Evaluation Framework, only one indicator was selected, based on available data: presence of space at home, which was measured through number of people per room. This is significant because children need to have space where they can stay alone, study, play, invite their friends, and so on (Giusti, et al., 2010).

Health and Social Services. This section is focused on the physical and mental health of children, and considers elements of the urban environment that can influence a child's development. In developed countries where infectious and parasitic diseases are well-controlled, unintentional injury ranks as the leading cause of death for children, accounting for almost 40 per cent of deaths in the one to 14 age group (UNICEF, 2001). For this reason, emergency room and urgent care centers in walkable distance is a key indicator for child-friendly development at the neighborhood level. The presence of hospitals as such does not play as important of a role, because in American cities it seems that parents take their children to a particular family doctor, which may or may not be in a hospital, and is not necessarily dependent on distance. On the other hand, in emergency situations children need to be able to get medical support from the nearest emergency care center.

As these are no uniformed data about physiological help and services for children, this study does not include the indicator determining mental health services; it is a topic of additional research.

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Educational Resources. One critical concern for parents is optimizing children's learning in formal settings. Elementary and middle schools are the main educational resources for children in the 6 to 14 age group. Access of schools is an important indicator for child-friendly neighborhoods, which is measured through the *distance to primary school and middle schools* indicator. This study does not consider high schools, because they are applicable for adolescents, which are outside the scope of this research.

Also, it is important to consider additional educational resources that can be provided in urban areas. When parents spend more time in the workforce, children's activities change. Compared with children of unemployed mothers, children with employed mothers spend more time in day care. This includes preschool programs or family childcare for young children and before- and after-school programs for school-age children (Gershuny & Robinson, 1988; Hofferth & Sandberg, 2001). Therefore, it is also significant to consider *child day care services* that are provided within neighborhoods or surrounding areas. Also, in order to include other types of educational resources like libraries, another indicator, *additional educational services*, was created.

Safety, Protection and Mobility. At every age level children acquire an increased level of autonomy - the ability to take steps on their own safely and unaided by parents. Fear for their children's safety, however, prompts many parents to forbid them free mobility. The safety of children has emerged as one of the dominant concerns within communities and neighborhoods (Harden, 2000; Leonard, 2007). Increasing fears about the risks to children within their communities are often cited as a reason for children to be highly supervised (Collins & Kearns, 2001; Tandy, 1999). These concerns include fear of children's

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exposure to: traffic and congestion (Björklid, 1994; Freeman, 2006), violence and criminal acts (Malone & Hasluck, 2002), and stranger danger (Valentine, 1995). Three indicators in the Evaluation Assessment address this: overall crime rate, child-related crime rate and number of traffic crashes within a neighborhood. A related indicator is *presence of block watch program,* which can be an important factor for child-friendliness. For children, it is important to feel safe and know that people from one's neighborhood are ready to help in a dangerous situation.

However, the greatest threat to children is from fast moving traffic (Skenazy, 2010). Studies show that children have only a fifty percent survival rate when hit by a vehicle traveling at 30 mph, but a ninety percent survival rate if the vehicle is traveling at 18 mph (Lennard, 2000, p.65). In addition, these research that provides strong evidence that children may make risky crossing judgments when vehicles are travelling at 30 or 40 mph (Langdon, 2011). Therefore, it is significant to see how many streets have speed limits that are less than 25 mph.

A lack of pedestrian routes, bicycle networks and public transportation in a neighborhood sends a signal to young people that their community does not care to make their city accessible for them, and restricts their autonomy in moving around their city until they reach driving age (Lennard & Lennard, 2000). UNICEF does not include questions to participants about available transportation, but instead focuses more on safety. However, in developed countries mobility is a very significant factor for children; that is why mobility was added to this dimension. The Evaluation Assessment uses distance to bus stops, presence of bicycle lanes and pedestrian paths as indicators to address this issue.

Access to Play and Recreation. The final dominant theme for child-friendly design in the literature was the importance for children to develop a sense of place through experiences in outdoor and natural environments. Several authors provide strong evidence that these experiences are a critical means of building confidence and autonomy and developing relationships (Blades, 1989; Korpela, Kyttä, & Hartig, 2002). Woolley (1999) outlines the range of outdoor places that children seek to play in. These include domestic open spaces such as community gardens, and neighborhood open spaces such as parks, playgrounds, playing fields, sports' grounds, streets, city farms, and natural green spaces. The provision of seating areas, vegetation, or creative and imaginative design in these spaces can provide opportunities for more social contact and unstructured play. Children should have the ability to play, and have independent access to the outdoor physical environment for the benefit of their health and wellbeing. The history of playgrounds provides valuable lessons on society's goals for children as citizens and citizens-in-waiting (Hart, 2010). Five indicators in the "Access to Play, and Recreation" category of the Evaluation Assessment measure this aspect of child-friendliness: distances to parks, playgrounds, sports facilities, community centers/recreation centers, and big parks with recreational trails, rivers and lakes.

Community Life. Behavior is learned through observation and participation. The public realm provides examples and models of how people behave when interacting with family and friends, with the young and old, with those of different social backgrounds, of different temperament, and with the physically and mentally disabled. It is essential for children to see what other people look like and how they act, to be able to observe people engaged in a

variety of different activities, at work and at play, and in both casual and serious conversations. Children learn about human relationships by observing everyday encounters: how friends relate; how adults talk to strangers; how one expresses tenderness, or shows pleasure in each other's company (Lennard & Lennard, 2000). These aspects of diverse community life are accounted for by the indicators racial diversity, age diversity, and percentage of educated people in a neighborhood.

Scoring Methods and Data Sources

All indicators can be divided into five groups according to the method for scoring and source of data: distance indicators, percentage indicators, diversity indicators, ratio indicators, and presence indicators (See Table 2).

Distance Indicators. This group of indicators is based on accessibility to point objects that are important features in terms of child-friendliness. Generally, 0.25 (1/4) mile is considered a walkable distance for people, so in this study we assume that for children the ideal walkable distance is less than 0.25 mile.

Because indicator scores need to be representative of the whole neighborhood, but neighborhoods are large enough to have some areas that are more accessible to features than others, an 1/8-mile grid was overlaid on each neighborhood. A ½-mile buffer around the neighborhood was created to include nearby points of interest. If there was no point of interest for a given indicator within the 0.5 mile buffer, then a 1 mile buffer was used (Figure 20).

Then, distance to features was measured from the centroid of each cell in the grid using the ArcGIS 10 Point Distance function. For instances where there

were several points related to the same indicator, the average distance value was

calculated.

Table 2.
Indicator Groups

Indicator group	Indicator
Distance indicators	Distance to urgent care
	Distance to primary school
	Distance to middle school
	Distance to child day care services
	Distance to additional educational services
	Distance to bus stop
	Distance to parks
	Distance to playgrounds
	Distance to sport facilities
	Distance to public swimming pool
	Distance to community/recreation centers
	Distance to big parks with recreational trails, rivers and lakes
Percentage indicators	Presence of space at home
	Street speed limits
	Presence of bicycle lanes
Diversity indicators	Racial diversity
	Age diversity
Ratio indicators	Overall crime rate
	Child-related crime rate
	Incidence of traffic accidence
	Presence of educated people
Presence indicators	Block watch program
	Board meeting

Using this method, each distance indicator was then given a score for each

cell of the grid:

- 4 points: 0 – 0.25 mile

- 3 points: 0.25 – 0.5 mile

- 2 points: 0.5 – 0.75 mile

- 1 points: more than 0.75

- 0 points: no objects within distance of 1 mile

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Centroids	Distance in miles
1	0.226
2	0.241
3	0.260
4	0.283
5	0.309
6	0.180
7	0.190
8	0.207
9	0.229
10	0.255
11	0.283
12	0.144
13	0.156
14	0.177
15	0.201
16	0.231
17	0.262
18	0.107
19	0.123
20	0.149
Average	0.211

Legend

- Middle School
- Centroids of 1/8 mile cell
- Neighborhood area
- 1/2 mile buffer
- 1 mile buffer
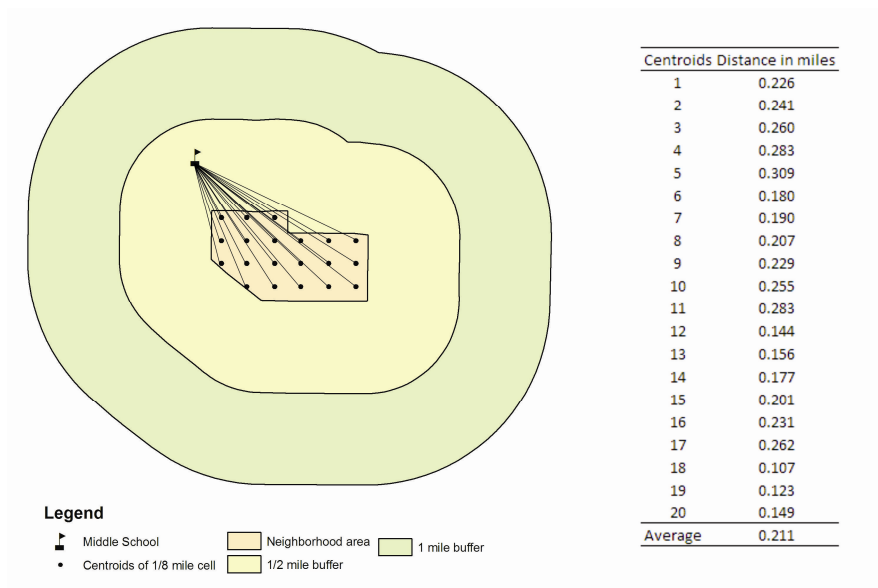
Figure 20. Example of distance measurement: low-income neighborhood and middle school in 0.5 mile buffer

In order to convert this to one score for the entire neighborhood, the cell scores were averaged. This method provides both an overall score, but also a more detailed view of which parts of a neighborhood score better than others, which can be useful in providing targeted recommendations after the assessment is complete.

Almost all data for these indicators were provided by Neighborhood Partnership of Glendale Municipalities. The locations of child care services and additional educational services were derived from public online resources such as Google Maps.

Percentage Indicators. There are several subgroups within the percentage indicator group; however, all of these indicators are based on percentage values. The percentage for each indicator is based on the rate of a particularly-defined element (See Table 3). Therefore, the score looks like:

- 4 points: 100 – 90 %

- 3 points: 89 – 70 %

- 2 points: 69 – 50 %

- 1 points: 59 - 20%

- 0 points: less than 20%

Table 3.
Units of Measurement of Percentage Indicators

Percentage Indicator	Units of Measurement
Presence of space at home	Number of occupied housing units with one or less occupants per room
Street speed limits	Length of roads in miles with speed limit of 25 mph or less
Presence of lanes	Length of roads in miles with bike lanes

American Community Survey 2005-2009 data at the tract level from US Census Bureau website was used for the Presence of space at home indicator. This is the latest data that is available at the tract level. Blocks and block groups were not used because their borders do not coincide closely with neighborhood boundaries; moreover, the latest data that is available at these levels is the 2000 Census.

Presence of space at home is based on answers to the 2009 ACS item B25014-Tenure by occupants per room, where key value is percentage of occupied housing units with one or less occupants per room. Indicators of presence of bicycle lanes and pedestrian paths are based on percentage of road length with bike lanes and sidewalks in the neighborhood. The same method is used to measure the street speed limits indicator, where percentage of road length with speed limits lower than 25 mph is a key value.

Diversity Indicators. The diversity indicator group results are also based on American Community Survey 2005-2009 data at the tract level from the

US Census Bureau website. The Simpson diversity index was used to define the level of age and ethnic diversity at the tract level. Simpson's Diversity Index is a measure of diversity which takes into account the number of groups of people present, as well as the relative abundance of these groups, and is derived from the following equation:

$$D = 1 - \left(\frac{\sum n(n-1)}{N(N-1)} \right)$$

where n = the total number of individuals of a particular group; N = the total number of individuals of all groups . The value of D ranges from 0 to 1, where 1 represents infinite diversity, and 0 represents no diversity. The scoring for this indicator group is as follows:

- 4 points: 1-0.8
- 3 points: 0.8 – 0.6
- 2 points: 0.6 –0.4
- 1 points: 0.4 – 0.2
- 0 points: less than 0.2

Ratio Indicators. Four indicators, overall crime rate, child-related crime rate, incidence of traffic accidence, and presence of educated people, were measured by comparing the value at the neighborhood level to the value for the whole city of Glendale through a location quotient. Specifically, location quotient is a measure developed in regional planning and economics to evaluate economic structure and specialty (Isserman, 1977). The location quotient (LQ) is an indicator that compares an area's share of a particular activity with the reference area's share of some basic or aggregate phenomenon. The formula is as follows:

$$LQi = \frac{E_{ij}/E_i}{\sum E_{ij} / \sum E_i}$$

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where Eij - economic activity in subarea i department j, Ei - total economic

activity in subarea i, ΣEij - economic activity of department j in the whole area,

ΣEi - total economic activity in the whole area

The City of Glendale provided crime and traffic accidences statistics for

the last 6 months of 2010. This data was geocoded by location of crimes and

traffic accidents within a 0.5 mile buffer of case study neighborhoods. To

measure the location quotient, each crime event or traffic accident was the basic

unit of measure. The formula can be restated as

$$LQCi = \frac{C_{ij}/A_i}{\sum C_{ij} / \sum A_i}$$

where: Cij - crime frequency in subarea i, Ai - area measure like population at risk

or total crime count in subarea i, ΣCij = crime frequency in the whole area and

ΣAi = total area measure in the whole area.

To calculate the crime rate and traffic accidents, the number of people at

risk was defined using block level population data from the Census 2000. For

calculation of child-related crime rate, children's population was used as area

measure. Location quotients (LQ) can be interpreted using the following

conventions:

- If LQ > 1, this indicates a relative concentration of the activity in area i
  (for this study, this means in a particular census tract), compared to the
  region (for this study, the city of Glendale) as a whole.
- If LQ = 1, the area has a share of the activity in accordance with its share
  of the base.
- If LQ < 1, the area has less of a share of the activity than is found in the
  region as a whole.

Therefore, the scoring for crimes and traffic accidences looks like:

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- 4 points: LQ is 0 – 0.5

- 3 points: LQ is 0.5 – 1

- 2 points: LQ is 1

- 1 points: LQ is 1 – 1.5

- 0 points: LQ more than 1.5

The presence of educated people was defines through the 2009 ACS 5-year estimate for the item B15002-Sex by educational attainment for the population 25 years and over, which tells the number of people with associate's/bachelor's degree and higher.

The scoring of this ratio indicator is opposite of crime and traffic accidents, because in this case a higher location quotient is positive. The scores were calculated as follows:

- 4 points: LQ more than 1

- 3 points: LQ is 0.75 – 1

- 2 points: LQ is 0.5 – 0.75

- 1 points: LQ is 0.25 – 0.5

- 0 points: LQ less than 0.25

Presence Indicators. These indicators measure the presence of two types of activity that help to create child-friendly atmosphere in a neighborhood: a block watch program and neighborhood meetings. Because there either is or is not a presence of these activities, there are only two possible scores for these indicators:

- 4 points: activity is present

- 0 points: activity is not present

Final scoring. As the final step of calculating the indicator scores, an overall score is provided for each of the 6 dimensions, that characterize the child-friendliness of a neighborhood. These scores can then be summed to give one overall score for the neighborhood. Each dimension in the evaluation has equal weight, so that even dimensions that are based on several indicators are defined through an average value of these indicators.

The final score of the evaluation defines the child-friendliness of a neighborhood with a maximum of 24 points, with descriptions of each point range as follows:

- 19 - 24: Child-friendly neighborhood
- 13 - 18: Somewhat child-friendly neighborhood
- 7 - 12: Not child-friendly neighborhood
- Less than 7: Neighborhood is not for children

Table 4.
Summary Table of the Evaluation Framework

N	Dim.	Indicator	Type of indicator	Data Resource	Units of measurement
1.	I	Presence of space at home	Percentage	2005-2009 American Community Survey	Number of housing units
2.	II	Distance to emergency room	Distance	GIS files from Glendale Municipalities	Miles
3.	III	Distance to primary school	Distance	GIS files from Glendale Municipalities	Miles
4.		Distance to middle school	Distance	GIS files from Glendale Municipalities	Miles
5.		Distance to child day care services	Distance	KML files from Google Maps	Miles
6.		Distance to educational services	Distance	GIS files from Glendale Municipalities	Miles
7.	IV	Overall crime rate	Ratio	Statistical Data from Glendale Municipalities	Number of crimes
8.		Child-related crime rate	Ratio	Statistical Data from Glendale Municipalities	Number of crimes
9.		Incidence of traffic accidence	Ratio	Statistical Data from Glendale Municipalities	Number of traffic crashes
10.		Street speed limits	Percentage	ASU GIS data repository	Miles
11.		Block watch program	Presence	Neighborhood Information System	Yes/No
12.		Distance to bus stop	Distance	GIS files from Glendale Municipalities	Miles
13.		Presence of bicycle lanes	Percentage	GIS files from Glendale Municipalities	Miles
14.	V	Distance to parks	Distance	GIS files from Glendale Municipalities	Miles
15.		Distance to playgrounds	Distance	GIS files from Glendale Municipalities	Miles
16.		Distance to sport facilities	Distance	GIS files from Glendale Municipalities	Miles
17.		Distance to public swimming pools	Distance	GIS files from Glendale Municipalities	Miles
18.		Distance to community/recreation centers	Distance	GIS files from Glendale Municipalities	Miles
19.		Distance to big parks with recreational trails, rivers and lakes	Distance	GIS files from Glendale Municipalities	Miles
20.	VI	Board meetings	Presence	Neighborhood Information System	Yes/No
21.		Race diversity	Diversity	2005-2009 American Community Survey	Number of people
22.		Age diversity	Diversity	2005-2009 American Community Survey	Number of people
23.		Educated people	Ratio	2005-2009 American Community Survey	Number of people

Chapter 4

RESULTS OF THE EVALUATION

This chapter describes the results for all 23 indicators for each of the four case study neighborhoods. They are grouped according to the six dimensions of a child-friendly neighborhood: home environment; health and social services; educational resources; safety, protection and mobility; play and recreation; community life.

Home Environment

1. Presence of space at home. The presence of space at home indicator score was based on data from the 2009 ACS 5-year estimates item B25014-Tenure by occupants per room, where the key value is the percentage of occupied housing units (both rented and owned) with one or less occupants per room at the census tract level. The results for each case study neighborhood are presented in Table 5.

Table 5.
Presence of Space at Home

N	Name of Neighborhood	Occupied housing units	Occupied housing units with one or less occupants per room	Percentage of Occupied housing units with one or less occupants per room	Points
1	Heart of Glendale	1225	1089	86.77	3
2	Daybreak Neighborhood	2022	1956	96.74	4
3	La Buena Vida	1702	1657	97.36	4
4	Highlands at Arrowhead Ranch	1709	1707	99.88	4

The Heart of Glendale has the lowest percentage of housing units with one or less occupants per room. This neighborhood also has the highest percentage of

rented housing units (64 per cent), which is generally expected for lower income residents. The remaining three neighborhoods have more than 95 per cent of occupied housing units with one or less occupants per room; this means that children in these neighborhoods have their own room.

This presence of space at home indicator is the only one for the home environment dimension, as shown in Figure 21.
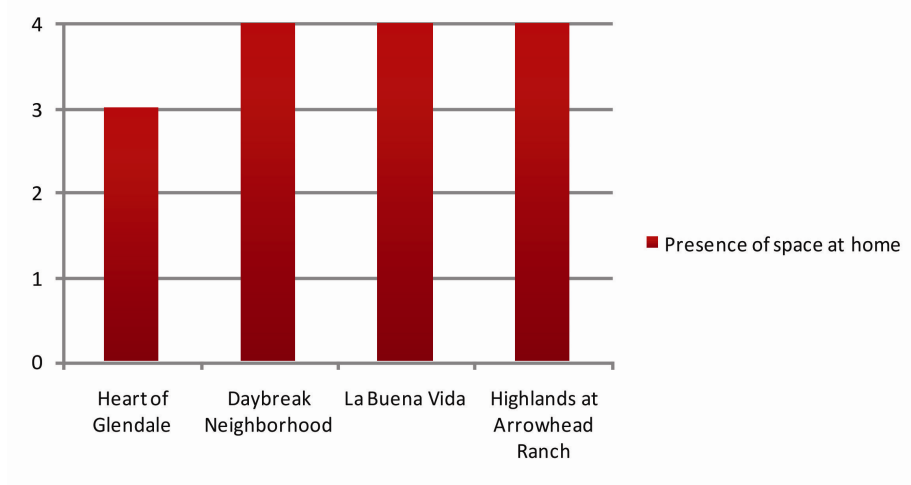
Figure 21. Resultant scores of Home Environment

Health and Social Services

2. Distance to urgent care. Calculation of distances to urgent care centers was based on GIS files obtained from the city of Glendale. According to this data, there are only 8 urgent care centers in Glendale and 2 hospitals with emergency rooms. The results, in terms of distance from the four case study neighborhoods to these facilities, are presented in Table 6. The Heart of Glendale and La Buena Vida do not have urgent care centers within 0.5 or 1 mile distance, according to the data.

Daybreak Neighborhood has one urgent care center within the 1 mile buffer which is located at 15236 N 59th Ave. The average distance from the

gridded points in the neighborhood to the urgent care for this neighborhood is 0.684 miles.

The Highlands at Arrowhead Ranch neighborhood also have only one urgent care center within the 0.5 mile buffer, which is located at 18589 N 59th Ave; the average distance from the neighborhood is 0.812 mile.

Table 6.
Distance to Urgent Care

N	Name of Neighborhood	Number of Urgent Care Centers within 0.5 mile buffer	Number of Urgent Care Centers within 1 mile buffer	Average Distance	Points
1	Heart of Glendale	0	0	N/A	0
2	Daybreak Neighborhood	0	1	0.684	2
3	La Buena Vida	0	0	N/A	0
4	Highlands at Arrowhead Ranch	1	0	0.747	2

The final score of the Health and Social Services dimension, shown in Figure 22. These scores show a lack of urgent health and social services that are accessible for children in the four case study neighborhoods.
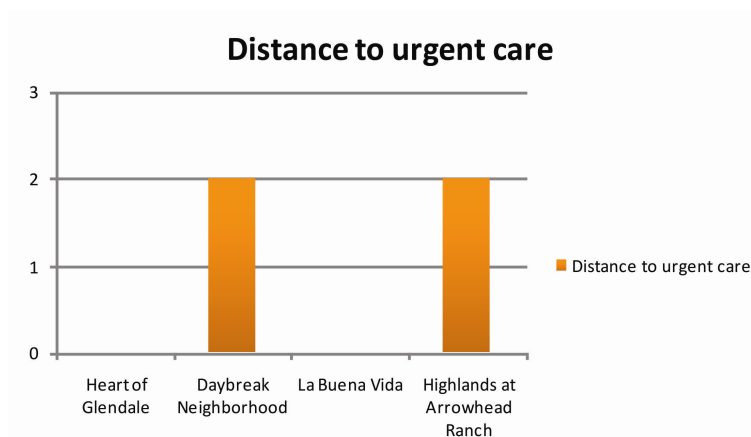
Figure 22. Resultant scores of Health and Social Services

The Heart of Glendale, low-income neighborhood, and La Buena Vida, the upper-middle income neighborhood, do not have either of the services included

in the Health and Social Services dimension within a 1 mile buffer, which is the first feature of unfriendly urban development for children. It is obvious that children cannot use the majority of these services independently if necessary.

Educational Resources

        3. Distance to primary school. Calculation of the distances to primary schools was based on GIS files that were provided by the city of Glendale. According to this data, there are 43 primary schools in Glendale. The results of the indicator calculations for the four case study neighborhoods are presented in Table 7.

Table 7.
Distance to Primary School

N	Name of Neighborhood	Number of Primary Schools within 0.5 mile buffer	Average Distance	Points
1	Heart of Glendale	4	0.186	4
2	Daybreak Neighborhood	2	0.115	4
3	La Buena Vida	1	0.144	4
4	Highlands at Arrowhead Ranch	1	0.116	4

        The Heart of Glendale has 4 primary schools within the 0.5 mile buffer zone. Isaac E Imes School is located within the neighborhood area, which translates to an average distance 0.186 miles from the gridded points in the neighborhood. La Buena Vida and Daybreak Neighborhood each have 1 primary school in the 0.5 buffer zone, with an average distance of 0.144 and 0.115 miles, respectively. Pioneer Elementary School is located within the Daybreak Neighborhood. There is 1 primary school within Highlands at Arrowhead Ranch, with an average distance of 0.116 miles; Highland Lakes School is also located in immediate proximity to the neighborhood.

4. Distance to middle school. Calculation of the distances to middle

schools was based on GIS files that were provided by the city of Glendale.

According to this data, there are only 5 middle schools in Glendale. In terms of

the case study neighborhoods, Heart of Glendale has a middle school within the

0.5 mile buffer, which means an average distance of 0.211 miles. The other three

case study neighborhoods do not have a middle school even within a 1 mile

buffer. The results are presented in Table 8.

Table 8.
Distance to Middle School

N	Name of Neighborhood	Number of Middle Schools within 0.5 mile buffer	Number of Middle Schools within 1 mile buffer	Average Distance	Points
1	Heart of Glendale	1	0	0.211	4
2	Daybreak Neighborhood	0	0	N/A	0
3	La Buena Vida	0	0	N/A	0
4	Highlands at Arrowhead Ranch	0	0	N/A	0

5. Distance to child day care services. Calculation of the distances

to child day care services was based on information obtained from Google Maps.

Child day care services and preschools that provide relevant services were

considered for this analysis. The results are presented in Table 9.

There are 5 child day care services within 0.5 mile buffer for the Heart of

Glendale neighborhood; only two of them are located within the neighborhood

area. The average distance to child day care services is 0.478 miles.

La Buena Vida and Daybreak Neighborhoods have 1 child day care facility

each within a 0.5 mile buffer; the average distance is 0.534 and 0.492 miles,

respectively.

Table 9.
Distance to Child Day Care Services

N	Name of Neighborhood	Number of Child Day Care Services within 0.5 mile buffer	Average Distance	Points
1	Heart of Glendale	5	0.478	3
2	Daybreak Neighborhood	1	0.492	3
3	La Buena Vida	1	0.534	2
4	Highlands at Arrowhead Ranch	4	0.716	2

The Highlands at Arrowhead Ranch has 4 child day care services each, with an average distance of 0.716 miles. Only one child day care service facility is located in Highlands at Arrowhead Ranch neighborhood, and the rest are outside of the neighborhood area.

6. Distance to additional educational services. Calculation of the distances to additional education services was based on GIS files that were provided by the city of Glendale; libraries were considered the basic unit of analysis for this indicator. According to this data, there are only 3 libraries in Glendale, and neither La Buena Vida nor Daybreak Neighborhood has a library within a 1 mile buffer distance. The results are presented in Table 10.

Table 10.
Distance to Additional Educational Services

N	Name of Neighborhood	Number of Libraries within 0.5 mile buffer	Number of Libraries within1 mile buffer	Average Distance	Points
1	Heart of Glendale	1	0	0.620	2
2	Daybreak Neighborhood	0	0	N/A	0
3	La Buena Vida	0	0	N/A	0
4	Highlands at Arrowhead Ranch	0	1	1.009	1

The Heart of Glendale has one library, which is located within the 0.5 mile neighborhood buffer; the average distance from all neighborhood points is 0.620

miles. Highlands at Arrowhead Ranch has one library located within the 1 mile buffer, but the average distance for all points is more than 1 mile.

The resultant scores for the educational resources dimension are presented in Figure 23. The Heart of Glendale, which is the low income case study, has the best accessibility to educational resources among all four of the case study neighborhoods. The remaining neighborhoods do not have some of the educational resources even within a 1 mile buffer.
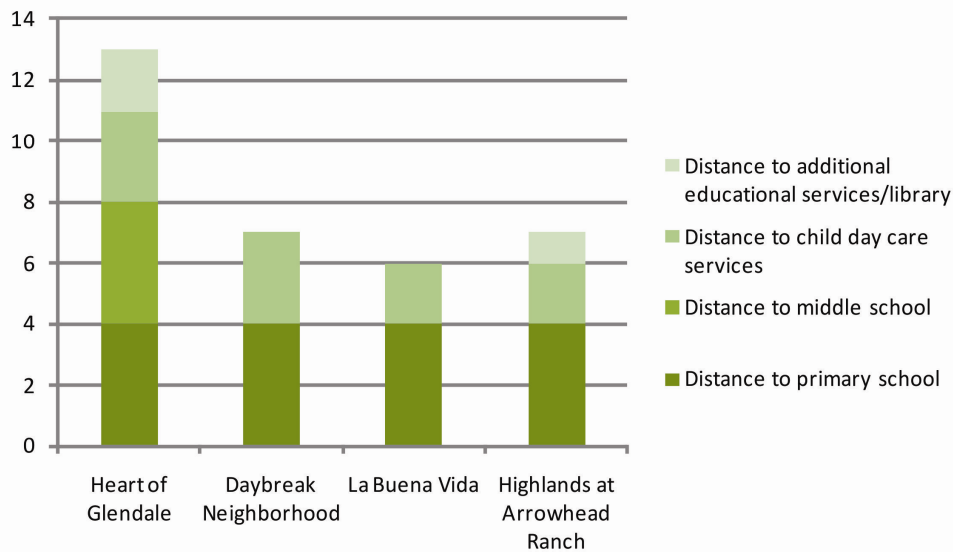
Figure 23. Resultant scores of Educational Resources

Safety, Protection and Mobility

7. Overall crime rate. Calculation of the location quotient coefficient for crime rates was based on statistical data obtained from the city of Glendale with type and location of all crimes committed in the last six months of 2010. The results are presented in Table 11.

The Heart of Glendale has the highest number of crimes among the case study neighborhoods. However, because the location quotient for crime rate is based on the number of people at risk, the value of the location quotient is less

than 1, which means that crime level in the neighborhood is lower than in the city

of Glendale as a whole. Daybreak Neighborhood, the lower-middle income

neighborhood, also has a low LQ for crime rate (0.512).

Table 11.
Overall Crime Rate

N	Name of Neighborhood	Total number of crimes for 6 months	LQ	Points
1	Heart of Glendale	868	0.888	3
2	Daybreak Neighborhood	343	0.512	3
3	La Buena Vida	408	1.274	1
4	Highlands at Arrowhead Ranch	314	0.289	4

La Buena Vida, the higher middle income neighborhood, has a higher

frequency of crimes in a relation to the population (including a 0.5 mile buffer

around the neighborhood), than in the city of Glendale. As a result, the location

quotient is more then 1 (1.274).

The Highlands at Arrowhead Ranch has the lowest location quotient for

crime rate (0.289), which means that the number of crimes in the neighborhood

is much lower than in Glendale in general.

8. Child-related crimes rate. Calculation of the location quotient

coefficient for child-related crimes was based on the same statistical data as

indicator 8, but considers only types of crimes that are specific to children. Child-

related crimes include child abuse of several types, including the physical, sexual,

emotional mistreatment, or neglect of children. These translate directly to the

four major categories of child abuse that were considered in the assessment:

neglect, physical abuse, psychological or emotional abuse, and child sexual abuse.

The results are presented in Table 12.

Table 12.
Child-Related Crime Rate

N	Name of Neighborhood	Total number of child-related crimes for 6 months	LQC	Points
1	Heart of Glendale	14	1.064	2
2	Daybreak Neighborhood	3	0.384	4
3	La Buena Vida	5	1.043	2
4	Highlands at Arrowhead Ranch	4	0.299	4

The highest number of child-related crimes is found in the Heart of Glendale – 14 in the last 6 months of 2010. However, the location quotient is almost equal to 1 (1.064), which means that the average level of child-related crimes in the City of Glendale is approximately the same. La Buena Vida has a similar value (1.043), even though there were only 5 child-related crimes during the same period of time. This is because the there are fewer children in the population of the La Buena Vida neighborhood.

Location quotients for child-related crimes in the Daybreak Neighborhood and Highlands at Arrowhead Ranch are quite low, 0.384 and 0.299, respectively. This means that the occurrence of child-related crimes in these neighborhoods is rarer than in the city of Glendale in general.

9. Incidence of traffic accidences. Calculation of the location quotient coefficient for traffic accidents was based on statistical data provided by the city of Glendale. The results are presented in Table 13.

The Heart of Glendale has the highest number of traffic accidents, with a location quotient of 1.691; this means that it exceeds the average number of the city more than 1.5 times.

Table 13.
Incidence of Traffic Accidences

N	Name of Neighborhood	Total number of traffic crashes for 6 months	LQC	Points
1	Heart of Glendale	224	1.691	0
2	Daybreak Neighborhood	37	0.374	4
3	La Buena Vida	15	0.317	4
4	Highlands at Arrowhead Ranch	127	0.793	3

The Highlands at Arrowhead Ranch also has a high location quotient for traffic accidents, probably because of major highways that are located in immediate proximity of the neighborhood. However, even with this factor, the location quotient is lower than 1 (0.793), which means that the rate of traffic crashes in the neighborhood is in general lower than in the city as a whole.

La Buena Vida and Daybreak Neighborhood have fewer traffic accidents than city of Glendale in general, as shown by their relatively low location quotients of 0.317 and 0.374, respectively.

10. Street speed limits. Calculation of the percentage of roads with a speed limit of 25 or less miles per hour was based on GIS data available to Arizona State University from the Maricopa Association of Governments. Road segments within a 0.5 mile buffer of the case study neighborhoods were considered to calculate this indicator. The results are presented in Table 14.

All of the case study neighborhoods have different total length of streets. The lowest speed limit found in all neighborhoods is 25 miles per hour, and the highest speed limit is 50 mile per hour.

The Heart of Glendale has 34.628 miles of roads within a 0.5 mile buffer, of which 27.282 miles (78.79%) have a speed limit of 25 mph . The highest speed limit in the neighborhood is 50 mph.

Table 14.
Street Speed Limits

N	Name of Neighborhood	Total length of the streets, miles	Length of the street with speed limit 25 m/h or less, miles	Percentage	Points
1	Heart of Glendale	34.628	27.282	78.79	3
2	Daybreak Neighborhood	24.289	21.896	90.15	4
3	La Buena Vida	14.712	11.442	77.78	3
4	Highlands at Arrowhead Ranch	39.698	33.731	84.97	3

La Buena Vida has only 14.712 miles of roads within 0.5 mile buffer, of which 11.442 miles (77.78%) have a speed limit of 25 mph . The maximum speed limit is 35 mph.

The Daybreak Neighborhood has the highest percent of roads with speed limit of 25 mph or less (90.15%), with 24.289 miles of total street length. The highest speed limit in the neighborhood is 35 mph.

The Highlands at Arrowhead Ranch has 39.698 miles of roads within 0.5 mile buffer, of which 33.731 miles (84.97%) have a speed limit of 25 mph.. The maximum speed limit is 35 mph.

11. Block watch program. This indicator shows whether or not a neighborhood has a block watch program, which helps to create a child-friendly atmosphere. It is based on data from the neighborhoods' fact sheets that are part of Glendale's Neighborhood Information System. A summary of the results are presented in Table 15. Currently, only the Highlands at Arrowhead Ranch has a block watch program.

12. Distance to bus stops. Calculation of the distances to bus stops was based on GIS files provided by the city of Glendale. The results are presented in Table 16.

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Table 15.
Presence of Block Watch Program

N	Name of Neighborhood	Presence of block watch program	Points
1	Heart of Glendale	No	0
2	Daybreak Neighborhood	No	0
3	La Buena Vida	No	0
4	Highlands at Arrowhead Ranch	Yes	4

Table 16.
Distance to Bus Stops

N	Name of Neighborhood	Number of Bus Stops within 0.5 mile buffer	Number of Bus Stops within 1 mile buffer	Average Distance	Points
1	Heart of Glendale	63	N/A	0.597	2
2	Daybreak Neighborhood	10	N/A	0.508	2
3	La Buena Vida	0	1	1.087	1
4	Highlands at Arrowhead Ranch	24	N/A	0.801	1

The Heart of Glendale has the highest number of bus stops within the 0.5 mile buffer, with an average distance of 0.597 miles from all points in the neighborhood. La Buena Vida has only one stop in a 1 mile buffer, and it is located an average distance of 1.087 miles from all points in the neighborhood. The Daybreak Neighborhood has 10 bus stops in 0.5 mile buffer with an average distance of 0.508 miles. The Highlands at Arrowhead Ranch has 24 bus stops with an average distance of 0.801 miles.

13. *Presence of lanes*. Calculation of the percentage of roads with bike lanes was based on GIS files that were provided by the city of Glendale. Roads within a 0.5 mile buffer of case study neighborhoods were taken into consideration to calculate the indicator results, presented in Table 17.

Table 17.
Presence of Bicycle Lanes

N	Name of Neighborhood	Total length of the streets, miles	Length of bike lanes, miles	Percentage	Points
1	Heart of Glendale	34.628	1.498	4.32	0
2	Daybreak Neighborhood	24.289	3.291	13.55	0
3	La Buena Vida	14.712	3.178	21.60	1
4	Highlands at Arrowhead Ranch	39.698	6.565	16.53	0

The Heart of Glendale has only 1.498 miles of roads (4.32%) with bike lanes., which is the lowest percentage for all of the case study neighborhoods. La Buena Vida has the highest score with 21.6 per cent, where 3.178 miles of roads have bike lanes. In Daybreak Neighborhood, 13.55 per cent of roads (3.291 miles) have bike lanes, and in the Highlands at Arrowhead Ranch 16.53 per cent of roads (6.565 miles) have bike lanes.

The resultant average score for the dimension Safety, Protection, and Mobility for each of the case study neighborhoods is presented in Figure 24. It seems that for this dimension, there is no relationship between overall indicator scores and income level. The low income neighborhood (Heart of Glendale) has a high rate of crimes and traffic crashes, very few bike lanes, and there are no preventative programs. For the high and middle income neighborhoods the scores are higher for this dimension. However, the maximum score for the dimension is 28 points, and the Highlands at Arrowhead Ranch (the high income neighborhood) has only 19 points. This means that, in general, the results for this atribute show room for improvement even for higher income neighborhoods.
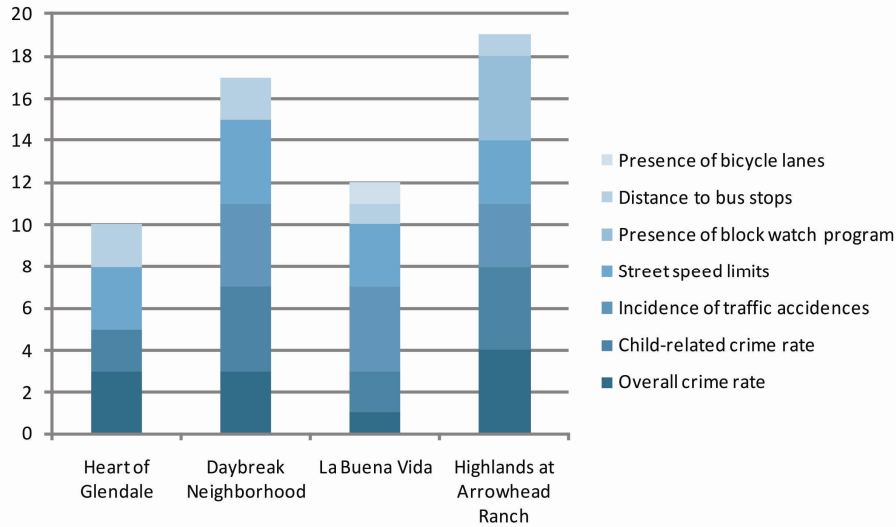
Figure 24. Resultant scores of Safety, Protection and Mobility

Access to Play and Recreation

14. Distance to parks. Calculation of distances to parks was based on GIS files provided by the city of Glendale. According to this data, there are 92 parks in Glendale, and all of the case study neighborhoods have parks within the 0.5 mile buffer. The results are presented in Table 18.

Table 18.
Distance to Parks

N	Name of Neighborhood	Number of Parks within 0.5 mile buffer	Average Distance	Points
1	Heart of Glendale	8	0.544	2
2	Daybreak Neighborhood	4	0.579	2
3	La Buena Vida	6	0.472	3
4	Highlands at Arrowhead Ranch	3	0.713	2

Heart of Glendale has access to 8 parks with an average distance 0.544 miles. Two of these parks are located directly within the neighborhood area, while the remaining 6 are within the 0.5 mile buffer area. La Buena Vida has 6 parks, but only one is located within the neighborhood area. However, the

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average distance to the parks (0.472 mile) is considered more accessible.

Daybreak Neighborhood has 4 parks with an average distance of 0.579 mile.

There are no parks within the neighborhood area itself. Highlands at Arrowhead

Ranch has access to 3 parks, and one of them is located in the neighborhood. The

average distance to the parks is 0.713 miles.

      15. Distance to playgrounds. Calculation of distances to playgrounds

was based on GIS files that were provided by the city of Glendale. Playgrounds

are usually located in parks, so that this indicator is really a more specific

measure of the distance to parks indicator, but only includes parks with

playgrounds. According to the data provided, there are 52 parks with

playgrounds in Glendale. The indicator results are presented in Table 19.

Table 19.
Distance to Playgrounds

N	Name of Neighborhood	Number of Playgrounds within 0.5 mile buffer	Number of Playgrounds within 1 mile buffer	Average Distance	Points
1	Heart of Glendale	3	N/A	0.515	2
2	Daybreak Neighborhood	2	N/A	0.543	2
3	La Buena Vida	3	N/A	0.556	2
4	Highlands at Arrowhead Ranch	0	5	1.256	1

      The Heart of Glendale and La Buena Vida each have 3 accessible parks

with playgrounds, with average distances of 0.515 and 0.556 miles, respectively.

Only one of these parks is located in the neighborhood within the neighborhood,

and it is in Heart of Glendale. Daybreak Neighborhood has only 2 accessible

parks with playgrounds, and both are located outside of the neighborhood with

an average distance of 0.543 mile from all points.

The Highlands at Arrowhead Ranch has 5 accessible parks with playgrounds, however, all of them are located within a 1 mile buffer of the neighborhood, with an average distance of 1.256 miles. There are no parks with playgrounds located within this neighborhood.

16. Distance to sport facilities. Calculation of distances to sports facilities, such as playing fields and sport courts, was based on GIS files provided by the city of Glendale. Sport facilities are usually located in parks, so that— like the distance to playgrounds indicator (15) — this indicator again a more specific measure of the distance to parks, but only includes parks with sports facilities. According to the data, there are 54 parks with sport facilities in Glendale. The results are presented in Table 20.

All case studies have sport facilities within a 0.5 mile buffer of the neighborhood. The Daybreak Neighborhood has only one park with sports facilities, with an average distance from all points in the neighborhood of 0.578 miles. La Buena Vida has two parks with sport facilities with an average distance of 0.555 miles; they are both located outside of the actual neighborhood.

Table 20.
Distance to Sport Facilities

N	Name of Neighborhood	Number of Sport Grounds within 0.5 mile buffer	Average Distance	Points
1	Heart of Glendale	3	0.515	2
2	Daybreak Neighborhood	1	0.578	2
3	La Buena Vida	2	0.555	2
4	Highlands at Arrowhead Ranch	3	0.712	2

The remaining case study neighborhoods each have 3 parks with sport facilities. The Heart of Glendale has one park with sports facilities located in the neighborhood, and the average distance for all 3 parks with sports facilities is

0.515 miles. Although the Highlands at Arrowhead of Ranch has one park with sport facilities in the neighborhood, the average distance for all facilities is 0.712 miles.

17. *Distance to public swimming pools.* Calculation of distances to public swimming pools was based on GIS files provided by the city of Glendale. According to this data, there are 7 public swimming pools in Glendale, none of which are located even within a 1 mile buffer of La Buena Vida or the Highlands at Arrowhead Ranch neighborhoods. The results for this indicator are presented in Table 21.

Table 21.
Distance to Public Swimming Pools

N	Name of Neighborhood	Number of Public Swimming Pools within 0.5 mile buffer	Number of Public Swimming Pools within1 mile buffer	Average Distance	Points
1	Heart of Glendale	1	0	0.607	2
2	Daybreak Neighborhood	1	0	0.459	3
3	La Buena Vida	0	0	N/A	0
4	Highlands at Arrowhead Ranch	0	0	N/A	0

The Heart of Glendale and Daybreak Neighborhood each have one public swimming pool within 0.5 mile buffer; the average distance is 0.607 and 0.459 miles, respectively.

18. *Distance to community/recreation centers.* Calculation of distances to community/recreation centers was based on GIS files that were provided by the city of Glendale. According to this data, there are 2 parks with recreation centers and 6 community centers in Glendale. It is important to note that for this study, community/recreational centers were considered public locations where members of a community can gather for group activities, social

support, public information, and other purposes. The results are presented in

Table 22.

Table 22.
Distance to Community/Recreation Centers

N	Name of Neighborhood	Number of Recreation Centers within 0.5 mile buffer	Number of Recreation Centers within 1 mile buffer	Average Distance	Points
1	Heart of Glendale	1	0	0.560	2
2	Daybreak Neighborhood	0	1	0.864	1
3	La Buena Vida	0	0	N/A	0
4	Highlands at Arrowhead Ranch	0	1	1.143	1

La Buena Vida does not have community/recreation centers even within a

1 mile distance of the neighborhood, according to the data.

The Heart of Glendale has two community centers in the buffer of 0.5

mile and one recreation center; one of community center is in the centre of the

neighborhood area (5401 W. Ocotillo Rd.) and one is outside. As a result, the

average distance to a neighborhood center for residents of the neighborhood is

0.428 miles, which is quite walkable. The Daybreak and Highlands at

Arrowheads Ranch neighborhoods each have one community center within a 1

mile buffer, and the average distances are 0.864 and 1.143 miles, respectively.

19. Distance to big parks with recreational trails, rivers and

lakes. Calculation of the distances to big parks with recreational trails, rivers

and lakes was based on GIS files provided by the city of Glendale. The results are

presented in Table 23.

The Heart of Glendale has access to one park with a pond, which is

located in a 1 mile buffer zone, with an average distance of 1.013 miles. The

Daybreak Neighborhood also has access to one big park, which is located in the

0.5 mile buffer for an average distance of 0.552 miles.

Table 23.
Distance to Big Parks with Recreational Trails, Rivers and Lakes

N	Name of Neighborhood	Number of Big Parks within 0.5 mile buffer	Number of Big Parks within1 mile buffer	Average Distance	Points
1	Heart of Glendale	0	1	1.013	1
2	Daybreak Neighborhood	1	0	0.552	2
3	La Buena Vida	0	0	0	0
4	Highlands at Arrowhead Ranch	0	0	0	0

The resultant score for the Access to Play and Recreation dimension is

presented in Figure 25. This shows that there seems to be a counter-intuitive

relationship between scores for this dimension and income level. The low and

lower-middle income neighborhoods have the best scores, and the high income
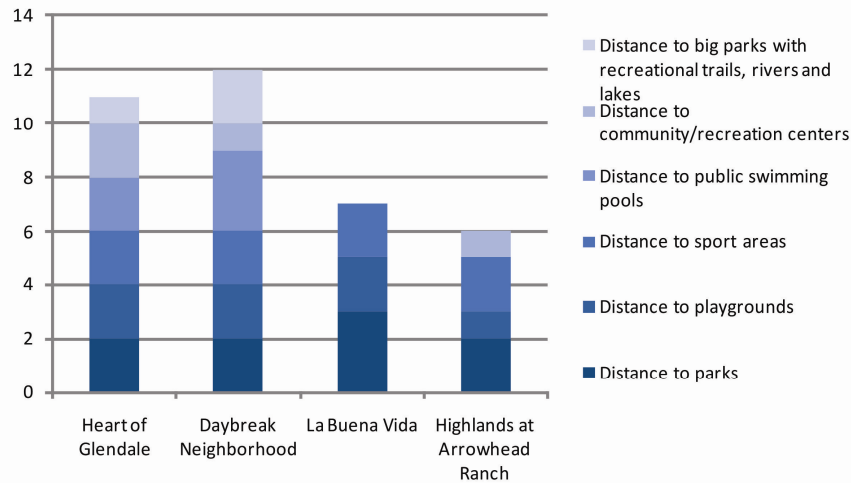
neighborhood has the lowest.

Figure 25. Resultant scores of Access to Play and Recreation

Community Life

20. Board meetings. These indicators show whether or not the case study neighborhoods have board meetings, which is an indicator of community involvement in a neighborhood. The results are based on data from the neighborhoods' fact sheets on Glendale's Neighborhood Information System. Currently, only the Heart of Glendale has a monthly board meeting. A summary of the results is presented in Table 24.

Table 24.
Presence of Board Meetings

N	Name of Neighborhood	Presence of Board Meetings	Points
1	Heart of Glendale	Yes	4
2	Daybreak Neighborhood	No	0
3	La Buena Vida	No	0
4	Highlands at Arrowhead Ranch	No	0

21. Race diversity. Calculation of Simpson's race diversity index was based on 2009 ACS 5-year estimates for item B02001-Race data at the census tract level. Races that are usually present in the US census were taken into consideration: White, African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, and Some other race. Hispanic population was included as a separate race group. The results are presented in Table 25.

The Highlands at Arrowhead Ranch and Daybreak Neighborhood have a relatively homogenous white population, with low Simpson's index values of 0.502 and 0.402, respectively. The Heart of Glendale also has a low diversity value (0.446), but with domination of a Hispanic population.

Table 25.
Race Diversity

N	Name of Neighborhood	Simpson's Race Diversity Index	Points
1	Heart of Glendale	0.446	2
2	Daybreak Neighborhood	0.502	2
3	La Buena Vida	0.725	3
4	Highlands at Arrowhead Ranch	0.402	2

La Buena Vida has the highest racial diversity, with a Simpson's index of 0.725. In this neighborhood there is nearly an equal distribution between white, Hispanic, and other races.

22. Age diversity. Calculation of Simpson's age diversity index was based on 2009 ACS 5-year estimates for item B01001-Age of American Community Survey data at the census tract level. From this data, 18 age groups were distinguished with intervals of 5 years (0-4, 5-9, 10-14, 15-19 years old, and so on). The results are presented in Table 26.

Table 26.
Age Diversity

N	Name of Neighborhood	Simpson's Age Diversity Index	Points
1	Heart of Glendale	0.916	4
2	Daybreak Neighborhood	0.921	4
3	La Buena Vida	0.920	4
4	Highlands at Arrowhead Ranch	0.923	4

There is age diversity in all neighborhoods; all neighborhoods have high Simpson's index values.

23. Presence of educated people. Calculation of the location quotient coefficient for the presence of educated people was based on 2009 ACS 5-year estimates for item B15002-Sex by educational attainment for the population 25

years and over, where the key value is the number of people with associate's/bachelor's degrees and higher. The results are presented in Table 27.

Table 27.
Presence of Educated People

N	Name of Neighborhood	Total number of people with degree	LQ	Points
1	Heart of Glendale	174	0.25	1
2	Daybreak Neighborhood	1275	1.25	4
3	La Buena Vida	1089	1.11	4
4	Highlands at Arrowhead Ranch	1679	2.29	4

The Heart of Glendale has the lowest location quotient coefficient (0.25) for this indicator because, according to the American community Survey, there are only 174 people with associate's/bachelor's degree and higher in the relevant census tract. The rest of the neighborhoods have location quotient coefficients greater than 1, which means that the presence of educated people in general is higher than the average for the city of Glendale.

Resultant scores of indicators for the Community Life dimension of all neighborhoods are presented in Figure 26. There is not a significant difference between the final scores of the four case study neighborhoods. However, for example, the lack of educated people in the Heart of Glendale is compensated by the presence of a monthly board meeting for the neighborhood's Community Life score.

Final score

The final score is a summary of all six dimensions, with each dimension equally weighted for a maximum of 4 points. Therefore the, final scores of the child-friendliness evaluation are presented in Table 28. and Figure 27, 28.
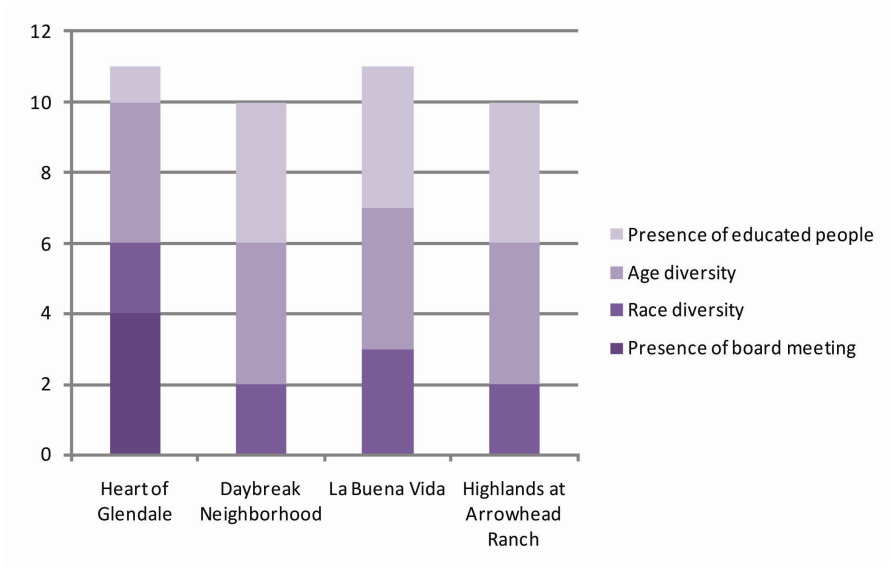
Figure 26. Resultant scores of indicators for community life

Table 28.
Final Scores of the Child-Friendliness Evaluation

Neighborhoods	Heart of Glendale	Daybreak Neigh-borhood	La Buena Vida	Highlands at Arrowhead Ranch
Income level of a neighborhood	Low-income	Lower-middle income	Upper-middle income	High-income
Home environment	3	4	4	4
Health and Social Services	0	2	0	2
Educational Resources	3.25	1.75	1.5	1.75
Safety, Protection and Mobility	1.43	2.43	1.71	2.71
Access to Play and Recreation	1.83	2	1.17	1
Community Life	2.75	2.5	2.75	2.5
Total	12.26	14.68	11.13	13.96

There is not a significant difference between the final scores for the four

case study neighborhoods. However, we can say that the high and lower-middle

income neighborhoods are somewhat child-friendly neighborhood, while the

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upper-middle and low-income neighborhoods are not child-friendly, as per the score definitions in chapter 3.

It is difficult to see a relationship between child-friendliness and the income level of the case study neighborhoods. However, it is possible to see that each dimension of the assessment has particular factors that influence the overall score. Therefore, the null hypothesis, that there is no relationship between income level and child-friendliness in a city at neighborhood level, was supported by the findings in the four case studies. Children who live in the high-income neighborhood do not have more child-friendly living conditions; at the same time, children who live in poor neighborhoods can have slightly better conditions, though this does not make these neighborhoods a perfect environment for children.
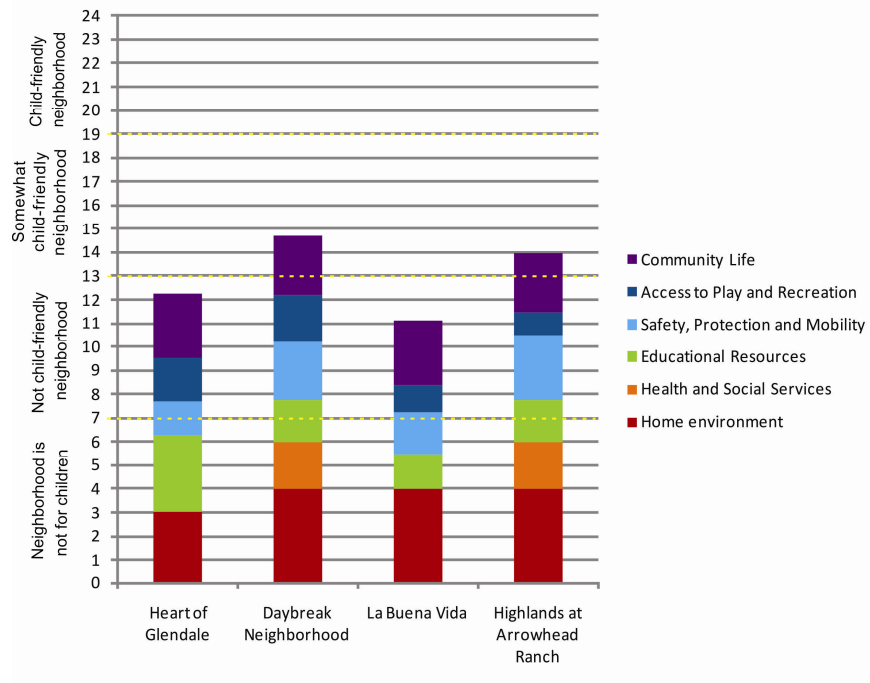

Figure 27. Final score of the evaluation

Chapter 5

DISCUSSION AND CONCLUSION

Discussion

The final scores of the evaluation assessment suggest that there may be some validity to the alternative hypotheses— that there is a correlation between the income level of a neighborhood and the child-friendliness of its built environment. However, this relationship is not clear, which is why it is necessary to consider all of the factors that can influence the results of the analysis.

First, it is necessary to look at the structure and content of the evaluation framework itself. According to the evaluation framework, there was not much of a difference between the case study neighborhoods for the Home Environment, Health and Social Services and Community Life dimensions. As the evaluation framework is calibrated for use in different neighborhoods, the Home Environment dimension should probably include more indicators for a more thorough assessment of children's living conditions. However, because of a lack of available information, the Home Environment dimension was limited to only one indicator for these case studies. Future use of this framework should consider adding indicators related to air, water, waste pollution, and other relevant aspects of the home environment if there is data available.

Health and Social Services dimension has also limited number of indicators. As was mentioned before, the presence of hospitals as such does not play as important of a role, because in American cities it seems that parents take their children to a particular family doctor, which may or may not be in a hospital, and is not necessarily dependent on distance; that is why there is only one indicator that addresses physical health. In addition, because of a lack of

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available information, services of mental health are missing in the evaluation framework. This field requires an additional research.

Additionally, the Community Life dimension could also include more indicators, such as events for children at the local level that allow more opportunities for socialization. This was not included in these case studies because of limited data. On the other hand, the results for the other dimensions varied between the case study neighborhoods, which means that the framework proposed here is able to distinguish the differences in child-friendliness in some aspects of the built environment.

The Final results of the evaluation by each neighborhood are presented in the Figure 27.
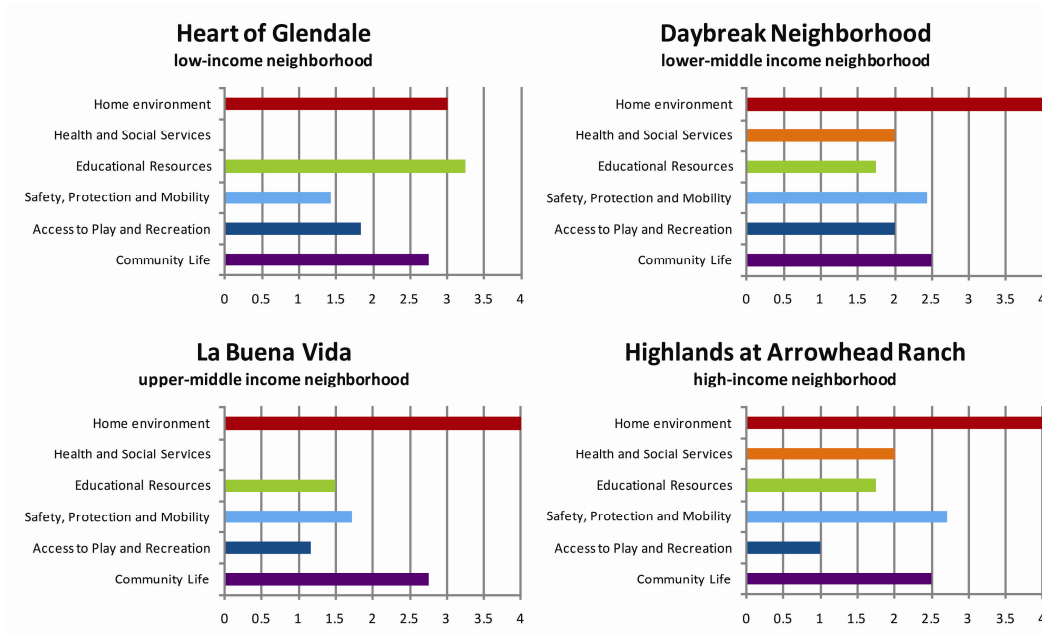

Figure 28. Final results of the evaluation by each neighborhood

The final score for the low-income neighborhood, the Heart of Glendale, was quite high. We can see that dimensions such as access to play and recreation, and especially educational resources have higher scores for Heart of Glendale

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than in higher-income neighborhoods. At the same time, however, the safety, protection, and mobility dimension has the lowest value of all of the case study neighborhoods.

Heart of Glendale's high scores were achieved almost entirely through the distance indicators, because it is located near downtown Glendale where many city services are located and development is more dense in general with smaller block sizes. The upper-middle and high income neighborhoods have less accessibility to many of downtown's services. In these neighborhoods, children are more dependent on their parents, who drive them to access particular amenities. On the other hand, it is important to mention that high-income single family houses often have swimming pools and yards for children to play. However, at the same time, children lack social interactions; they cannot gain life experience when they stay locked in their houses by themselves or with friends that were chosen by their parents.

The low-income neighborhood— Heart of Glendale— also has a high rate of crimes and traffic accidents. Even if children's mobility is sufficient in the neighborhood, which is included in the same dimension, it is the area with the highest number of crimes in the city. Future use of this evaluation framework may consider separating these factors between two dimensions. Neighborhoods with high income often focus on safety and protection by creating gates and limiting access to the living areas. As a result, the high-income neighborhood has the lowest crime rate of the case study neighborhoods; moreover, it has a block watch program which acts as further prevention of crime, and increases the score for this dimension.

However, Daybreak Neighborhood— the lower-middle income case study— has the highest final score for the evaluation assessment. This neighborhood is located in the northern part of Glendale, where income in general is higher. It is also significant that this neighborhood is located on the border between Glendale and Peoria; in general, Peoria residents have higher incomes, especially in the area where the Daybreak Neighborhood is located. Moreover, services that are located in Peoria were not taken into consideration in indicator calculations, but could potentially make the final score even higher if included. As a result, Daybreak Neighborhood has uniform scores between all dimensions; it has a high score for the Safety, Protection and Mobility dimension. In addition, this neighborhood has a good score for Access to Recreation and Play, because it is located next to the Thunderbird Paseo Park that includes playgrounds and sports facilities.

La Buena Vida, the upper-middle income neighborhood, has the lowest final score, which seems to be caused mainly by its isolated location. This neighborhood is located far to the west of downtown Glendale, separated by many blocks of low-income neighborhoods where there is high level of overall crime rate, which makes it not safe for children. The La Buena Vida neighborhood is located next to University of Phoenix Stadium that opened in 2006 and is a major attraction for the entire Phoenix metropolitan area. This area is expected to continue developing, but currently, there are not many services for children. The lack of public transportation makes this neighborhood even more isolated, and not independently accessible for children.

As many indicators of the evaluation framework were based on features of the neighborhoods including buffers of 0.5 and 1 mile around them, a fairly large

area of the city of Glendale was considered in this research. This leads to the possibility of considering child-friendliness not only at the neighborhood level, but also at the city level, like UNICEF's Child Friendly City Initiative. Findings can also be used to characterize particular regions of the city and guide future redevelopment in terms of child-friendliness.

As the research covered a large area of the city, it is necessary to pay attention to indicators that received the lowest score for several neighborhood because this means that the city of Glendale has deficiencies in these fields. First of all, it is obvious that according to the data from the city of Glendale, there are only six centers with urgent care and two emergency rooms in the city, and they are not located walkable for children in the case study neighborhoods. However, it is necessary to mention that probably these data do not necessarily reflect the real situation, because there may be additional services available that are not in the list of local municipalities. There same is true for child-day care services; local municipalities do not have data available about how many services the city has or where they are located; Google maps data was used to complete the evaluation. The local authorities could not provide relevant information, because they did not have any available information about these services.

According to the research, there is a lack of accessible middle schools, and additional educational services such as libraries, public swimming pools, and community and recreational centers. Primary schools, on the other hand, seem to be better distributed for children to access independently. However, because of the relatively low population density in Glendale, it may not be economically feasible to increase the number of these services. The current pattern of urban

development has created conditions a car-dependent population, which makes the city less child-friendly.

The infrastructure for alternative kinds of transportation, which is very important for children's mobility, is not well-developed. According to the data, there are not many bike lanes in the city that support cyclists with the proper conditions for riding, such as safety and comfort. Children can bike around their neighborhoods without marked bike lanes, but it is necessary to separate car and bike lanes for safety. A lack of public transportation in geographically-isolated areas, such as La Buena Vida neighborhood, is also not a child-friendly feature that isolates children.

The distribution of parks in the city is acceptable. However, some parks are missing playgrounds and sports facilities, and only one park in the city has a pond, despite the fact that it is important for children to experience games with water and different natural materials, and to observe wild life and nature.

Recommendations

An evaluation of child-friendliness provides empirical evidence that can be utilized to improve the urban environment for children. If Glendale policymakers want to create a more child-friendly urban environment, then they can address UNICEF to participate in the Child-Friendly City Initiative and develop a strategic plan for future actions. Based on the results produced, this study suggests a few recommendations to city planners and officials to ensure future generations of children have the proper conditions for living and development:

1. Create a database of services for children in the city. Standardization or uniform classification system for these services would improve the

planning and development of the urban environment in terms of child-friendliness in the future. It is necessary to first benchmark the existing conditions in the city. Some institution, offices and businesses can provide particular services to children, however, there is no information available about this. Such information can help to make these sorts of services available in the city for future planning.

2. Define priorities for development based on results of the evaluation. Because of limited resources, it is necessary to prioritize those developments that will have the most positive impact toward making the whole city more child-friendly:

   a. For low-income neighborhoods, the first priority should be to reduce the crime rate. A long-term strategy should be created that addresses both crime prevention and reduction. However, the first step could be promoting block watch programs in these neighborhoods.

   b. For neighborhoods that are isolated in the western part of the city, it is necessary to extend public transportation routes that will provide people with alternative transportation. Children should have the opportunity to travel in the city independently. Currently, children from this area do not have this opportunity.

   c. For high-income neighborhoods, it is important to educate and regulate developers, so that they construct neighborhoods that take children's needs into account.

3. Promote events for children from neighborhoods of different income levels to avoid socio-economic segregation. There appears to be some socio-economic segregation already, and these sorts of events can help to

maintain tolerance and diversity in society, and also allow children to connect with children outside of their normal circle.

Conclusion

Sustainable planning and development of cities is becoming more popular throughout the world. However, are today's so-called sustainable cities a good place for today's children? Do they create the proper conditions to learn about sustainability principles in daily life?

Children need to have a safe, healthy, and clean environment where they can experience social diversity and equal human rights, interact with nature, and play, create, improvise and imitate adult life independently, so that they learn everything that is necessary for a future life of their own. A city that can provide children with these conditions can be considered a child-friendly city that contributes to a future sustainable society.

In terms of planning, such conditions will be expressed through urban design that addresses mobility and access to play space. Good mobility for children means the possibility of independent movements at the neighborhood level. Children should have the opportunity to move around their neighborhood independently without threats to their safety. This can be achieved through walkable design and the presence of safe public transportation. Access to play space for children means the presence of public, green space nearby, where children can meet independently and feel safe. Playgrounds can be one kind of play space, however, children should have the opportunity to express themselves, which is why open, natural areas that encourage creativity, and free activities are also important.

The city of Glendale is one American city that has experienced fast growth of suburban development that has been largely car-centric. The needs of children have been neglected, and urban design and planning have not considered children as a major stakeholder in development decisions. Regardless of a neighborhood's income level, all children face deficiencies in their urban environment that limit their ability to be independent and develop their social skills. However, it is possible to make the city more child-friendly by paying attention to the findings of this research.

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