UNIVERSITY OF NORTH TEXAS
HEALTH SCIENCE CENTER AT FORT WORTH
1970

W 4.5 B993e 2006
Byerly, Jerah J.
Examining the
relationship between

LEWIS LIBRARY
UNT Health Science Center
3500 Camp Bowie Blvd.
Ft. Worth, Texas 76107-2699

Byerly, Jerah J., Examining the Relationship between Relative Wellbeing & Health Disparities in the City of Dallas. Master of Public Health (Community Health), August 2006, 43 pp., 8 tables, 6 illustration (figures), bibliography, 29 titles.

Health disparities are studied across many diseases and demographic characteristics. This study examined health disparities in relation to geographic assets ... a social determinant of health. The purpose of this project was to replicate the Relative Wellbeing Index model in Albrecht & Ramasubramanian's 2004 study, "The Moving Target: A Geographic Index of Relative Wellbeing". This study sought to measure well-being at the neighborhood level in Dallas. Data was collected from 2000 U.S. Census. Results indicated the presences of pockets of extreme concentration and social isolation. South Dallas and Fair Park, two of the lowest socioeconomic neighborhoods, had the lowest level of wellbeing. In conclusion, the study indicated Well being scores were *not* equally distributed across neighborhoods in the City of Dallas.

EXAMINING THE RELATIONSHIP BETWEEN RELATIVE WELLBEING &

HEALTH DISPARITIES IN THE CITY OF DALLAS

Jerah J. Byerly, B.S.

APPROVED:

Major Professor

Committee Member

Committee Member

Department Chair

Dean, School of Public Health

EXAMING THE RELATIONSHIP BETWEEN RELATIVE WELLBEING & HEALTH DISPARITIES IN THE CITY OF DALLAS

THESIS

Presented to the School of Public Health

University of North Texas
Health Science Center at Fort Worth

in Partial Fulfillment of the Requirements

for the Degree of

Master of Public Health

By

Jerah J. Byerly, B.S.

Fort Worth, Texas

August 2006

ACKNOWLEDGMENT

Special acknowledgment to Dr. Tim Bray of University of Dallas and The J. McDonald Williams Institute for his statistical guidance and assistance.

TABLE OF CONTENTS

LIST OF TABLES.....iv

LIST OF FIGURES.....v

Chapter

I. INTRODUCTION.....1

II. LITERATURE REVIEW.....10

III. METHODOLOGY.....20

IV. RESULTS.....27

V. CONCLUSION.....31

APPENDICES.....34

REFERENCES.....41

LIST OF TABLES

Table 1. Age Adjusted Mortality Rates in Texas, Dallas County, and South Dallas per 100,000, Leading Causes of Death (2002)... 3

Table 2. Social Capital Definitions.....18

Table 3. Geographic Coverage.....20

Table 4. Descriptive Statistics for Wellbeing Factors.....27

Table 5. Results of Principal Components.....28

Table 6 Scoring Coefficients for Principle Component.....29

Table 7. Zip Code Wellbeing Scores for the City of Dallas.....29

Table 8. Age Adjusted Mortality Rates.....32

LIST OF FIGURES

Figure 1. Healthiest to Least Healthy Areas in Dallas.....4

Figure 2. The Psychological Stress Response.....16

Figure 3. Spatial Distribution of Wellbeing Factors, 2000.....37

Figure 4. Scree Plot.....38

Figure 5. Wellbeing in Dallas Block Groups.....39

Figure 6. Wellbeing in Dallas ZCTAs, 2000 40

I. Chapter 1: Introduction

A. Problem

Life expectancy and the quality of life have improved in America, but not equally among all Americans. Many Americans are experiencing rates of morbidity and mortality that are disproportionate to those of other racial, ethnic, and economic groups. Terms used to describe these differences include *health disparities, unequal access,* and *health inequities.* According to Congress as cited by the National Center for Minority Health and Health Disparities, a health disparity is "'a significant disparity in the overall rate of disease incidence, prevalence, morbidity, mortality, or survival rate' in a specific group of people as compared to the general population" (2001, p. 3).

In the United States, health disparities are typically examined across two spectra: race and socioeconomic position (SEP). Both Marmot (1999) and Krieger et al. (2005) suggest that income inequality and racial disparities in health mirror the social environment and are part of what these authors call *social determinants of health.* Social determinants of health include economic and social conditions that, in addition to biological factors, influence health and wellbeing. For example, although the United States spends roughly 15% of its Gross Domestic Product (GDP) on health care, the nation still ranks 1st in infant mortality, 37th in overall performance of the health care system, and 40th in patient satisfaction when compared with other industrialized nations. In addition, the United States is the only industrialized country that does not provide its citizens with universal access to health care.

Thus, it is readily apparent that the financial capital of a country does not necessarily equate to wellness and positive health outcomes. One possible reason for this is the fact that some aspects of health outcomes can be impacted by the social environment. The social determinants of health framework is receiving more attention from scholars and public policy makers as Americans become more

stratified by race, SEP, and occupations. For example, recent studies indicate that 1 out of every 4 Texans is uninsured—making the state's uninsured rate the largest in the country. Another recent study suggests that Texas has the second largest income disparity between the top 5% of wage earners and the bottom 20% of wage earners in the nation (American Community Survey, 2004; Center on Budget and Policy Priorities & Economic Policy Institute, 2005). While socioeconomic position (SEP) is a major influence on health disparities in the United States, other contributing factors include the environment, specifically in regard to geographic location, racism, discrimination, and stress (Williams, 2002; Green, Lewis, & Bediako, 2005).

Dallas, Texas

Dallas is the eighth largest city in the United States, with a total population of 1.2 million residents (U.S. Census Bureau, 2004). Approximately 42% of the total population resides in the southern sector of Dallas and 58% in the northern sector. There are significant differences between the two spatial areas, including demographic, social, economic, and health disparities. More than 80% of the southern sector residents are minorities, while the northern sector residents are predominately White. Southern Dallas residents have traditionally experienced higher crime rates and lower levels of academic attainment. Moreover, South Dallas residents experience higher unemployment rates and lower rates of capital investments from both the private and public sector. References

Furthermore, a recent analysis titled "Dallas at the Tipping Point" suggests vast disparities in the city's tax base between its northern and southern sectors. South Dallas represents only 16% of the tax base (Booz, Allen, & Hamilton, 2004). These facts are important for several reasons. First, the total population size of Dallas's southern sector is roughly 550,000 people (U.S. Decennial Census, 2000). If the Dallas southern sector were a city by itself, it would be the 26th largest city in the country—larger than the cities of Atlanta, New Orleans, and Washington, D.C. Second, southern sector residents experience significantly higher rates of morbidity

and mortality than Dallas' northern sector residents (see Table1). In addition, disparities exist in many areas within Dallas' southern sector, especially in the South Dallas/Fair Park area (zip codes 75210 & 75215).

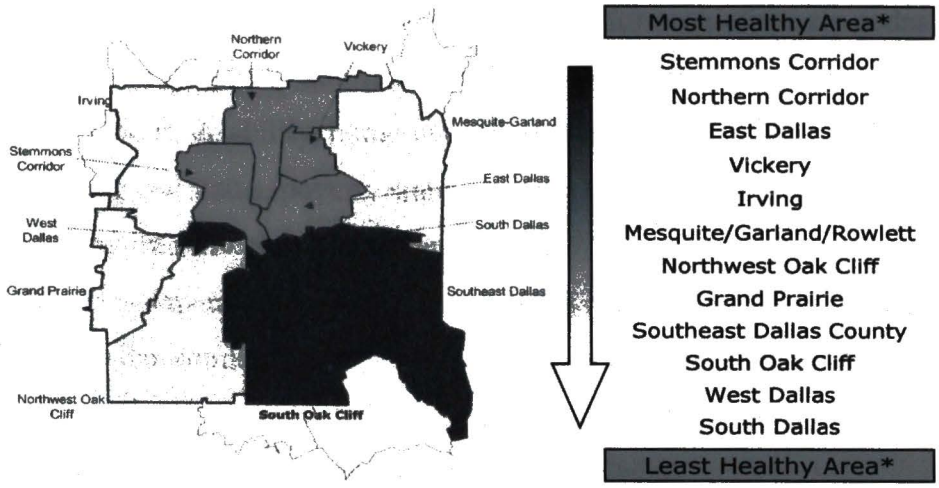
According to the 2004 Parkland Hospital Check-up (2004), the South Dallas/Fair Park area had a 61.2% uninsured rate. Residents in this area are experiencing mortality rates that are 2 to 5 times higher than those of other areas in Dallas County. As shown in Table 1 below, in 2002 South Dallas experienced higher rates than both the county and state in multiple health outcomes.

Table 1. Age Adjusted Mortality Rates in Texas, Dallas County, and South Dallas per 100,000, Leading Causes of Death (2002)

Cause of Death	2002 Texas	2002 Dallas County	2002 Fair Park South Dallas
Heart Disease	253.1	261.1	472.7
Cancer	191.5	195.7	301.1
Stroke	62.7	61.0	66.7
Diabetes	32.1	26.7	77.8
Flu	21.9	20.5	28.1
Accidents	39.9	16.3	24.9
Septicemia	13.1	12.5	13.5
Kidney Disease	12.5	11.7	20.7
Homicide	6.3	10.8	48.9
Cirrhosis	11.8	10.7	34.4
Suicide	11.0	10.7	48.5
HIV/AIDS	5.0	8.2	33.2

Parkland Hospital Annual Checkup, 2005

Figure 1. Healthiest to Least Healthy Areas in Dallas



Parkland Hospital Annual Checkup, 2005

B. Purpose

According to Kreiger et al. (2005), the current U.S. public health surveillance systems lack critical socioeconomic data needed to assess the contributions of SEP inequalities to health disparities among racial and ethnic groups. These authors believe the understanding of this association is essential for the understanding of social disparities in health in America. Albrecht and Ramasubramanina's 2004 study titled "The Moving Target: A Geographic Index of Relative Wellbeing" attempted to address this shortcoming and described a measurement called the *Index of Relative Wellbeing*. The Index of Relative Wellbeing is a composite index that aggregates equally weighted measures that directly and indirectly impact individual as well as neighborhood health.

The purpose of this project is to apply the Index of Relative Wellbeing model in Albrecht and Ramasubramanian's 2004 study to the city of Dallas. More specifically, this study seeks to measure wellbeing at the neighborhood level, as distinguished by zip code.

Specific aims of the study are:

1. To create an index of relative wellbeing for each of the zip codes in Dallas County using 10 key variables from the 2000 U.S. Census (income support, disability, homeownership, overcrowding, educational attainment, parental status, poverty status, vehicle ownership, unemployment, and having a telephone at home).
2. To compare wellbeing measures across zip codes in the city of Dallas
3. To determine if those areas with the lowest measures of wellbeing are similar to the areas that have been identified in published studies to have the highest rates of health disparities in Dallas.

C. Hypothesis

The null hypothesis in this study is that wellbeing scores are equally distributed across neighborhoods in the city of Dallas.

D. Delimitations (Internal Validity)

Delimitations to the study include the following:

- Any case with an invalid zip code was excluded from the analysis.
- Zip codes selected were limited to the city of Dallas.

E. Limitations (External Validity)

As pointed out in the 2004 Albrecht and Ramasubramanian study, the wellbeing index should not be used as an end-all indicator, but should rather be used as a proxy measure. Index scores are reported on an ordinal scale, or ranking system, and should be interpreted accordingly. The index was formulated to measure relative deprivation and not absolute deprivation.

This research can be characterized as an ecological study, as it evaluated possible associations between two variables by comparing groups, which are more

commonly used to show patterns of emergence. In this study, groups are defined by block groups and then by zip code tabulation areas (ZCTAs), which serve as a proxy measure for zip codes. There are two major disadvantages of ecological studies: ecological fallacy (associations existing at an aggregate level may not exist at an individual level) and imprecise measurement of variables.

External validity limits data interpretation, such that findings in the study population may not be representative of the target population. Ultimately, target populations in this study were individuals residing in the city of Dallas ZCTAs. The study population is a subset, or sample, of the target population. Extreme measures, or outliers, within ZCTAs may drive outcome measure(s) for the entire geographic area. For example, a small pocket of wealth within a low-income neighborhood or ZCTA may lead to the ZCTA's appearing less impoverished. One way this potential limitation was addressed in this study was to show wellbeing scores at both the census block and ZCTA levels. Unfortunately, the majority of health outcomes are not measured at a level lower than the zip code level.

Wellbeing, as used in this research, is not to be confused with wellness. In this study, wellbeing is defined as a relative measure of socioeconomic status. While the two terms are conceptually different, it is my belief that wellbeing directly affects the wellness of a community.

F. Assumptions

The study was conducted under the following assumptions:

1. Variables in the data set are measured consistently.
2. The U.S. decennial census is the most reliable and valid measure of accurately assessing the social, economic, and demographic indicators at the neighborhood, city, county, and state levels.

G. Conceptual Definitions of Measures

Refer to Appendix A for data operational definitions.

Index of Wellbeing, as described in Albrecht and Ramasubramanian, 2004

- Income support: Income support includes social security, supplemental security income, public assistance, or any kind of support from a governmental agency. Individuals receiving support are typically not in a secure enough financial position to cope with any abrupt changes in their social or physical environments. Such changes have potential to negatively affect their wellbeing (Albrecht & Ramasubramanian, 2004).
- Disability: This variable is inclusive of physical, cognitive, and emotional disabilities. A person with a disability may have limited employment opportunities and have more costly health expenditures.
- Homeownership: Homeownership is a measure of assets, economic stability, and wealth. Studies have shown a positive relationship between homeownership and overall wellbeing (Albrecht & Ramasubramanian, 2004).
- Overcrowding: Overcrowding can be caused by a variety of factors, including housing costs, unemployment, and accessibility to schools and services. Overcrowding aids in the spread and propagation of disease and may create unsanitary living conditions (Albrecht & Ramasubramanian, 2004).
- Educational attainment: This indicator is usually associated with socioeconomic status, which is directly linked to health status. The level of education an individual attains dictates employment opportunities, thus affecting potential income earnings and the level of overall wellbeing (Albrecht & Ramasubramanian, 2004).
- Parental status: Single-parent households could potentially damage the wellbeing of all individuals in the home. Children in single-parent households are more likely to live in poverty and be considered at risk. They are more likely to become involved in juvenile crime and drug use and demonstrate low school performance. Single parents cope with the demands of parenting, economic hardships, and social stigmas attached to

this parental status (Albrecht & Ramasubramanian, 2004; Analyze Dallas, 2004).

- Poverty status: Poverty has an inverse relationship with health. Poverty affects nutritional, educational, transportation, housing, service, and emotional needs. Material deprivation may lead to social deprivation, both of which adversely affect an individual's wellbeing (Albrecht & Ramasubramanian, 2004).
- Vehicle ownership: Metropolitan cities around the country have been undergoing decentralization of employment, and residents have dispersed into surrounding suburbs. For many, the availability of reliable transportation, including public transportation, is a prerequisite for employment opportunities, and the lack of it can affect residents' economic stability and wellbeing (Albrecht & Ramasubramanian, 2004; Dallas, 2003).
- Unemployment: This indicator encompasses the number of individuals in the workforce who are unable to find employment. In 2000, approximately 1 in 5 Dallas children lived in a family without working parents—almost twice as high as the national average. Unemployed family members may divert limited resources to other family members and neglect their own health. Unemployment is also linked to physiological and emotional problems and may lead to the adoption of risky behaviors (Dallas, 2003).
- Telephone at home: While most homes have phones by which residents can communicate, households in low-income communities seem to be the exception. Access to information via telephone enhances communication networks and is a measurement of social capital and connectivity. Having access to a telephone affects access to information, services, and potential job leads (Albrecht & Ramasubramanian, 2004).

H. Significance

Eliminating health disparities is one of the two overarching goals of Healthy People 2010; the other is to increase quality and years of healthy life (Healthy People, 2004). This project will contribute to the knowledge and research in health disparities among this specific population by examining neighborhood conditions that create the precursors to health disparities. The research examined the spatial distribution of relative wellbeing in the study population. The results show the importance of examining neighborhood health and the benefits of spatial analysis in health.

On a local level, the findings of the study will be invaluable. The data will provide Dallas officials with additional information evaluating the dynamics that exist between neighborhoods and health, as well as the identification of key indicators (social determinants) for disparities within the city. Providing such information to public health professionals and policy makers can leverage resources and aid to promote community development in indicated "hot spots"—areas experiencing a high proportion of negative health outcomes. The creation of social and economic opportunities is essential to the growth and wellbeing of a city, and information contributing to decisions regarding where to establish these services is equally important.

II. Chapter 2: Literature Review

> *The student must clearly recognize that a complete study must not confine itself to the group, but specially notice the environment; the physical environment of the city, sections and houses, the far mightier social environment—the surrounding world of custom, wish, whim, and thought which envelops this group and powerfully influences its social development.*
>
> *—W. E. B. DuBois (1899)*

Social Context of Health

Urban environments are complex. The effect of any single influence is magnified based on population density alone. Urban areas are unique, with distinctive assets and challenges. The urban experience is diverse and requires an assortment of prevention and intervention strategies and the need for cultural competency. "Indeed, cities can defeat definition and challenge the imagination" (Galea & Vlahov, 2005, p. 1).

Urban health, the study of health in urban populations, is typically examined in two facets: (a) the health of urban populations and its subpopulations and (b) the relationships of the city's social constructs and population health (Galea & Vlahov, 2005). Understanding urban environments is a critical element in population health. Roughly half of the world's 6 billion population lives in urban areas. Thus, an examination of the urban context of health is vital.

Behaviors and health outcomes are not randomly distributed; they occur in patterns. Huie stated that "the processes that affect health and mortality are larger than the individual" (2000, p. 354). Individuals are entrenched in societies; therefore, individual behaviors have a social context. Health behaviors and health outcomes are related to social conditions, but are rarely examined in the social context. Distal social structures, which may be referred to as social determinants of health, influence day-to-day behavioral activities (Emmons, 2000). There are two ways through which neighborhoods influence health: (a) relatively short-term influences on behavior, attitudes, and health

care access/utilization and (b) the life course perspective—the long-term process of accumulated stress (both physical and psychosocial) (Ellen, Mijanovich, & Dillman, 2001).

The life course perspective suggests exposures in early life may continue to manifest in outcomes in later life. "A person's past social experiences become written into physiology and pathology of their body" (Blane, 1999). There are three hypotheses that support the life course perspective (Berkman & Kawachi, 2000). The first hypothesis infers that early childhood exposures influence the developmental process, therefore suggesting the presence of critical stages in early life. The second hypothesis is cumulative disadvantage. Disadvantage early in life increases the likelihood of disadvantages in the future and the likelihood that the accumulation of these experiences will result in disease. The third hypothesis states that early experiences lead to subsequent risk of exposure(s), which ultimately is associated with health outcomes. For example, low educational attainment does not lead directly to disease, but it sets the stage for limited employment opportunities, which may in turn lead to limited health knowledge, services, and utilization.

Spatial Variation

Negative health outcomes disproportionately affect socially and economically deprived communities. Researchers debate whether those living in poor communities exhibit more unhealthy outcomes because of their lower socioeconomic status (SES) or whether living in poor communities increases the likelihood of ill health (Ellen, Mijanovich, & Dillman, 2001). Why does health differ by communities?

One reason for this difference is the notion that neighborhoods have both social and spatial dimensions (Huie, 2000). These spatial variation explanations fall into two categories: (a) compositional and (b) contextual (Kawachi & Berkman, 2003). According to the composition theory, poor people—regardless of their residence—would be more likely to have negative health outcomes. Compositional reasons infer that the differences between places are due to the different composition of individuals within

those places, and thus focus on individual behaviors. In contrast, the contextual explanation suggests that both physical and social characteristics of locations and areas influence the health of residents. In some cases, the level of income and the SES may be more reflective of an individual's upbringing and environment than their personal attributes. The contextual model addresses relative deprivation of resources needed for adequate health and wellness, as well as the allocation and access to these resources. Poor people have limited resources (e.g., sidewalks, nutritional foods, and health services), which may hinder their wellness and increase their vulnerability (Kawachi & Berkman, 2003).

As researchers continue to examine compositional and contextual variation, there is much debate on the topic of residential choice. How much choice does a resident truly have? Kawachi and Berkman (2003) refer to this conflict of theories as *social selection vs. social causation. Social selection* refers to the ability to choose, while *causation* suggests the presence of macro-level structures that may limit or increase the opportunity to choose as well as the number of choices (Kawachi & Berkman, 2003; Marmot, 1999). For example, higher education increases an individual's employment opportunities. Similarly, how much does context interact with residential choice?

Residential segregation is also a major factor in evaluating neighborhood health. Residential segregation as defined by Borrell and Hatch as that which "refers to the composition and spatial distribution of a segment of the population" (2005, p. 72). It may occur by race and/or class. For example, African American females, regardless of income, are more likely than other women to reside in segregated, impoverished neighborhoods (Williams & Collins, 2001). Segregation suppresses diversity and may limit resources and social mobility for disfranchised populations. Equally importantly, segregation can limit one's social networks. It may also alter the quality of the physical environment (e.g., air and water quality)—an issue of environmental justice. Segregation often leads to disproportionate deprivation and exposures (Galea & Vlahov, 2005).

Acevedo-Garcia and Lochner (2003) describe Massey and Denton's proposed five dimensions of residential segregation:

(a) unevenness

(b) isolation

(c) clustering

(d) concentration

(e) centralization

Unevenness refers to the compositional dissimilarity between neighborhoods. Residential segregation increases the probability of social *isolation* and limits interaction between segregated groups. *Clustering* is the extent to which like (in composition) neighborhoods adjoin one another. Clustering may act as a precursor to *concentration*, which describes areas of high population density of the segregated population. *Centralization* occurs when a segregated population is located primarily in the central city (Acevedo-Garcia & Lochner).

Current demographic trends encourage residential segregation. Suburbanization and metropolitan deconcentration describe demographic movements of populations moving from central cities to their surrounding areas—the suburbs. Resources and jobs soon follow and leave inner cities with limited assets. The movement of businesses leads to the decrease of property taxes, a major source of revenue for schools and the city's infrastructure. Inner-city communities are often left fighting redlining and gentrification. Redlining is a term used to describe the denial of loans for housing purchases, home improvements, and homeowners insurance in areas considered to be undesirable.

Gentrification refers to the process of "buying out" residents in these undesirable areas and converting the property into middle- to high-income housing, which is often condominiums and single-family dwellings. While this process changes the economic base of the community, residents are often displaced by the area's increasing living expenses (Borrell & Hatch, 2005). The important connection here as it relates to Dallas is that very few areas across the country have experienced demographic shifts like the city of Dallas—Dallas is a minority majority city.

Neighborhood Influences

A neighborhood's abundance or lack of resources impacts behaviors, such as those related to crime, academic achievement, and exercise. Macintyre and Ellaway (2000) identified five features of areas that influence health at the neighborhood level:

- *Physical environment* of the area shared by all members of the geographic community
  - Includes air and water quality.
- *Housing and working environment*
  - Includes quality of housing, safe parks and playgrounds, and hazardous work conditions.
  - Neighborhoods vary in these features.
- *Public and private services*
  - Includes transportation, education, and welfare services.
- *Sociocultural* features
  - Include political, economic, religious, and all other cultural aspects of the neighborhood as well as variables surrounding social capital.
- *Reputation* of an area
  - For example, in the instance of redlining, it is important to note how all parties (community members, policy makers, investors, and outsiders) view a particular neighborhood because perceptions and expectations may influence behaviors of residents, the actions of governing officials, and the allocation of resources.

There are numerous pathways through which neighborhoods influence health: physical stresses, neighborhood institutions and resources, social stresses, coping strategies, social control, and social capital (Macintyre & Ellaway, 2000; Ellen, Mijanovich, & Dillman, 2001).

Physical Stresses

Physical environments directly affect health. Environmental hazards and toxins affect low-income communities disproportionately. Landfills increase exposure to pollutants, and toxins increase the likelihood of cancer and other illnesses. Chemical plants, refineries, and factories are often located in low-income areas, and lower housing standards and poorly maintained facilities are often found in these areas. Lead paint in dilapidated housing is associated with neurological disorders in children. Proximity to highways increases exposure to noise and respiratory irritants. Few resources and opportunities resulting from the structural environment may lead to stressful, unhealthy events (Huie, 2000).

Neighborhood Institutions and Resources

Neighborhoods vary in their access to health care services and quality of care. Poorer communities are more likely to be medically underserved areas. Some communities are fortunate to have cutting edge technology not only within their economic reach, but also within attainable proximity. In poorer communities, simple issues such as clinic hours, travel time, and distance may impede health services. One study of New York City neighborhoods found pharmacies in predominately minority neighborhoods were less likely than other neighborhoods to offer adequate supplies of pain medication (Morrison, Wallenstein, Natale, Senzel, & Huang, 2000).

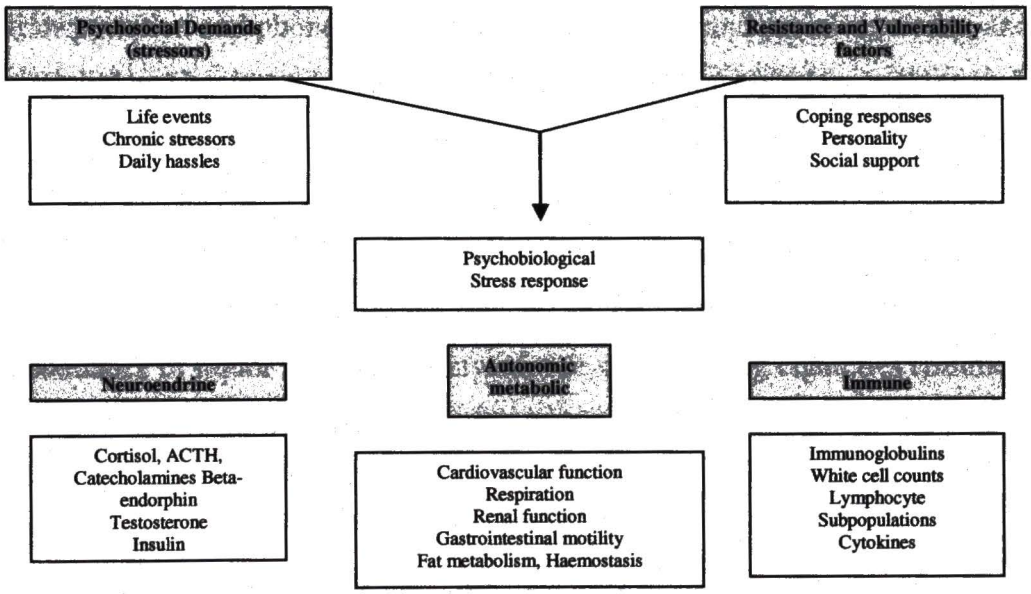
Neighborhoods may or may not supply adequate opportunities to engage in health promoting behaviors. Residents in low-income neighborhoods often experience overpriced goods—the result of limited resources and an absent competitive market. Quality foods and exercise accessibility differ by neighborhoods; for example, a neighborhood may have a community recreation center or an onsite workout and spa facility.

Social Stresses

Crime and violence are social stressors of a neighborhood that affect health. Such stressors may lead to physical and emotional trauma. Psychosocial factors are social and psychological circumstances that influence health. Unemployment, poverty, and family structure (e.g., single-parent households) may also be sources of social stress.

Biological pathways connect social structure and health. The human body has an automatic response to emergencies: the fight-or-flight response. This reaction can be described as a cascade of hormonal responses triggered by the nervous system that alert the cardiovascular and immune systems to quickly combat physical and social stressors.

Figure 2. The Psychological Stress Response (Brunner & Marmot, 1999, p. 40).



While this biological process is beneficial to acute short-term stress, it may be maladaptive to chronic accumulative stress. Psychosocial factors may disrupt neuroendocrine, psychological, metabolic, and immune processes, which may eventually lead to ill health. High levels of stress have been linked to hypertension, increased susceptibility to infection, and the likelihood of

developing chronic conditions such as heart disease and diabetes (Brunner & Marmot, 1999).

Coping Strategies

African American women are more likely than women of other ethnic groups to be single parents and reside in poor neighborhoods. These women often experience elevated levels of stress brought on by limited finances, leisure time, and physical activity (Williams, 1992). Emmons (2000) described a study conducted by Hillary Graham to examine social context among differing economic classes of English women. Graham reported four categories of influencing social context: (a) everyday responsibilities, including employment and caretaking; (b) material circumstances, such as homeownership and access to transportation and phone services; (c) social support and social networks; and (d) personal and health resources. She saw no association between smoking and minority women; however, smoking was a factor for low-income White women. Graham concluded in this study that smoking among low-income women was a coping mechanism for economic and social strife. Areas of concentrated poverty often have easier access to health-damaging coping methods, such as the abundance of liquor stores and convenience stores selling cigarettes (Emmons, 2000; Williams & Collins, 2002).

Social Control

Social control describes a community's capacity to sustain neighborhood stability and control over disorderly behavior, or social disorder. Social disorder may include acts of littering, prostitution, defamation of property, excessive truancy, and public intoxication. Social control includes addressing deviant behaviors and their consequences. Communities often leverage for and obtain or develop resources, such as police force, block grants, and homeowners associations. The collaboration of private (families), public (state and local), and

community-based institutions may be less functionally effective in enforcing social control in some neighborhoods (Raudenbush, 2003).

Social Capital, Social Cohesion & Social Networks

Social capital has been defined and conceptualized in many ways. James Coleman is credited for framing the first definition, which is listed in the table below.

Table 2. Social Capital Definitions (Kawachi & Berkman, 2000, p. 176).

Author	**Definition**
James Coleman, 1990	Social capital is defined by its function. It is not a single entity, but a variety of different entities having two characteristics in common: They all consist of some aspect of social structure, and they facilitate certain actions of individuals who are within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that would not be attainable in its absence (p. 302). *Examples*: Level of trustworthiness, extent of obligations, norms and effective sanctions, appropriable social institutions, information channels
Pierre Bourdieu, 1996	"Social capital is the sum of resources, actual and virtual, that accure to an individual or group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition" (p.119).
Glenn Loury, 1992	"[Social capital refers] to naturally occurring social relationships among persons which promote or assist the acquisition of skills and traits valued in the marketplace" (p. 100).
Robert Putman, 1993a	"Social capital … refers to features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions" (p. 167). *Indicators:* Level of trust, perceived reciprocity, density of membership in civic associations.

Kawachi and Berkman (2000) suggest the general consensus would define social capital as (a) social and (b) a public good. Social capital is defined as social

because it functions through the structure of social relationships and is a byproduct of these relationships. It is a public good because it is a feature of a collective group, such as neighborhoods, and results from the social investment of the group members. Social capital is embedded in social relationships and manifests itself through social exchange. It is cumulative and generalizable. Social capital may operate as reciprocity, social trust, intergenerational closure (exchange among generations), interdependence, group membership, and social networks (Kawachi & Berkman, 2000; Sampson, 2003; Wallack, 2003).

Social networks shape societal norms and customs; social norms assist in shaping health-related behaviors. For example, obesity in some communities may be not only common, but socially acceptable and may even be celebrated. Social environment and networks can also serve as a venue for behavior exposures, especially if an individual associates with a limited number of networks and experiences.

Social cohesion refers to the degree of connectedness among group members. It is indicated by the absence of social conflict and presence of strong social bonds and mutual trust. Researchers have found that communities with higher levels of social cohesion and social capital have better health outcomes than those with lower levels (Kawachi & Berkman, 2000; Sampson, 2003; Stansfeld, 1999).

III. Chapter 3: Methodology

A. *Population and Sample*

Wellbeing measures were compositional measures aggregated by block groups and then zip codes. Block groups were fully or partially contained in the city of Dallas, according to the 2000 Census of Population and Housing. Inclusion and exclusion criteria were as follows:

Criteria for inclusion

All block groups in the city of Dallas as identified by the 2000 U.S. Census

Criteria for exclusion

Any block group in the city of Dallas not identified by the 2000 U.S. Census

One in six households, or approximately 19 million housing units, receives the decennial questionnaire. This is a random sample that provides estimates for the aggregated study areas. All 50 states, the District of Columbia, and Puerto Rico are represented. The long form surveys nine major race and Hispanic/Latino groups and reports data by the geographic areas listed in the table three.

Table 3. Geographic Coverage

Geographic coverage: The data are available for:

U.S. Regions Divisions States Counties County subdivisions	Places Census tracts Block groups Metropolitan areas Urban areas (urbanized areas and urban clusters)	American Indian and Alaska Native areas Tribal subdivisions Hawaiian homelands Congressional districts ZIP Code® tabulation areas (ZCTA™)

Source: Census, 2002

B. *IRB/HIPPA documents*

No data set utilized contained direct (names, addresses, telephone numbers) identifiers. Data were gathered from existing data sets, and there were no human

subjects. Results reported are aggregated information by block group. Informed consent could not be obtained because as there were no direct identifiers. All data used for this study is open to the public and can be accessed via the Web at www.census.gov.

C. *Data collection procedures*

The U.S. Census Bureau gathers data at the individual level and then aggregates these data at multiple geographic levels before making them available to the public. Data used for the wellbeing index were downloaded from the Census 2000 (decennial census) link at the Census' Web site (www.census.gov) by using the Summary File Three (SF 3). Data at the census block group level for all block groups fully or partially contained in the city of Dallas were downloaded. SF 3 is simply a tabulation of the Census' long form at several levels of aggregation. One in six households throughout the country are surveyed, and the data are reported every 10 years. According to Albrecht and Ramasubramanian (2004), census data, while a collection of sample sets, currently represents the most comprehensive data available to the public.

To replicate Alberecht and Ramasubramanian's (2004) Wellbeing Index, 10 variables, representing indicators of wellbeing, were collected:

1. People with any form of income support
2. People with any form of disability
3. People not living in own home
4. People living in homes with too few bedrooms
5. People over 18 without high school qualification
6. People in single-parent households
7. People in households below poverty level
8. People in households without car
9. People unemployed (official 1999 figure)

10. People in households without phone

These 10 variables are chief among the most salient indicators of one's socioeconomic status and opportunity. The researchers propose these variables may "provide a proxy measure of health and its relationship to socio-economic status" (Albrecht & Ramasubramanian, 2004, p. 372). Demographic variables (i.e. age, sex, race, and ethnicity) were excluded from the index to ensure there would be no direct contribution of variations in demographic composition to variation in wellbeing.

Modifications and Adjustments to Index of Relative Wellbeing

While the Index of Relative Wellbeing used in this study was based on the index created by Albrecht and Ramasubramanian, it was unclear how the indicator percentages were calculated and from which universe they were drawn. The data source for disability was cited as Census Table P41. P41 identified the "total disabilities tallied for the civilian noninstitutionalized population 5 years and over with disabilities." However, P42 better represents the concept of disability as defined by the researchers, describing the concept as "people with any form of disability." In the original study, educational attainment was identified as a measure of people over 18 without high school qualification, indicating P37 as the data source. Census P37 reports people over 25 years of age. Similarly, poverty status reads as a household measure, but was collected as a population measure, P89. Lastly, there was confusion about how income support was calculated in the original article. In the initial analysis, the three components were treated equally as the numerator and were summed and then divided by the total number of households. The final analysis applied supplemental security income and public assistance as separate indicators. As the concepts remain constant between the two indexes, refer to Appendix A for indicators used in the modified Dallas index in this thesis.

D. Instrumentation

As mentioned above, the U.S. Census SF 3 is a sample data set. Information gathered is categorized as either population or housing data. There are 813 total tables, which include 484 population and 329 housing tables contained in the overall SF 3 file analysis. As Albrecht and Ramasubramanian stated, Census SF 3, while a sample, is the most comprehensive, widely acceptable public-use data available on many spatial levels.

E. Data analysis

Calculating Relative Wellbeing

The Dallas Relative Wellbeing Index was calculated using the following procedure:

1. Collected data was converted into percentages representing 10 identified concepts/variables for the index.
2. Using STATA statistical software, a principal component analysis (PCA) was calculated for all 1,469 Dallas block groups.
3. Review of eigenvalues and scree plot were performed for identification of factor component(s).
4. The weight of the identified factor component for each variable was multiplied by the variable value (percentage) in each block group. The absolute wellbeing score was computed by the sum of these products.
5. Scores were standardized with a mean equal to 0 and a standard deviation of 1. These values represent the relative wellbeing scores for Dallas block groups.
6. Deciles were then produced for ease of viewing scores.
7. The index was then computed for ZCTAs by compiling the spatial weighted averages of the comprised block groups. Deciles were then produced for ease of viewing scores.

A score of 1 represents an area with the highest level of wellbeing; a score of 10 indicates an area with the lowest level of wellbeing (Albrecht & Ramasubramanian, 2004). While the zip code is not considered a meaningful geographic unit by the U.S Census Bureau or U.S. Postal Service, the scores were aggregated to the ZCTA level in order to further examine the spatial disparities in health. The majority of health data is available for public consumption at only the ZCTA level or higher. In addition, zip code level measurements are most easily understood and meaningful to the public.

Analysis

Factor analysis, specifically PCA, was applied as the statistical measure of choice based on the nature of the index. Factor analysis is used for data reduction, the process of reducing a large number of variables to a smaller number of variables. The analysis examines and identifies patterns of variation and intercorrelation among several variables. The basic assumption of factor analysis is that variables with significant correlation between one another indicate that the variables are measuring the same phenomenon. PCA reduces data based on common variance and identifies the variance that is unique to each variable. It "establishes linear correlations between successive combinations of variables" (Albrecht & Ramasubramanian, 2004).

Albrecht and Ramasubramanian applied a PCA to each census tract that made up the city of Los Angeles at the time of their study. This procedure would yield separate PCA for each census tract; however, this may be problematic as each factor may weigh differently in each PCA run. It would be difficult to compare census tracts, as the component(s) may differ in the amount of variance among the variables it accounts for in each tract. In addition to these substantive concerns, there are also methodological considerations to the approach. There should be more cases than variables; in this study, each census tract should have more block groups than the number of variables in the index. The average number of block groups in a Dallas

census tract is approximately four. Therefore, the analyses in this study are based on the application of PCA to all 1,469 block groups in the city of Dallas.

A Kaiser-Meyer-Olkin (KMO) measuring sampling adequacy was performed. Simply stated, KMO measures factorability—whether there is sufficient variance to warrant factor analysis. The final overall KMO score for the model was 0.840 (see Appendix C). The lowest scoring variable was income support as replicated and computed as did Albrecht and Ramasubramanian. While all other variables exceeded 0.70, income support scored 0.5942. Given the vagueness of the construction of income support in Albrecht and Ramasubramanian's paper, another PCA and KMO were conducted using the three separate components instead of the combined variable of income support. Social security, supplemental support, and public assistance had the respective KMO scores of 0.5646, 0.8765, and 0.9302. Social security was removed due to a score of 0.5646—only slightly above the threshold for dismissal, and lower than the original income support variable. Final PCA and KMO analyses were run with 11 variables—the original variables, minus income support, plus the supplemental support and public assistance variables. The final KMO indicated that all variables were well qualified for factor analysis.

Spatial Analysis & Mapping

ESRI's ArcGIS software was used for mapping the data. Geographic areas included both census block groups and zip codes within the city of Dallas. Maps are thematic, and the groupings were determined using the Jenks optimization method (see Appendix A). While Albrecht and Ramasubramanian converted wellbeing scores into deciles for grouping, Jenks optimization was applied because the method minimizes variation within groups and maximizes variation between groups rather than creating 10 equally sized groups based on arbitrary cut points. Using the Jenks optimization procedure, five distinctive clusters of block groups were identified. Figure 3 shows the wellbeing scores for the block groups within Dallas zip codes.

F. *Summary*

All data used in this study were collected from the public use U.S. Census 2000 Summary File Three. Measures were reported by block groups and then aggregated to zip code tabulated areas (ZCTAs) which served as a proxy for zip codes. Modifications were made to Albrecht and Ramasubramanian's original model, constructing the Dallas wellbeing index with 11 total variables rather than 10. The index was calculated through the application of a series of principal component analyses, a type of factor analysis. Ultimately, the final outputs were spatially distributed wellbeing scores at both the block group and ZCTA levels.

IV. Chapter 4: Results

Descriptive Statistics

Table 4 shows the descriptive statistics for the wellbeing variables. All of the variables display a good deal of variability, as illustrated in Figure 3. Note in Figure 3 that the majority of the wellbeing factors show higher values in the city's southern sector, with the exception of social security income and renter occupancy (recall that social security was removed from the final analysis). On average, Dallas block groups had renter occupancy rates of 42%, approximately 26% of these households were receiving any form of income support, and approximately 26% of individuals in these areas were over 25 years of age with less than a high school diploma. Social isolation can be drawn from Table 4; there are significant differences between the 75th percentile scores and the maximum percentage experienced in each variable. For instance, Dallas block groups averaged 6.4% unemployment. Although 75% of the average block group experienced unemployment rates below 8.6%, unemployment rates reached as high as 80.9%—a 72.3% difference.

Table 4. Descriptive Statistics for Wellbeing Factors

Variable	Number of Non-Missing Values	Mean	Std. Dev	Percentiles 25th	Percentiles 75th	Maximum[2]
Income Support[3]	1,479	26.20%	16.1	13.80%	35.80%	97.80%
Social Security	1,471	19.80%	12.4	9.90%	28.00%	73.90%
Supplemental Security	1,471	3.80%	5	0.00%	5.30%	32.70%
Public Assistance	1,471	2.80%	4.4	0.00%	3.80%	54.00%
Disability[4]	1,472	20.10%	9.9	13.00%	26.00%	61.60%
Renter Occupancy[4]	1,471	42.00%	31.7	14.00%	69.30%	100.00%
Crowding	1,471	13.40%	14.3	2.20%	20.50%	69.00%
Insufficient Education[4]	1,472	25.50%	21.8	6.00%	41.90%	89.50%
Single Parent Households	1,469	18.80%	14.2	8.30%	25.80%	87.90%
Poverty[4]	1,472	14.10%	13.8	3.70%	20.60%	81.70%
Lack of Transportation[4]	1,471	9.10%	11.5	1.80%	11.90%	83.80%
Unemployment[4]	1,472	6.40%	7.1	2.20%	8.60%	80.90%
Lack of Telephone	1,471	3.00%	4.6	0.00%	4.20%	41.40%

2 To mitigate the effect of block groups with small populations (less than 100), they have been excluded from the
calculation of maximum values. Their exclusion had little effect on means and standard deviations.
3 The maximum value exceeding 100% is an artifact of the construction of the variable suggested by Albrecht and
Ramasubramanian (2004 #1).
4 Without the population constraint, these variables had a maximum value of 100% in some block groups.

Principal Component Results

As shown in Table 5, there were three components which met Kaiser criterion of 1. This rule is used for the selection of factor components: generally, any component less than 1 is discarded from further analysis, as such components explain little variance among the variables. Because components 2 and 3 were close to the value of 1 (the cut-off point), a scree plot was evaluated before proceeding. Figure 4 illustrates a large difference between the two components and the first, as well as a nearly indistinguishable difference between those that were previously excluded (components 4 through 11). In conclusion, only the first component, which explains 52% of the variation in the combined variables, was extracted for further analysis.

Table 5. Results of Principal Components

Component	Eigenvalue	Proportion of Variance Explained	Cumulative Proportion Explained
1	5.7925	0.5266	
2	1.271	0.1155	0.6421
3	1.0366	0.0942	0.7364
4	0.6298	0.0573	0.7936
5	0.5244	0.0477	0.8413
6	0.4853	0.0441	0.8854
7	0.3707	0.0337	0.9191
8	0.3291	0.0299	0.949
9	0.2553	0.0232	0.9722
10	0.2062	0.0187	0.991
11	0.0991	0.009	1

According to the loading/scoring coefficients shown in Table 6, each variable contributes roughly evenly to the component. The last column, Percentage Contribution,

shows the weight each variable contributes to the wellbeing index. Among Dallas block groups, the most important factor to wellbeing is poverty, contributing 13.92%. The least important factor is renter occupancy, contributing 5.65%.

Table 6. Scoring Coefficients for Principle Component

Variable	Loading/Scoring Coefficient	Percentage Contribution
Supplemental Security Income	0.2645	7.00%
Public Assistance Income	0.2716	7.38%
Disability	0.2843	8.08%
Renter Occupancy	0.2378	5.65%
Crowding	0.2821	7.96%
Lack of Education	0.3231	10.44%
Single Parent Families	0.3049	9.30%
Poverty	0.3731	13.92%
Lack of Transportation	0.343	11.76%
Unemployment	0.3019	9.11%
Lack of Telephone	0.3065	9.39%

Figure 5 presents the wellbeing scores for the city of Dallas block groups.

Zip Code Results

As mentioned in the Methodology section, zip code wellbeing scores were calculated using a weighted spatial average. Table 7 reports the average wellbeing zip code for each ZCTA in the city of Dallas. The higher the average value, the lower the level of wellbeing is; similarly, low values are associated with higher levels of wellbeing. Zip codes 75225 and 75093 had the highest sense of wellbeing with wellbeing scores of -2.54 and -2.46, respectively. Zip codes 75210 and 75215 scored 7.46 and 6.35, respectively.

Table 7. Zip Code Wellbeing Scores for the City of Dallas

ZCTA	MIN	MAX	MEAN	STD	ZCTA	MIN	MAX	MEAN	STD
75001	-2.32	-1.39	-1.79	0.31	75216	-0.10	7.63	2.85	1.66
75006	-2.68	2.60	-1.05	0.95	75217	-0.51	9.32	1.71	2.18
75007	-2.93	0.35	-2.15	0.77	75218	-2.75	1.13	-1.36	1.07
75039	-2.16	3.47	-0.97	1.72	75219	-2.20	4.79	0.42	2.09

75041	-2.58	2.21	-0.49	1.00	75220	-2.80	4.39	1.59	2.52
75051	-1.63	3.77	0.46	1.06	75223	-2.11	5.33	1.87	1.94
75052	-2.70	0.74	-1.77	0.81	75224	-2.14	4.62	1.30	1.49
75060	-1.83	3.00	0.02	1.11	75225	-3.12	-1.03	-2.54	0.47
75061	-2.65	3.00	-0.11	1.35	75226	-1.20	5.12	2.87	2.14
75080	-3.09	0.47	-1.78	0.94	75227	-1.58	3.29	1.25	1.30
75081	-2.75	2.74	-1.71	0.91	75228	-2.52	6.02	0.08	1.86
75093	-3.30	0.66	-2.46	0.75	75229	-3.01	3.47	-0.29	2.72
75115	-3.01	0.98	-1.60	1.02	75230	-3.06	2.04	-2.17	1.03
75116	-2.44	0.40	-1.36	0.89	75231	-3.02	3.02	-0.30	2.00
75134	-1.40	1.82	0.05	0.74	75232	-1.73	4.23	0.17	1.47
75141	-0.28	1.19	0.32	0.38	75233	-1.88	2.62	0.25	1.46
75149	-2.40	1.62	-1.14	1.09	75234	-2.97	3.47	-1.08	1.39
75150	-2.71	1.83	-1.29	0.90	75235	-0.91	3.80	1.18	1.30
75159	-2.28	2.37	-0.98	1.08	75236	-1.04	4.07	-0.41	1.15
75201	-2.14	2.78	-0.54	1.42	75237	-0.57	2.95	1.60	1.01
75202	-1.08	2.78	0.43	1.43	75238	-2.91	0.87	-1.06	1.32
75203	0.10	6.71	4.25	1.57	75240	-2.95	3.45	-1.04	1.66
75204	-1.82	5.08	0.85	2.43	75241	-0.37	6.22	1.38	1.63
75205	-2.95	-0.01	-2.04	0.78	75243	-3.01	2.04	-0.61	1.40
75206	-2.50	5.66	-0.66	1.84	75244	-2.70	0.98	-1.37	0.90
75207	0.98	5.10	1.53	1.33	75246	2.32	5.12	3.42	1.22
75208	-2.86	6.56	1.24	2.34	75247	0.98	3.00	2.92	0.39
75209	-2.93	2.18	-1.50	1.46	75248	-3.11	-0.95	-2.18	0.60
75210	3.03	10.64	7.46	2.40	75249	-2.70	-0.56	-1.71	0.41
75211	-1.10	3.57	1.69	1.36	75251	-2.09	-2.09	-2.09	0.00
75212	0.00	10.81	3.10	2.83	75252	-3.48	0.00	-1.62	1.03
75214	-2.99	3.17	-1.96	1.35	75253	-0.98	2.37	0.27	0.80
75215	1.30	10.53	6.35	2.38	75287	-2.99	-0.99	-1.77	0.51

Figure 6 presents the wellbeing scores for the city of Dallas ZCTAs.

V. Chapter 5: Conclusion & Recommendations

Summary

Health is influenced by many factors, both at the micro and macro levels. The social environment is just one of those many factors. Health has both social and spatial elements. The Relative Wellbeing Index is a tool that seeks to examine the relationship between health and socioeconomic conditions at the neighborhood level. The index's use of reliable, public data yields to a replicable model representative of the desired geography.

Conclusion

The results showed 7 of the 10 original variables (6 of the 11 used in the final analysis, had a maximum value greater than 80%, representing pockets of extreme concentration. This is illustrated again in Figure 3, with the exemption of two variables, social security and renter occupancy. Social security was excluded from the analysis, as it did not meet the KMO standard. It is interesting to note that renter occupancy was distributed approximately evenly across the city, with an average of 42% in each block group (one block group with 100%), but had the lowest contribution to the wellbeing index. Poverty, lack of education, and lack of transportation were the biggest factors in the index, contributing a combined 36.12%.

As the background data identified South Dallas and Fair Park (zip codes 75210 and 75215) as the least healthy areas in the city of Dallas, they also scored the highest wellbeing scores, indicating the lowest level of wellbeing. Similarly, the two zip codes that exhibited the greatest amount of wellbeing were located in the northern sector of the city. Figures 5 and 6 suggest not only that wellbeing is concentrated in the city's northern sector and poor wellbeing in the southern sector, but also that there is a clustering of wellbeing scores. In conclusion, Figures 5 and 6 indicate that wellbeing scores are *not* equally distributed across neighborhoods in the city of Dallas.

Discussion & Implications Meaning and Importance of Results

In 2000, 29% of the U.S. population were people of color; by 2050 that number will increase to nearly 50% of the population (U.S. Census Bureau, 2000). In 2004, Texas minority populations exceeded that of non-Hispanic Whites (Texas Department of State Health Services, 2005). Similar trends are occurring in Dallas.

Race and ethnicity are closely associated with economic and social conditions, as well as health inequities. Minorities experience 50% to 100% higher morbidity and mortality rates of diabetes than Whites (Institute of Medicine, 2002). African Americans experience higher rates of cardiovascular disease, cancer, and stroke. Table 8 shows the age adjusted mortality rates for the three highest and three lowest scoring ZCTAs for wellbeing. Wellbeing scores correspond with mortality rates. ZCTAs with the highest wellbeing scores exhibited the highest mortality rates.

Table 8. Age Adjusted Mortality Rates

ZTCA	Cardiovascular Disease	Cancer	Stroke	Diabetes	Infant Mortality
75203	1536.67	1017.92	342.23	17.38	6.2
75210	2238.46	1747.87	341.94	150.69	12.14
75215	2430.53	1749.93	499.36	210.6	11.15
75225	700.85	863.81	218.43	31.16	***
75230	828.11	804.63	202.65	20.61	***
75248	1114.37	971.6	374.12	62.08	***

Health disparities in the United States may be viewed as a reflection of inequitable distribution of goods, resources, and power in society. The Relative Wellbeing Index examines the material and social factors that influence health and wellbeing. The potential benefits of examining neighborhood conditions and their role in health disparities are numerous. This study and similar research aids in the identification of social determinants of health. This study design specifically indicates those determinates associated with disparity in the city of Dallas.

Recommendations

Further research should focus on the application of the index on other social structures such as crime. A deeper examination of the wellbeing index as it relates to health disparities should be assessed. And most importantly, information should drive action towards elimination of systematic inhibitors to health disparities and wellbeing.

Appendix A. Components of Wellbeing

Concept	Definition	Source
Level of Income Support	Total households: percent receiving social security, supplemental security, or public assistance income	P62, P63, P64
Disability	Civilian non-institutionalized population age 5 and over: Percent with any disability	P42[1]
Renter Occupancy	Occupied housing units: percent not owner occupied	H15
Crowding	Occupied housing units: percent with 1.01 or more persons per room	H20
Insufficient Education	Population 25 and over: Percent with less than high school diploma	P37
Single Parent Households	Families: Percent with single householder and own children under age 18	P17
Poverty	Population for whom poverty status has been determined: Percent with 1999 income below poverty level	P89
Lack of Transportation	Occupied housing units: Percent with no vehicle available	H44
Unemployment	Population age 16 and over in labor force: Percent unemployed	P43
Lack of Telephone	Occupied housing units: Percent with no telephone service available	H43

Appendix B. Results of Kaiser-Meyer-Olkin Tests for Sampling Adequacy

Variable	Solution 1	Solution 2	Solution 3
Level of Income Support	0.5942	--	--
Social Security	--	0.5646	--
Supplemental Security	--	0.8765	0.8518
Public Assistance	--	0.9302	0.9296
Disability	0.9059	0.9071	0.9253
Renter Occupancy	0.7231	0.7615	0.7544
Crowding	0.7350	0.7450	0.7330
Insufficient Education	0.7768	0.7917	0.7845
Single Parent Households	0.9102	0.9196	0.9118
Poverty	0.9171	0.9308	0.9283
Lack of Transportation	0.8825	0.9041	0.9124
Unemployment	0.9033	0.9186	0.9156
Lack of Telephone	0.9499	0.9566	0.9560
Overall Solution	0.8398	0.8672	0.8722

Appendix C. Terms

1. **Decile** any number or value in a series that divides the distribution of the numbers within that series into ten equal intervals so that each interval contains one-tenth of the distribution
2. **Eigenvalue** the amount of variability attributed to a factor
3. **Geocode** translating local information into corresponding latitudes and longitudes
4. **Health disparity** significantly disproportionate distribution rates of disease incidence, prevalence, morbidity, mortality, and survival rates across populations
5. **Jenks optimization method (goodness of variance fit, GFV)** classifies attributes using natural breaks; minimizes variance within groups while maximizing variance between groups
6. **Principal component analysis** a linear transformation of a set of correlated variables into a set of uncorrelated variables (factor extraction) to weigh the percentage of variance among variables of the data set
7. **Proxy measure** an indirect measure of a variable that is difficult to measure
8. **Spatial analysis** the study of spatial data and the relationships between the areas
9. **Thematic map** a map displaying the spatial distribution of an attribute for a single topic or theme

Figure 3

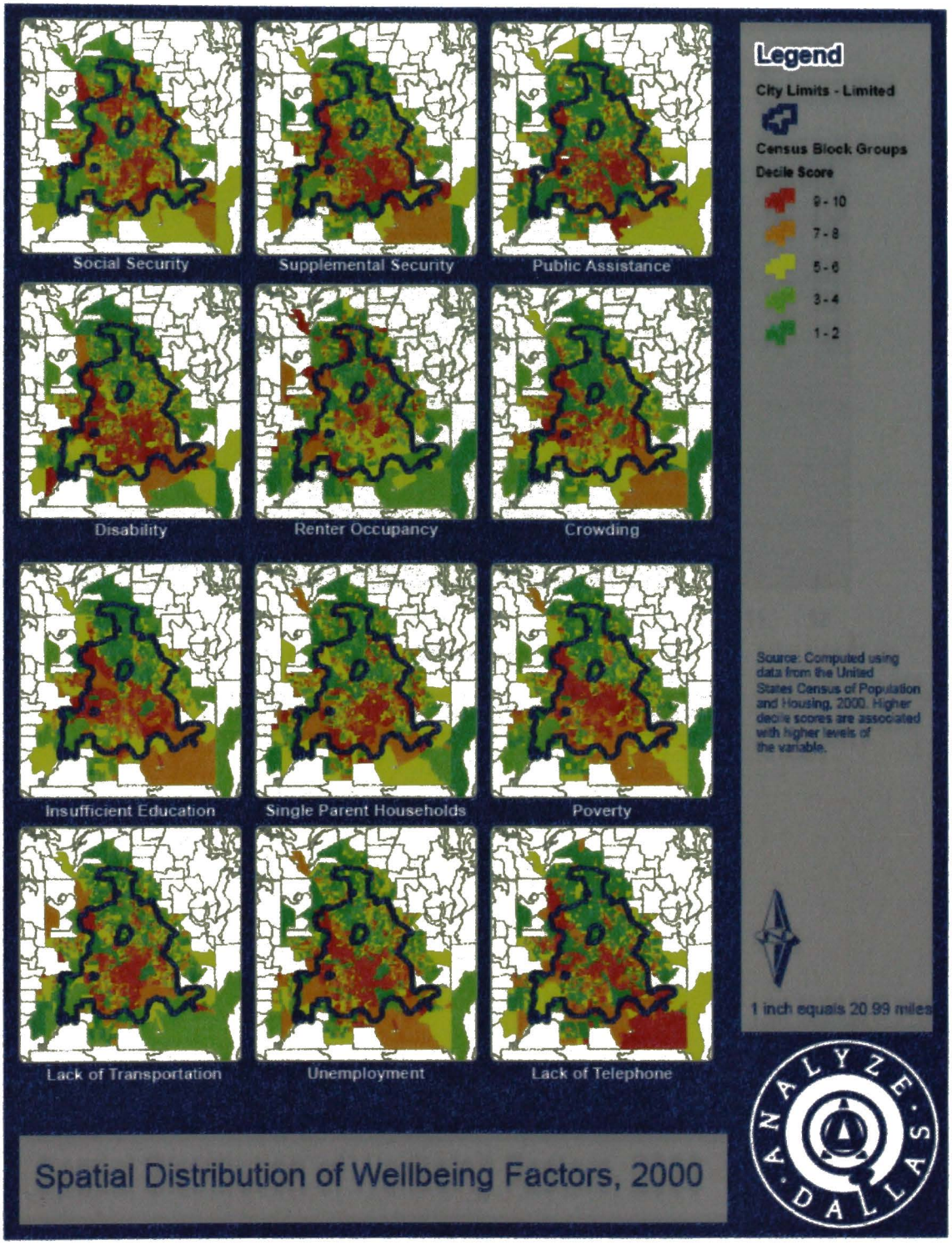

Social Security
Supplemental Security
Public Assistance
Disability
Renter Occupancy
Crowding
Insufficient Education
Single Parent Households
Poverty
Lack of Transportation
Unemployment
Lack of Telephone
Legend
City Limits - Limited
Census Block Groups
Decile Score
9 - 10
7 - 8
5 - 6
3 - 4
1 - 2
Source: Computed using data from the United States Census of Population and Housing, 2000. Higher decile scores are associated with higher levels of the variable.
1 inch equals 20.99 miles
ANALYZE DALLAS
Spatial Distribution of Wellbeing Factors, 2000

Figure 4. Scree Plot

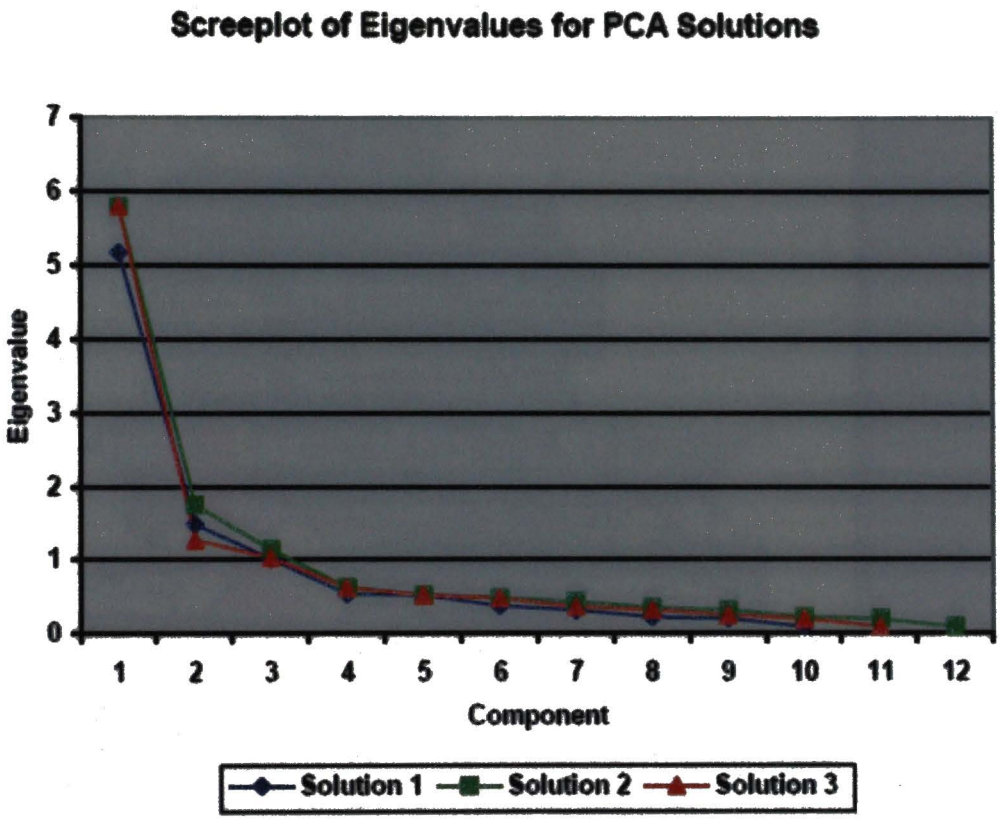


Figure 5

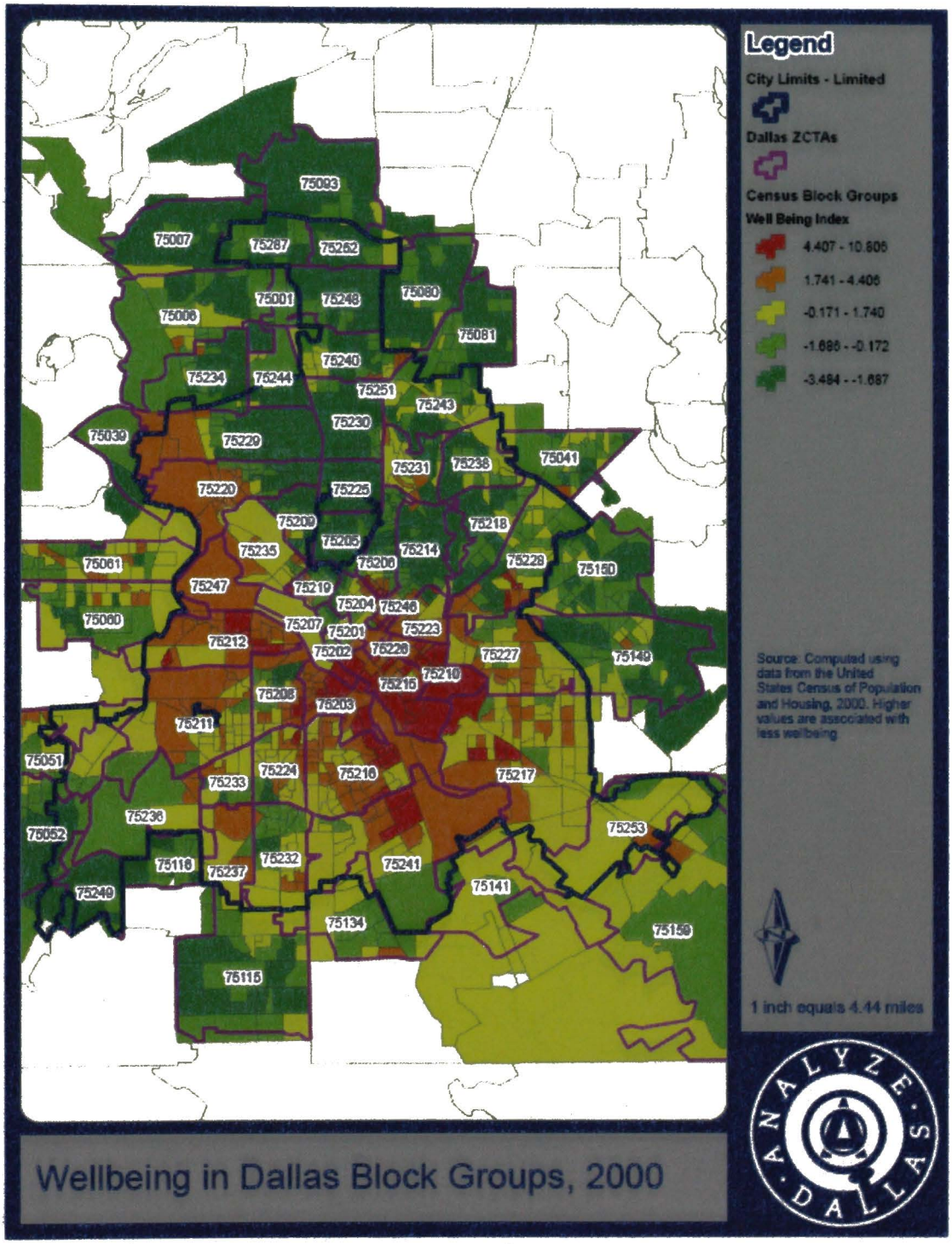
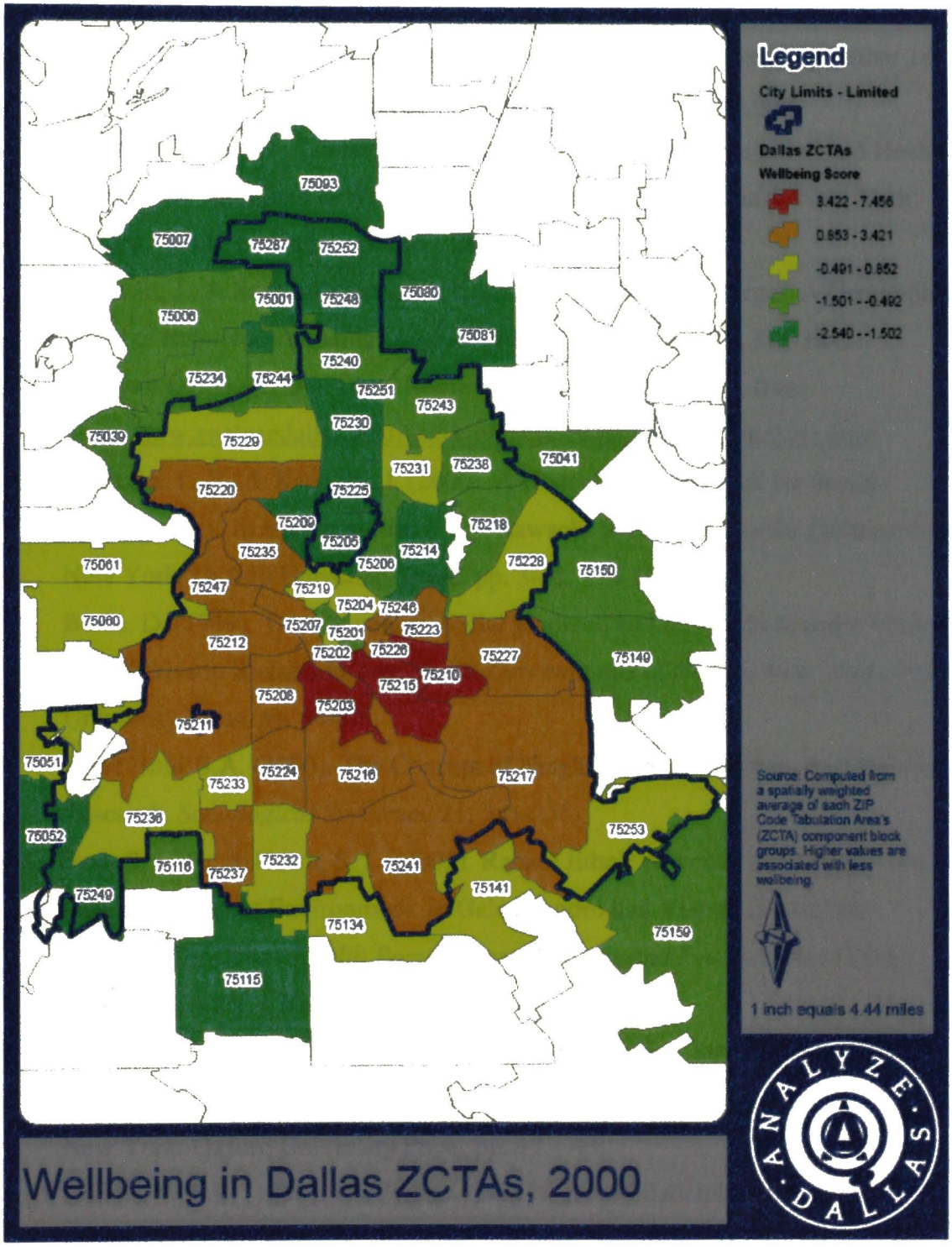

Legend
City Limits - Limited
Dallas ZCTAs
Census Block Groups
Well Being Index
4.407 - 10.606
1.741 - 4.406
-0.171 - 1.740
-1.686 - -0.172
-3.484 - -1.687
Source: Computed using data from the United States Census of Population and Housing, 2000. Higher values are associated with less wellbeing
1 inch equals 4.44 miles
ANALYZE DALLAS
Wellbeing in Dallas Block Groups, 2000

Figure 6


Legend
City Limits - Limited
Dallas ZCTAs
Wellbeing Score
3.422 - 7.456
0.853 - 3.421
-0.491 - 0.852
-1.501 - -0.492
-2.540 - -1.502
75093
75007
75287
75252
75001
75249
75080
75006
75081
75240
75234
75244
75251
75243
75230
75039
75229
75231
75238
75041
75220
75225
75209
75218
75205
75235
75214
75206
75228
75150
75061
75247
75219
75204
75246
75060
75207
75201
75223
75212
75202
75226
75227
75149
75210
75215
75208
75203
75211
75051
75224
75216
75217
75233
75236
75253
75052
75110
75232
75237
75241
75249
75141
75134
75159
75115
Source: Computed from a spatially weighted average of each ZIP Code Tabulation Area's (ZCTA) component block groups. Higher values are associated with less wellbeing.
1 inch equals 4.44 miles
ANALYZE DALLAS
Wellbeing in Dallas ZCTAs, 2000

References

1. (2003). Dallas in focus: A Profile from Census 2000. Retrieved September 18, 2005, from http://www.brook.edu/es/urban/livingcities/Dallas.htm.
2. Acevedo-Garcia, D., Lochner, K. A. (2003). Residential Segregation and Health. In Kawachi Ichiro and Berkman, eds: *Neighborhoods and Health*. New York: Oxford University Press, pp. 265 - 287.
3. Albrecht, J., & Ramasubramanian, L. (2004). The Moving Target: A Geographic Index of Relative Wellbeing. *Journal of Medical Systems*, 28, 371-384.
4. Analysis Dallas. (2004). Data. Retrieved September 18, 2005, from http://www.analyzedallas.org/AnalyzeDallas/Pages/BrowseDataSets.aspx.
5. Berkman, L. F., & Kawachi, I. (2000). A Historical Framework for Social Epidemiology. In Berkman Lisa F and Kawachi Ichiro, eds: *Social Epidemiology*. New York: Oxford University Press, pp. 3-12, 174-190.
6. Blane, D. (1999). The life course, social gradient, and health. In Marmot Michael and Wilkinson Richard G, eds: *Social Determinants of Health*. New York: Oxford University Press, pp. 64-80.
7. Bond Huie, S.A. (2000). The Concept of Neighborhood in Health and Mortality Research. *Sociological Spectrum*, 21, 341-358.
8. Borrell, L. N., & Hatch, S. L. (2005). Racial/ Ethnic Minority and Health: The Role of the Urban Environment. In Galea Sandro and Vlahov David, eds: *Handbook of Urban Health Populations, Methods, and Practice*. New York: Springer Science + Business Media Inc., pp. 63-78.
9. Brunner, E., & Marmot, M. (1999). Social Organization, stress, and health. In Marmot Michael and Wilkinson Richard G, eds: *Social Determinants of Health*. New York: Oxford University Press, pp. 17 – 43.
10. Dubois, W.E.B. (1899). *The Philadelphia Negro*. Philadelphia: University Pennsylvania Press.

11. Ellen, I. G., Mijanovich, T., & Dillman, K. (2001). Neighborhood Effects on Health: Exploring the Links and Assessing the Evidence. *Journal of Urban Affairs,* 23(3-4), 391-408.
12. Emmons, K. M. (2000). Health Behaviors in a Social Context. In Berkman Lisa F and Kawachi Ichiro, eds: *Social Epidemiology*. New York: Oxford University Press, pp. 242 - 266.
13. Galea, S., & Vlahov, D. (2005). Urban Health: Population, Methods, and Practice. In Galea Sandro and Vlahov David, eds: *Handbook of Urban Health Populations, Methods, and Practice*. New York: Springer Science + Business Media Inc., pp. 1-15.
14. Green, B. L., Lewis, R. K., & Bediako, S. M. (2005). Reducing and eliminating health disparities: A targeted approach. *Journal of the National Medical Association, 97,* 25-30.
15. Healthy People 2010. (2004). Healthy People 2010. Retrieved September 29, 2005, from http://www.healthypeople.gov/About/hpfact.htm.
16. Kawachi, I., & Berkman, L. F. (2003). Introduction. In Kawachi Ichiro and Berkman, eds: *Neighborhoods and Health*. New York: Oxford University Press, pp. 1-19.
17. Krieger, N., Chen, J. T., Waterman, P. D., et al. (2005). Painting a Truer Picture of US Socioeconomic and Racial/Ethnic Inequalities: The Public Health Disparities Geocoding Project. *Am J Public Health.* 95(2),312- 323.
18. Macintyre, S., & Ellaway, A. (2000). Ecological Approaches: Rediscovering the Role of the Physical and Social Environments. In Berkman Lisa F and Kawachi Ichiro, eds: *Social Epidemiology*. New York: Oxford University Press, pp. 332-348.
19. Marmot, M. (1999). Introduction. In Marmot Michael and Wilkinson Richard G, eds: *Social Determinants of Health*. New York: Oxford University Press, pp. 1-16.

20. Morrison, R.S., Wallenstein, S., Natale, D.K., Senzel, R.S., & Huang, L.L. (2000). "We don't care that": Failure of Pharmacies in predominately nonwhite neighborhoods to stock opioid analgesics. *N Engl J Med*, 342(14), 1023-1026.
21. Raudenbush, S. W. (2003). The Quantitative Assessment of Neighborhood Social Environments. In Kawachi Ichiro and Berkman, eds: *Neighborhoods and Health.* New York: Oxford University Press, pp. 112 - 131.
22. Sampson, R. J. (2003). Neighborhood-Level Context and Health: Lessons from Sociology. In Kawachi Ichiro and Berkman, eds: *Neighborhoods and Health.* New York: Oxford University Press, pp. 132 - 146.
23. Stansfield, S. A. (1999). Social support and social cohesion. In Marmot Michael and Wilkinson Richard G, eds: *Social Determinants of Health.* New York: Oxford University Press, pp. 155 - 178.
24. Texas Department of State Health Services. (2004). *Population Data.* Retrieved Apr. 7, 2005, from http://soupfin.tdh.state.tx.us/people.htm
25. U.S. Census Bureau. *Brief: Overview of race and Hispanic origin.* Retrieved Apr. 5, 2005, from http://www.census.gov
26. Wallack, L. (2003). The Role of Mass Media in Creating Social Capital: A New Direction for Public Health. In Hofrichter Richard, ed: *Health and Social Justice Politics, Ideology, and Inequity in the Distribution of Disease.* San Francisco: Jossey-Bass, pp. 594 – 626.
27. Williams, D. R. & Collins, C. (2001). Racial residential segregation: A fundamental cause of racial disparities in health. *Public Health Report, 116(5),* 404-414.
28. Williams, D. R. (2002). Racial/ethnic variations in women's health: The social embeddedness of health. *American Journal of Public Health, 92,* 588-597.
29. Williams, D. R., & Collins, C. (2002). Racial Residential Segregation: A Fundamental Cause of Racial Disparities in Health. In LaVeist Thomas A, ed: *Race, Ethnicity, and Health.* San Francisco: Jossey-Bass, pp. 369 – 390.