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The Application of a Modified Human Development Index: Spatial Modeling of Socioeconomic Well-being for Florida Counties

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by

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Abstract

This thesis uses the United Nations Human Development Index as a model for comparing a selected set of socioeconomic indicators across Florida's sixty-seven counties. Whether for urban planning, hazards mitigation, transportation forecasting, or other county-level and state-level functions, information and understanding of socioeconomic conditions are keys to efficient planning and policy making, both in the early development stages as well as during implementation. A summary overview of socioeconomic well-being and its distribution across a given area offers a distinct advantage in terms of deciding where planning or policy changes are most needed and where they will prove most beneficial.

This thesis takes a well-established and well documented index used for examining and comparing human development in nations across the globe, and modifies it for comparing county-level socioeconomic conditions across Florida. The results from this modified index are then displayed using choropleth maps as an aid to location interpretation of the ranked socioeconomic values, thereby providing a spatial context for the indexing.

In the end, this thesis seeks to answer whether or not the modified index model is a suitable one for normalizing, aggregating, and ranking county-level socioeconomic data for Florida, and whether the use of choropleth mapping to display the rankings is a viable choice.

Chapter One: Introduction

Using statistics to gauge social conditions in the United States dates to the early nineteenth century, when, for example, the temperance movement of the 1830s used statistical data collected from poorhouses and jails as evidence of the level of moral depravity, poverty, and economic wastefulness caused by consumption of alcohol (Cobb and Rixford, 1998). Through the early years of the twentieth century statistics were frequently used to investigate social issues. Since poverty was perceived as the most prevalent social ill, and economic progress was seen as the best solution to poverty, economic indicators became the dominant measurement, until ultimately they were equated with social well-being. Then in the 1960s, indicators such as education, health, and racial inequity gained in importance in social studies, and the social indicators movement emerged with a holistic perspective of social well-being. This movement advocated that measurements of social well-being must include a combination of social and economic indicators rather than focusing solely on economics as in preceding decades.

In 1973, David M. Smith developed the idea of territorial social indicators as the geographic representation of social well-being, bringing the spatial element of geography into the realm of the social indicators movement. In introducing the concept of *territorial* social indicators, Smith argues that it is not only important to discern *what* the social conditions are, but also how these conditions are distributed across a given area, and how these conditions are spatially related (Smith, 1973).

> "Alternatively described as 'social accounting,' 'social reporting,' or 'monitoring social change,' the development of social indicators involves the measurement of social conditions as they vary in time and space. A basic proposition of [the social indicator movement] is that we should be as well informed about the nature and performance of the social system as we are about the economic system." (Smith, 1973, p. 52)

In the years since the publication of Smith's work, two important tools closely tied to the geographic representation of socioeconomic conditions have been developed. The first of these tools, spawned by modern computer technology in the 1970s and 1980s, is a set of ever evolving, ever improving geographic information system (GIS) programs which link the power of computerized graphics with massive data bases to produce a wide array of thematic maps. The second tool is the Human Development Index (HDI). In 1990 the United Nations published its first annual Human Development Report, a cross-national comparative survey of social and economic conditions for 130 countries. In order to provide a holistic measurement of human development for ranking each country in the report, the United Nations Human Development Programme (UNDP) created the HDI, a composite index that combines both economic and social indicators. This model is referred to by Sharpe and Smith (2005) as the 'gold standard' for composite indicators:

> First, the HDI is by far the best-known composite indicator in the world, reflecting the fact it has been around since 1990 and that it is produced by a high-profile UN agency. Second, the HDI uses a simple framework for identifying what constitutes human development, namely income, health and education, which is intuitive and easy to understand.

> Third, despite the apparent simplicity, there is much technical sophistication behind the HDI. Nobel Prize winning economist A.K. Sen contributed significantly to the conceptual development of the index.
> (Sharpe and Smith, 2005, p. 58)

Geographer's find the HDI model highly adaptable and therefore useful for studying comparative socioeconomic conditions at the global scale, or at the scale of smaller spatial units such as the state, county (Hanham, Burhanu, and Loveridge, 2002; Bukenya and Fraser, 2002), and city level (Agostini and Richardson, 1997).

This thesis uses the basic precepts of the HDI to create a modified index for measuring a selected set of social conditions in Florida at the county level, then uses choropleth mapping to spatially situate the results. The model developed in this thesis is the Florida County Human Development Index (FCHDI). The construction of a modified index such as the FCHDI is supported by existing literature.

Criteria and Conceptual Boundaries

Two criteria shape the FCHDI. First, the model must use secondary source data from readily accessible Federal or Florida State agencies such as the United States Census Bureau and Florida Department of Health, and these data need not be processed through formulae more rigorous or complex than those used in the United Nations HDI model. Second, the model must be straightforward enough that it is easily replicated for any State, Province, or other territorial division where sufficient data as described in criterion one exist. This stipulation represents the expressed hope that the effectiveness of the FCHDI will encourage wider use of geographic socioeconomic index modeling, and the FCHDI will provide an accurate and practical benchmark of the basic socioeconomic conditions of Florida's counties, allowing the counties to be ranked according to their overall socioeconomic well-being.

Linking back to the overall goal of geographic representation, this benchmark of socioeconomic well-being is plotted using choropleth mapping, bringing to light the spatial patterns and relationships of the ranked counties. This thesis then considers how an alternative variable representing additional social, economic, or environmental attributes might change the FCHDI ranking of Florida counties. The alternative attribute used in this latter section of the study is selected based on its implicit relationship to socioeconomic conditions in Florida: natural amenities.

It is vital at this point to discuss two sets of conceptual boundaries within which this thesis operates. First and foremost, this thesis attempts to synthesize socioeconomic data, statistics, index modeling, and presentation of results, all from a predominantly geographic viewpoint. It is the spatial relationships rather than the cause and effect elements of socioeconomic well-being that are of primary interest here. The second conceptual boundary is the choice of scale, a topic which will be discussed in greater detail in Chapter Three - Research Methods. At this point, however, it is important in discussing the goals of the study to introduce the choice of a county-level scale for the FCHDI. The aggregation of socioeconomic data, beginning at the individual level and moving progressively higher to the neighborhood level, city level, county level, region of state and beyond tend to increasingly generalize socioeconomic conditions and mask extremes that influence the well-being of the individual. Therefore, it is important at the outset to clarify that the creation and use of the FCHDI in this thesis is to study spatial patterns and relationships of Florida's socioeconomic conditions at the county level strictly from a geographer's perspective of territorial units rather than the more focused scale of a sociologist, planner or policy-maker, although it is hoped that the index will encourage further research from various perspectives and scales.

A Note on Idioms Used

> *"There is an obvious need for clarifying the generic tools and terminology of the social sciences across the disciplines, as academics argue past each other, using identical terms but attaching different meanings to them.*" (Grix, 2002, p.175)

In a number of scientific disciplines, precise and accurate terminology is a straightforward feature of the field, however, in an interdisciplinary social science such as human geography, great verbal battles are often waged over the definition of frequently-used yet wooly terms such as *region, community*, *rural*, and *development*. The use of these widely understood yet diversely interpreted terms set the tone of the research and often suggest biases not intended by the researcher. Therefore, it is important at the onset to describe and, if not fully define, at least acknowledge the ambiguity of certain terms used in this thesis.

Without question the most vexing problem encountered in this project is the naming of *what* is being measured by the index model. Essentially, the FCHDI is measuring statistical socioeconomic elements of Florida's resident population per year 2000 data in order to estimate metaphorical socioeconomic living conditions of the populace at the county level during the 2000 census time frame. It is frustrating to use highly relative terms such as 'social well-being' or 'quality of life' to describe these conditions and it is therefore tempting to delve into neologism. However, no matter how tempting it may be, creating a 'metaphoric socioeconomic living condition index' is like waving a red cape before the bull of incredibility.

The idiom 'social well-being' as used by Smith and others in the social indicator movement is advocacy-oriented and closely associated with social justice and the fair distribution of economic and social resources (Smith, 1973; Andrews and Withey, 1976; NRC, 2002). The essence of 'well-being' clearly describes a positive condition, and in application, well-being as a descriptive term is more subdued than the highly subjective 'quality of life,' for arguably, what passes as 'quality' to an individual often becomes inconsequential in the larger context of society. Although this thesis uses the term 'socioeconomic well-being' for the FCHDI's measurement, the intent is to retain the positive aspect of 'well-being' without the advocacy-orientation or subjectivity of 'quality.'

In human geography, the term 'development' generally refers to either social, economic, or land-use (e.g. rural to urban) transformations. Defining development is problematic on at least two fronts: cultural perspective and globalizing redefinition. From cultural perspective, development by western value systems does not align precisely with eastern values, nor do development priorities of agrarian, industrial, or service-based social sectors match. As Straussfogel (1997) notes, development is a relative concept, and with the rapid changes and interactions brought on by globalization, we periodically need to reexamine and adjust our definitions of development and progress. Development is usually positively associated with growth (with the possible exception of suburban and rural sprawl development), and is therefore important to planning and policy-making.

For this reason, 'development' is measured and monitored by planning and policy makers, and index modeling is commonly used as a comparative tool due to its ranking-scale feature. The HDI was created for just this purpose: it measures and compares human (socioeconomic) development at a global scale as both a means to highlight socioeconomic disparities and to induce sound development planning and policies over time, monitoring national rankings as they move up or down the HDI scale. However, in this thesis the use of 'development' in the Florida County Human *Development* Index refers to the UNDP model the index was patterned after, and, unless otherwise specified in the text, does not refer to either human or land-use development in Florida.

There are undoubtedly additional ambiguous trigger words used in this thesis beyond *socioeconomic well-being* and *development*, however, every attempt has been made to define these terms 'in-text' in order to make the thesis as transparent as possible.

A Brief Overview of Florida Counties[1]

There are 67 counties in Florida, ranging in area from Union County (249.71 square miles) in the north, to Monroe County (3,737.15 square miles) on the southern tip of the peninsula. Florida's Monroe County typifies an anomaly not found in land-locked states, that is, since Monroe County incorporates the Florida Keys, the total area includes 2,740.24 square miles of water and tidal coastline. Therefore, solely in land area, Monroe County is 996.91 square miles in size. The largest county in *land* area is Collier County (2,025.30 square miles) just to the north of Monroe County.

1. County locator maps are found in the appendices.

One of the most prominent features of Florida is its long coastline, running 1,197 statute miles (Fernald and Purdum, 1996) from the Georgia state line on the Atlantic Coast, around peninsular Florida to the Alabama state line on the Gulf of Mexico. Taking the numerous islands, bays, and inlets into consideration, the Florida Coastal Management Program estimates Florida has approximately 8,400 miles of tidal coastal zone (FCMP, 2005). In their study for the University of Florida's Electronic Data Information Source, Adams et al. (2001) report that, with the exception of a small region of Columbia County's Pinhook Swamp, no point in Florida is more than 60 miles from either the Atlantic Coast or the Gulf of Mexico. Of Florida's 67 counties, just over one-half (35) are situated either along the Atlantic Coast or the Gulf of Mexico and 32 are non-coastal.

In terms of total population according to Census (2003) data, Miami-Dade County ranks the highest with 2,253,362 people while Liberty County in the panhandle ranks the lowest with a population of 7,021. Population density figures for the 67 counties range from 8.4 persons per square mile, again in Liberty County, to 3,292.0 persons per square mile in Tampa Bay's Pinellas County. The averaged population density for Florida is 296.4 persons per square mile. In broad, generalized terms, the Florida panhandle and northern counties tend to be more rural in character, while the southern counties of the peninsula, particularly along the coasts tend to be more urbanized. However, the distribution of population can be quite misleading in Florida. For example, according to the 2000 census, the population for Monroe County at Florida's southern tip shown in Figure 1- 1 is 79,589. The large mainland portion of the county has a total population of 60 persons, while the string of keys has the remainder population of 79,529.

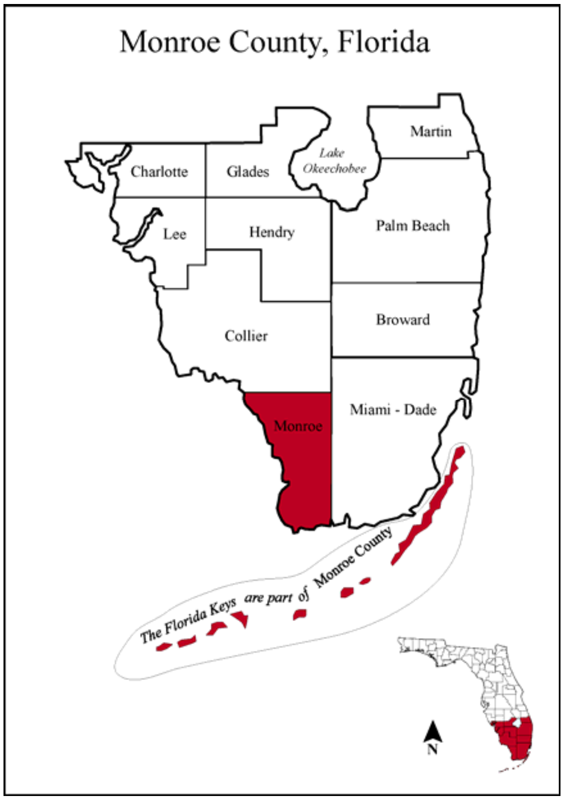


Figure 1-1: Monroe County: A population distribution anomaly. According to 2000 census data, the mainland has a population of 60, while the Florida Keys area of the county has a population of 79,529.

Research Aims

From a socioeconomic standpoint, Florida is not a homogenous State. There are heavily urbanized areas and predominantly rural sections; areas where the economy is based on agriculture, and areas where it is based on recreation; and there are areas of the state that have a high percentage of retired and seasonal residents. To the casual observer, it is sufficient that these conditions are spatial generalizations, however, for planning or policy making, a clearer delineation of socioeconomic well-being is needed. There are currently several useful economic indices available, but not so for a composite measure of economic *and* social conditions. This thesis is, primarily, a project using descriptive statistics which attempts to answer the following:

1. Can a modified model of the HDI be effectively applied to measure socioeconomic well-being across a contiguous territorial unit such as the State of Florida at the county-level? And,
2. Is the geographic representation of the model's rankings advantageous in discerning territorial patterns, relationships, and trends?

Should this thesis satisfactorily answer these questions, the significance of the work then becomes useful in the realm of planning, mitigation, and advocacy. Having a means to model socioeconomic well-being at the county level is of interest to several groups, including planners, policy makers, public managers, social activists, and politicians.

Chapter Two: Foundation Literature

The literature reviewed for this thesis is sorted into two broad categories regarding first, the Human Development Index (the model used to normalize and rank the socioeconomic units); and second, thematic mapping (the means of presenting the results).

The first section of the review details the components and formulae of the United Nations' Human Development Index (HDI), how the model works, concerns and critiques of the model, how it has been modified for use in four recent socioeconomic studies similar to this thesis, and why a modified HDI model is appropriate for the FCHDI. The second section of this chapter considers design elements of data visualization through thematic mapping. Five of the more familiar thematic maps for socioeconomic studies are discussed: dot-distribution maps; proportional symbol maps; data maps; cartograms; and choropleth maps with emphasis on choropleth mapping and why it is deemed a good fit for this thesis. Bearing in mind that the index model proposed in this thesis begins as a retrofitting of the original HDI, using the existing literature as a foundation and guideline is a logical first step in the development of the FCHDI in Chapter Three. Likewise, a background for the choices of data mapping format and design elements helps clarify the choices made in chapters Three (research methods) and Four (presenting the index results).

The Human Development Index

> "*As the 1990 Human Development Report argued, a basic distinction needs to be made between the means and the ends of development. Human beings are the real end of all activities, and development must be centered on enhancing their achievements, freedoms, and capabilities.*"
> (Anand and Sen, 1994, p.1)

The Human Development Index (HDI) is a composite socioeconomic model used by the United Nations Development Programme (UNDP) to rank the countries listed in the annual Human Development Report. The HDI was originally designed as an alternative means of measuring a country's development based on composite social and economic conditions rather than on solely economic indicators such as the GNP (ul Haq, 2003; Estrada, 2005). In this respect, the HDI is essentially "designed to measure the relative attainments of nations more subtly than the annual ranking by GNP per head that the World Bank provides" (People Doing Better, *The Economist*, May 25, 1991, p. 48: In Agostini and Richardson, 1997, p. 19). The intent of the HDI is to provide a multi-dimensional view of development by measuring people's ability "to live a long and healthy life, to be educated, and to have access to the resources needed for a decent standard of living" (UNDP, 1990, p.10, Box 1.1). According to the 2004 FAQ's page, an additional intent of the HDI is "to capture the attention of policy makers, media, and NGO's and to draw their attention away from the more usual economic statistics to focus instead on human outcomes" (UNDP, 2004b).

The HDI is a combined measurement of three key elements: health and longevity (mortality); knowledge (literacy); and a decent standard of living based on income and purchasing power (ul Haq, 2003).

According to the Human Development Report 2004 – Technical Notes (UNDP, 2004a), the HDI is a straightforward model composed of the three dimensions mentioned above (long life, knowledge, and a decent standard of living), four indicators (life expectancy at birth; adult literacy; gross school enrollment ratio; and GDP per capita) and three dimension or interim indices (see Figure 2-1).

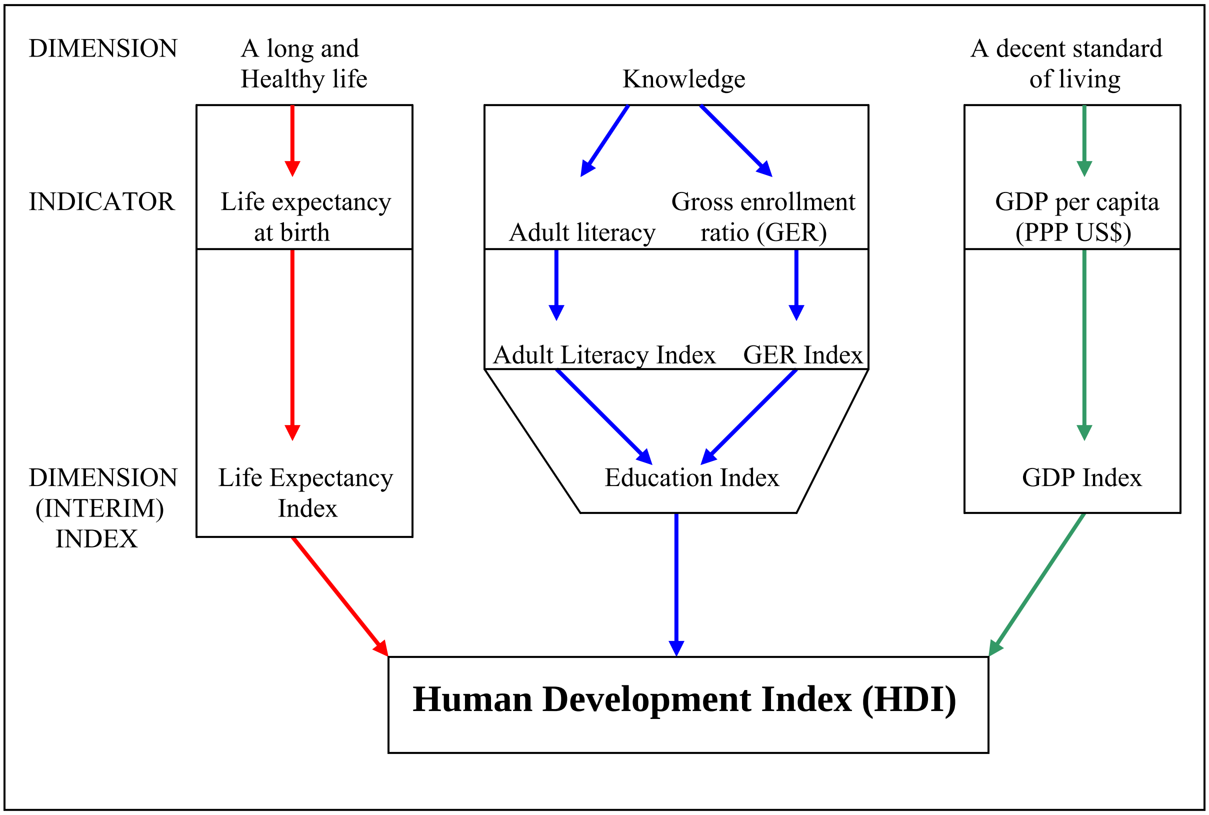


Figure 2-1: The human development index model as used by the United Nations Development Programme, 2004. : Adapted from UNDP HDR 2004

Before the HDI can be calculated, the raw indicator data must first be normalized to facilitate computation, and then converted into an interim index format. The first interim index is life expectancy, which is based on the 'expected life-span from birth indicator.' The second interim index of education is a combined and averaged measure of the adult literacy rate indicator and the collective primary, secondary, and tertiary gross enrollment ratio (GER) indicator. These two indicators are weighted with two-thirds weight given to adult literacy and one-third weight to the GER. The third interim index is referred to as the gross domestic product or GDP index. The HDI uses a per capita GDP derived from purchasing power parity calculations in US dollars (PPP US$).

Two common methods for normalizing or standardizing raw data are to either convert the data values into z-score values, or use a linear scaling transformation set between two bounds, generally on a scale between zero and positive one. The UNDP uses the latter method to normalize their data. To do this, minimum and maximum values determined by the UNDP are set for each of the four indicator data sets, and then interim index values are calculated using the linear scaling transformation formula:

$$\text{Interim index} = \frac{\text{actual value} - \text{minimum value}}{\text{maximum value} - \text{minimum value}}$$

According to Anand and Sen (1994), these minimum/maximum values need to be comparable *over time* in order to track a country's human development. For this reason the minimum/maximum values for the HDI calculations were developed for the original 1990 HDR as follows:

Life expectancy:

To establish the minimum value for life expectancy at birth the UNDP used 1960 data, which is the earliest point in time when all of the countries in the study had reliable life expectancy records. In 1960, the lowest average life expectancy for any country was 35 years, which became the minimum value for the HDI. Using projections out to the year 2050 from "Barbara Torrey and other references" (Anand and Sen, p. 10), the maximum value for life expectancy was set at 85 years.

Knowledge:

Initially, adult literacy minimum/maximum values were set using a 0 to 100 range (percent) based on whether a person is or is not literate. The UNDP defines literacy in a person 15 years or older as being able to "with understanding, both read and write a short, simple statement about their everyday life" (Human Development Report 1994, p. 221: In Agostini and Richardson, 1997, p. 25).

Standard of living:

For the minimum/maximum GDP values, the UNDP used "the logarithm of per capita GDP in 1987 Kravis dollars truncated at the average official poverty line income in nine developed countries" (Anand and Sen, p. 10), resulting in a maximum GDP value equal to the logarithm of purchasing power parity (PPP) $4,861 in 1987 prices.

Since the initial 1990 report, two indicators of the HDI were modified to increase the robustness of the HDR: the GDP, and median years of schooling. The standard of living attribute was changed in 1991 by moving to a more systematic determination of income diminishing returns using the Atkinson formulation for the utility of income:

$$\left\{(y) = 1/\ 1\text{-}\varepsilon\ \times y^{1-\varepsilon}\right\}$$

in which (y) represents the poverty line. With this formula, any income up to the poverty line has a full weight, however any income over the poverty line does not, the weighting being reduced as the per capita income increases. The intent here is to measure *up to* an established income cut-off point that the UNDP considers "adequate for a reasonable standard of living and for a reasonable fulfillment of human capabilities" (ul Haq, 2003,

p. 129), and treat income above the cut-off point with a diminishing return. This is perhaps one of the strongest statements against indexing methods that emphasize economic growth as a means to an end, suggesting that well-being is not dependent solely on income. “The HDI emphasizes sufficiency rather than satiety” (UNDP, 1994, p. 91). Using correlation and principle components analysis, Cahill (2002) was able to support the HDI’s diminishing returns assumption.

The knowledge indicator was reconfigured in 1995 to combine adult literacy with the mean years of schooling, adult literacy being weighted at 2/3 and years of schooling weighted at 1/3. The literature does not clearly explain why the indicators are weighted as they are, however, since the HDI is intended to measure *basic* levels of human development, it is assumable that the mere existence of literacy outweighs the level of literacy.

In 1994 the minimum/maximum values were ‘set,’ and, with the exception of mean years of schooling changing to a gross enrollment ratio, and the minimum value for the GDP per capita dropping from $200 to $100, these values continue being used through 2004. The minimum/maximum values set by the UNDP and used to calculate the 2004 Human Development Report are shown in Table 2-1.

Table 2-1. Maximum/minimum values used for the 2004 HDR.

Indicator	Maximum value	Minimum Value
Life expectancy at birth (years)	85	25
Adult literacy rate (percentage)	100	0
Combined gross enrolment ratio (percentage)	100	0
GDP per capita (PPP US$)	40,000	100

Source: UNDP HDR 2004

Once the interim index values are determined using the minimum/maximum values against each country's actual indicator value set, the HDI is calculated as the average of these combined interim index values:

$$\text{HDI} = \frac{(\text{life expectancy index} + \text{education index} + \text{GDP index})}{\mathbf{3}}$$

Criticisms of the HDI include concerns that the minimum/maximum values are subjective and exceptional values, and that they highlight deprivation rather than development (Kelly, 1991); that there are an insufficient number of dimensions (addition of human rights or political freedom dimensions have been suggested); and that there is a need for improved indicators such as infant mortality rates or levels of education attainment beyond basic literacy (Agostini and Richardson, 1997; Noorbakhsh, 1998). The UNDP, however, has held steadfast to the concept that the three dimensions – long life, knowledge, and decent standard of living – together with the established minimum / maximum values are sufficient measurements for the Human Development Reports.

In their assessment of the sufficiency of HDI's measurements, Ivanova, Arcelus, and Srinivasan (1999) concluded that the index held useful information about current levels of each country's development, but offered little in terms of projecting future development. An early criticism by Kelly (1991) is that since countries with high development have essentially reached the maximum values for the three dimensions, the HDI offers little in terms of measuring progress for human development in these countries. The UNDP recognized the problem of disparity occurring when one index is applied equally to a country with a low human development level and a country with a high human development level. Therefore, in 1993, changes were made to the number of indicators used relative to each country's human development level. For countries with a 'low' level, one basic indicator would be used for each dimension. For 'medium' level countries, two indicators would be applied, and for 'high' level countries, three indicators would be applied to each dimension (Anand and Sen, 1994). Table 2-2 lists these indicators:

Table 2-2: The number of indicators used to calculate the HDI is relative to level of human development within each country.

Human Development Level	Low	Medium	High
Human Development Indicators	1.1 Life expectancy	1.1 Life expectancy 1.2 Under-5 mortality	1.1 Life expectancy 1.2 Under-5 mortality 1.3 Maternal mortality
	2.1 Adult literacy	2.1 Adult literacy 2.2 Secondary school enrollment	2.1 Adult literacy 2.2 Secondary school Enrollment 2.3 Tertiary enrollment
	3.1 Log per capita GDP – up to international poverty line	3.1 Log per capita GDP – up to international poverty line 3.2 Incidence of poverty	3.1 Log per capita GDP – up to international poverty line 3.2 Incidence of poverty 3.3 Gini-corrected mean national income

Source: Anand and Sen, 1994, p.14

Despite the criticisms leveled against it, the HDI remains one of the most universally studied and accepted index models available for examining and comparing socioeconomic conditions across nations (Lanteigne, 2005). By virtue of its straightforward computation method and its transparency, the HDI is also a highly adaptable model as demonstrated in several studies. Four studies pertinent in methodology and objective to this thesis have successfully used modified HDI models in their research. The first, by Agostini and Richardson (1997), uses the HDI to rank and compare twenty-five U.S. cities for the purpose of identifying 'benchmarks' in the success of local government strategic planning policies. By using a ranking system, policy makers are able to evaluate the success of implemented development policies against development in other U.S. cities, and prioritize or make adjustments to their strategic plans accordingly. Agostini and Richardson find that the UNDP HDI is less suited to generate subtle distinctions of well-being in highly developed study areas where the indicator values do not vary widely. Additionally, not all data required for the UNDP HDI are available at the city level. For this reason, proxy indicators are used and, where data are not available at the city level, data from county or the Federal Office of Management and Budget's Standard Metropolitan Statistical Area are used. In the conclusion of their study, Agostini and Richardson describe moderate success in using the modified HDI at a city-level scale to identify benchmarks among the twenty-five sample cities. This moderate success is perhaps due to the scale of study and the diversity of the sample.

Even in modified form, the HDI appears to have limited capability for discerning subtle variations at the city-level scale. The insensitivity to subtle variation at the city-level scale further masks dissimilarities between cities as diverse as Jacksonville Florida, San Francisco California, and Detroit Michigan. Presumably, if the sample cities were taken from the same region, for example, Jacksonville, Miami, and Tampa Florida, *any* variations in their similarity would be highlighted rather than masked by the HDI. In theory then, a modified HDI applied at a county-level scale to counties within a similar region such as the State of Florida will improve the success level reached by Agonstini and Richardson.

The second study, by Hanham, Berhanu, and Loveridge (2000), remains much more closely aligned to the original intent of the HDI model, that is, measuring and ranking the levels of human development. The approach taken by Hanham et al. is focused less on policy issues than on comparatively assessing development and quality of life within the state of West Virginia at the county level. The tone of the study is set in the questions posed in the introduction: "If you had your choice of living anywhere in the state, where would you live? Where would your quality of life be the highest? How would you choose where to locate?"(Hanham et al., p. 2). As with the Agostini and Richardson study, Hanham found it necessary to modify components of the HDI indicators due to data constraints. For example, the UNDP HDI uses life expectancy as a key component, however these data are not available at the county level in West Virginia. Therefore the study uses adjusted mortality rates per 100,000 population combined with an averaged mortality rate for children under the age of five years as a proxy for longevity. As with the Agonstini and Richardson study, adult literacy is replaced with education attainment indicators, in this case: median years of schooling of persons 25 years and older, high school drop-out rate, and percentage of persons 25 years and older with a bachelor's degree or higher. The results at each stage of the indexing process in this study are presented in choropleth map form using a 5 sequential color theme (low scores: dark to high scores: light). By presenting the results in this visual manner, Hanham is able to convey effectively how the raw data (poverty rates, high school dropout rates, et cetera) are combined in the modified HDI, and where dissimilarity patterns in the key dimensions exist, even to those not familiar with West Virginia.

The third study, by Bukenya and Fraser (2002), is very similar to the West Virginia research, but focuses on human development at the county level in Alabama, and rather than seeking a best location, emphasis in this study is on uncovering social inequities within the state, particularly in the 'Black belt region' of southern Alabama. Bukenya and Fraser supplement the basic HDI with one additional environmental indicator: amenities based on the Natural Amenities Scale published by the Economic Research Service of the USDA (ERS, 1999). By running the data through the model both with and without the amenities indicator, Bukenya and Fraser are able to demonstrate the significance of amenities in the overall quality of life ranking of the Alabama counties. According to McGranahan (1999), natural amenities such as those found in Florida are a major pull factor in migration patterns, and, coupled with the results of the Bukenya and Fraser study, this suggests that an indexing of socioeconomic factors in Florida should include a natural amenities indicator.

The fourth study, by Estrada (2005), uses a modified HDI to assess the effectiveness of community resources and economic development programs created by the Cooperative State Research, Education, and Extension Service (USDA). Estrada's research focuses on evaluating the Empowerment Zone program and its impact on community well-being at the county level in the Rio Grande Valley of Texas. The intent of the study is to demonstrate the usefulness of the HDI model for evaluating a variety of programs and policies by measuring their effectiveness in improving quality of life. In order to show the adaptability of the model, Estrada has replaced the longevity dimension with a housing dimension, and altered the GDP dimension to reflect economic opportunity resulting from implementation of the Federal Government's Empowerment Zone program. The socioeconomic indicators used in this study include the total number of housing units, the number of owner-occupied housing units, and the median value of the owner-occupied housing units. While the indicators have been modified or replaced, Estrada uses the same formula format used in the original UNDP HDI, replacing the UNDP minimum/maximum values with values specific to Texas. For example, instead of a GDP based on a maximum value of $40,000 and a minimum of $100, Estrada uses the figure from the Texas county with the highest average income for the maximum, and the figure from the county with the lowest average income for the minimum value. Estrada shows through this study that the HDI can successfully be used to measure at the county level, in his terms: "a holistic indicator of community resources and economic development's goal of community well-being" (p. 2), an indicator that is equally applicable to a Florida study.

From these four studies, it is evident that the HDI is a practical and adaptable model for ranking socioeconomic well-being in Florida at the county level. It is shown that proxy indicators can be used when data for the original indicators are unavailable or inadequate. Data available from secondary sources such as the U.S. Census Bureau, the Bureau of Economic Analysis, Florida State, and others are sufficient to produce valid results. These studies also show that alternate indicators such as natural amenities can be used in the basic format of the HDI to check the significance of variables on socioeconomic well-being in Florida.

Thematic Mapping

> "*If the map reader is to receive a proper understanding of the statistical intercorrelations among a set of variables, then we must encode maps so that the map reader's decoding corresponds to the intercorrelations of the variables*"
> (Lloyd and Steinke, 1977, p. 430).

Visualizing Data

For composite data such as socioeconomic well-being measurements to be by any means useful for analysis or interpretation, they must be presented in an understandable format. Presentations of data are made on several levels, including verbal description, tabular or matrix, and graphic representation. Statistical data are most often presented in either numerical tables such as frequency distribution tables, matrices, and indices, or visual graphic representations such as scatter plots, histograms, pie charts, bar graphs, ogives, and time series graphs. For the geographer, spatial relationships play a key role in visualizing and comparing abstract data, and so thematic maps are a common form of visual representation. Four of the more familiar thematic maps for socioeconomic studies are proportional symbol maps, data maps, cartograms and choropleth maps (Rittschof et al. 1996). To date, geographic information systems (GIS) have greatly improved our ability to quickly generate thematic maps on a wide range of topics to suit the needs of a variety of groups from sociologists to planners and policy makers. However, just prior to this technological advancement, the usefulness of maps as a tool for conveying and analyzing statistical data was being questioned within the geographic discipline (Board and Taylor, 1977). Smith (1975) lauds the matrix system for displaying numerical facts, noting that tables are more precise, easier to read, and easier to directly manipulate in terms of mathematical computation. In Smith's view, "[a]ny geographical pattern, be it one of points, lines, or areas, may be depicted as a matrix" (p. 5). In 1981, Phillip Muehrcke wrote an opinion piece in the *Professional Geographer* discussing what he termed the 'demise of geographic cartography.' Muehrcke credits this demise to the following:

> "Possibly the most devastating blow to the preeminence of maps, mapping, and map use in geographical methodology came with the conceptual/theoretical/quantitative revolution. Implicit in the shift to quantitative methods that took place during the 1950's-1960's was the belief that maps had hurt geography. Traditional over-reliance on maps was blamed in part for the lack of geographical theory. In support of this notion it was pointed out that maps are subjective and descriptive rather than explanatory; maps are weak in hypothesis testing, and maps encourage a descriptive rather than problem-oriented approach to geography" (Muehrcke, 1981, p. 398).

Muehrcke's article was written, ironically, on the eve of the GIS revolution. GIS has done much to answer criticisms of maps as subjective and cumbersome tools. The ability to quickly see the results of data manipulation on a computer generated thematic map has greatly increased the map's value as an analytical modeling tool (Carr et al., 2005).

Five thematic map types:

The common dot-distribution map discussed by Dent (1999) and the four thematic maps mentioned by Rittschof (proportional symbol maps, data maps, cartograms and choropleth maps) each offer particular benefits for graphically displaying data, depending on the specific goals and requirements of the research project. Dot-distribution and proportional symbol mapping are effective means of showing spatial distribution for discrete elements (One dot or symbol representing 300 people, 100 bushels of corn harvested, et cetera). These maps generally plot the spatial units (nations, states, counties) at true-scale. A dot or symbol proportional to its statistical value is placed within each spatial unit. An easily imagined example of a proportional symbol map is a GNP map of the world where symbolic stacks of coins of varying heights are placed on each country, each coin in the stack representing a quantitative unit of money. In this example, the symbol used is explicit (coins represent a monetary unit) and proportion is simply a matter of counting the coins in the stack. The explicit symbol and proportion are both crucial elements that allow the map reader to easily decode the map. The problem in proportional symbol mapping arises when non-explicit symbols such as circles (or stars, blocks, cut-out human figures, et cetera) are used and the increase or decrease in size is not easily discernable. Dot-distribution and proportional symbol maps frequently suffer the additional problem of symbol-crowding, a condition that causes more confusion than clarity for the map reader. Though effective for discrete elements, these mapping techniques are less effective at showing continuous phenomena such as ranking or scale.

Data maps are similar to proportional symbol maps in that they are also geographically true-scale, however, rather than using a symbol to represent the statistical value, the actual numeric value is placed within its corresponding spatial unit. Cluttering is occasionally a problem in data maps, however more troubling is the shallowness of spatial analysis. Listing the data values within the spatial units is only marginally different than listing the same data in a table: it gives an idea of where the values are located, but it can be difficult to visualize distribution patterns, rankings, or comparisons between spatial units that are not in close proximity to each other.

Cartograms, in contrast to the true-scale maps, intentionally distort the spatial unit boundaries of a regional map so that the size of the distorted area is proportional to its statistical variable (Du and Liu, 1999), but in such a way that the region of the map is still recognizable (Rittschof et al. 1996; House and Kocmoud, 1998; Keim, North, and Panse, 2004). Due to the link between the statistical values and the areal distortion, cartograms are also referred to as value-by-area maps. The areal distortion of a cartogram can result in confusion for the map reader who has no prior concept of the conventional spatial boundaries, for as Olson (1976) points out in her introduction to noncontiguous area cartograms: "Cartograms are usually visually striking and intellectually interesting, at least to those who are familiar with the ordinary map area" (p. 371). Perhaps the most daunting aspects of cartograms are the algorithms required to generate them:

> “The current solutions have two major problems: First, the high time complexity of the algorithms restricts their use to static applications with a small number of polygons and vertices. Second, they have very limited shape preservation” (Keim, North, and Panse, 2004, 99);
>
> “Generating a cartogram for a not-so-complex map may require hours of computation, and the resulting cartogram may not be satisfactory” (Du, Liu, 1999, 1);
>
> “Cartograms are controversial in part because they are difficult to construct and the results seen to date are crude or imprecise or both” (Dougenik, Chrisman and Niemeyer, 1985, 75).

While cartograms do provide a visual feel for the relationship between the statistical variables and their associated spatial units, the effort required to generate them does not suit one of the primary objective of this thesis, that is, to develop a 'user-friendly' means of geographically presenting socioeconomic information that is beneficial to a large group of users.

Choropleth Maps

> "*Descriptive statistics and choropleth map design go hand-in-hand*."
> (Kumar, 2004, p. 218)

The etymology of 'choropleth' is Greek: *choro* meaning 'area' or 'place' and *pleth* (from *plethos*) referring to 'a crowd' or 'multitude' (Wright, 1944; Robinson et al, 1984; Dent,1999), or in the case of *things* rather than persons, 'an abundance.' Loosely interpreted then, choropleth describes 'how many in a place.' The International Cartographic Association defines choropleth mapping "as a geographic representation of areas, generally administrative or enumeration units with distinct intensity of color/shading proportional to the data value associated with these units" (Kumar, 2004, p. 218). This description reflects the technological advances made from the time when the use of color was a rather expensive option in the map making process, a time when data values were more often distinguished one from the other on choropleth maps through cross-hatching, stippling, or gray-scaling.

Although the human eye can discern and distinguish between a large number of colors, map-makers using choropleth mapping find that too many colors cause confusion on the part of the map reader. Since it is impractical to assign a separate color to every data value in cases where there are more than seven or eight values, the data values are traditionally grouped into classes in order to reduce the number of colors required. There are several methods for breaking a data set into classes, each having advantages or disadvantages depending on the purpose for displaying the data. Jenks and Caspall (1971) and Richard Smith (1986) stress the importance of selecting valid class intervals, making a convincing argument for optimization classing. This is particularly true with single variable data where the distribution is highly skewed. However, in the case of composite indexing, where distribution tends to normalize, it appears the advantages over quantile classing may weaken. Brewer and Pickle (2002) compare seven classification methods to determine the most suitable for epidemiological map-reading. These methods are: quantile; minimum boundary error; natural breaks (Jenks – optimized method); hybrid equal interval; standard deviation; shared area; and box plot. Of these seven, Brewer and Pickle concluded that the classification methods "best suited for choropleth maps intended for a wide range of map-reading tasks were quantiles and minimum-boundary error" (p. 677). This research suggests that, as with epidemiological maps, quantile classification is well suited for the FCHDI.

Today, color monitors, digitizing tablets, color inkjet and laser printers are ubiquitous in map development and production, common tools not readily available prior to the 1980s. This high-quality, low-cost accessibility of color maps promotes flexibility in the design of maps, including exploration into designing maps suitable for people with color-vision impairments (Olson and Brewer, 1997; Light and Bartleine, 2004).

The color palettes available as a default feature in visualization software products, including GIS, allow the map designer to choose from a veritable rainbow of colors to represent data values. While such a plethora of choice may seem advantageous, unless the map-maker has some understanding of statistical graphic design and visual perception, there is considerable likelihood of confusion and misinterpretation on the part of the map-reader being introduced to the map (Rogowitz and Treinish, 1998). “Color has the potential to enhance communication, but design mistakes can result in color figures that are less effective than gray scale displays of the same data” (Light and Bartlein, 2004, 385). Edward Tufte (1990), in discussing the complexity of coloring data concludes that when working with colors, “avoiding catastrophe becomes the first principle in bringing color to information: *Above all, do no harm* (p. 81, emphasis in text).

The psychological perception of color by the map-reader must at least be taken into consideration when designing a choropleth map. First of all, colors convey qualitative information more readily than quantitative values, that is, because a bright orange hue draws more attention than a muted brown, the map-reader may perceive the orange area more important, but not by how much. In an experiment on assigning colors to data values, Olson finds that the subjects often choose colors based on connotative associations: “dull colors with the dull outlook of little income or education, green with money, purple with academia, and so on”(Olson, 1981, p. 226). This may explain the tendency for “hot” items, or those issues the map maker wishes to highlight as urgent being expressed in red hues. The extent of the map-reader’s prior experience with maps can also effect perception. For example, even brief encounters with topographical maps condition the map-reader to interpret blue as water and green as vegetation.

Map coloration can inadvertently exaggerate visual weighting by drawing the map-reader's attention to the larger geographic units (House and Kocmoud, 1998; Kumar, 2004). For example, if all the counties in Florida were the same shape and size, there would be little problem with correlating quantitative data with geographic area, however, when there are large counties and small counties on the same map, the eye will register the larger counties first. As mentioned in the first chapter, Monroe County at the southern tip of Florida is quite large, yet over 99 percent of the population live off the county's coast in the Florida Keys. Conversely, the population density of Tampa Bay's Pinellas County is the highest in the state, but the county is so small that even when the color values are clearly distinct, the map-reader will most likely 'see' the larger Monroe County first. This correlation of spatial unit size to data value is a major issue with proponents of cartograms.

In working on the design of a mortality atlas for the National Center for Health Statistics, Pickle (2004) notes that sequential color scales are well suited for determining extremes in data. Sequential color scales are a light to dark progression of either a single hue or color group (yellow-orange-red). The sequential scales are particularly useful for recognizing clusters of similar data values; an important feature to the FCHDI where the spatial patterns of socioeconomic well-being is of special interest.

In conclusion, the literature supports not only the value and usefulness of the UNDP's human development index for gauging comparative social well-being across geographical regions, but also the model's adaptive characteristics, which lend themselves to modification for the purposes of the FCHDI. The literature supports the development of the FCHDI as a tool for studying Florida's socioeconomic well-being at the county-level. The literature also supports the use of choropleth thematic mapping and quantile interval classification as an effective means for uniformly displaying the FCHDI's rankings as an aid in identifying clusters or spatial patterns of socioeconomic distribution.

Using this background material as a foundation, the methods for constructing the FCHDI and mapping the results are elucidated in Chapter Three.

Chapter Three: Research Methods

> *"Research…is the concentrated examination and correlation of the multitudinous phenomena co-existent in some specific field of activity."*
>
> (Theodor Seuss Geisel, 1939)

The Florida County Human Development Index Equation

The key components of the Florida County Human Development Index (FCHDI) are based on those dimensions used by the UNDP: life expectancy, knowledge, and a decent standard of living. Due to data constraints found at the county level but not at the national level, coupled with the goal of using universally accessible data sources, proxies for these components are established following the works of Hanham et al (2002) and Bukenya and Frasier (2002). For example, data for life expectancy at birth are available for most nations – the aggregated life expectancy in the United States per the 2004 Human Development Report is 77.0 years- however, these same data are not easily found disaggregated to the county level in a format useful to the FCHDI. For this reason, mortality rates are used as a proxy measurement for the life expectancy dimension. Table 3-1 lists the indicators used by the UNDP to measure the life expectancy, knowledge, and a decent standard of living dimensions, plus the proxy indicators used by Hanham et al, Bukenya and Frasier, and this thesis. In the FCHDI, a conscious effort is made to ensure that these proxies reflect the general socioeconomic indicators modeled in the UNDP Human Development Index.

Table 3-1: Dimension indicators used in the UNDP HDI and proxy indicators used in the modified HDI models for West Virginia, Alabama, and Florida

Dimension	UNDP - HDI	West VA HDI Hanham, Berhanu, and Loveridge	Alabama HDI Bukenya and Frasier	FCHDI Kelsey
A long and healthy life	Life expectancy at birth	Adjusted mortality rate per 100,000 Infant mortality rate	Life expectancy at birth Adjusted mortality rate per 100,000 Infant mortality rate	Adjusted mortality rate per 1,000 Infant mortality rate Leading cause of death
Knowledge	Adult Literacy Gross enrollment ratio	Median years of schooling High school dropout rate Percent of population with bachelor's degree or higher	Median years of schooling High school dropout rate Percent of population with bachelor's degree or higher	Non-high school graduate Percent of population with high school degree or higher Percent of population with bachelor's degree or higher
A decent standard of living	GDP per capita	Poverty rate Per capita income Inequality of income distribution (Gini coefficient)	Poverty rate Poverty among children Per capita income Inequality of income distribution (Gini coefficient)	Poverty rate Per capita income Price level index

As noted by Agostini and Richardson (1997), Anand and Sen (1994) and others, measuring the subtle variances in a country with a high level of human development is difficult when using only one indicator to represent a socioeconomic component. In order to increase the sensitivity of measurement across Florida's sixty-seven counties, it is determined that each of the three key components, or dimensions, should be calculated from an interim index made up of three indicators for an overall total of nine indicators.

Proxy Socioeconomic Indicators

For the FCHDI, a proxy of the life expectancy dimension used by the UNDP is established using three indicators or measures of mortality gathered from the State of Florida's Vital Statistics Annual Report 2000 (FDOH, 2001). The first is the resident death rate per one-thousand population. This rate is taken directly from Table D-1 of the report, and reflects the death rate of Florida residents specifically as opposed to the larger and more general record of deaths occurring within the state. The FDOH defines resident death as "events occurring to Florida residents regardless of the place of occurrence" (FDOH, 2001, viii), with "resident" referring to persons whose usual place of residence is Florida. This mortality indicator raises the issue of non-resident deaths in Florida, and how a non-resident mortality variable might influence the socioeconomic well-being index. Florida is a destination state for vacationers and seasonal residents escaping the discomforts of northern winters. Therefore, tourism and the service sector play vital roles in the state's economy. As such, socioeconomic conditions are highly sensitive to a tourist death, or the threat of tourist death as in the spate of shark attacks in 2005 or the high number of tourist muggings and murders in the early 1990s. A non-resident mortality variable is certainly intriguing and merits further research, however, spotty data sources and inconsistent data availability run counter to the stated criteria of the FCHDI, and therefore the variable is omitted from this version of the index.

The second mortality indicator is the death rate of children under the age of five years. This value requires combining the number of deaths in each county for infants (under one year in age) and the number of deaths of children aged one to five taken from Table D-4 (Resident Deaths by Age Group) of the annual vital statistics report. Following the rates and formulae given by the Florida Department of Health for age-specific rates (FDOH, 2001, p. *xiv*), this total is first multiplied by 1,000 and then divided by the number of children under the age of five years for that county as reported by the U.S. Census Bureau (CENSUS, 2003), resulting in a child mortality rate per one-thousand population.

To establish a third indicator for the mortality dimension, a process similar to the UNDP method for calculating the education interim index is used, that is, combining the rate of adult literacy with the total gross enrollment ratio. In order to reflect the health issues of the mortality dimension, values for the two leading causes of death in Florida - heart disease and malignant neoplasm (cancer) - are taken from Table D-12 of the vital statistics report, normalized, combined and then averaged to produce the third indicator.

Due to the assumption that the basic literacy rate as defined by the United Nations is relatively high across Florida, a proxy education attainment dimension is developed for the FCHDI. As previously noted, the UNDP defines adult literacy as the ability by persons 15 years and older to read, comprehend, and write simple sentences about their everyday lives. Adult literacy is reported in the 99.0 percent range for the United States (UNDP, 2002, Table 1), however, there are conflicting figures in the same report indicating that in the United States, the percentage of persons between 16 and 64 years who *lack* functional literacy skills is 20.7 (UNDP, 2002, Table 4). Because literacy rates at the county level are difficult to determine, the focus for the FCHDI education dimension is education attainment using three indicators taken directly from Table 4 (Education and Veteran Status) of the U.S. Census Bureau's 2000 Census of Population and Housing: Summary Social, Economic, and Housing Characteristics (Census, 2003). The indicators are: non-high school graduate (population 16 to 19 years, not enrolled in school and not high school graduate); education attainment - high school graduate or higher (population 25 years and over: Percent high school graduate or higher); and education attainment – Bachelor's Degree or higher (population 25 years and over: Percent with Bachelor's degree or higher).

From a socioeconomic well-being standpoint, 'a decent standard of living' is a highly subjective term, for a level considered 'decent' by the researcher may differ greatly from various sectors of the study population, thereby potentially violating objectivity in analysis. Therefore, indicators for the standard of living dimension fall back to more traditional and well establish economic standards measurements: measures of poverty, per capita income, and the price level index developed by the Bureau of Economic and Business Research at the University of Florida (BEBR, 2003). This last indicator is the only one used to compute the FCHDI, which is not taken directly from Federal or State data sets, however the intrinsic significance of the pecuniary consumption price level index to the FCHDI necessitates its inclusion. The data come from the 2003 Florida Price Level Index report, Table II. The county-level poverty figures and per capita income data come from the U.S. Census Bureau's 2000 Census of Population and Housing: Summary Social, Economic, and Housing Characteristics, Table 16 (Poverty Status in 1999: 2000) and Table 10 (Work Status and Income in 1999: 2000).

The conceptual model of the FCHDI developed for this thesis and shown in Figure 3-1 illustrates the flow of the ten indicators to their respective interim indices, which are then combined to produce the FCHDI.

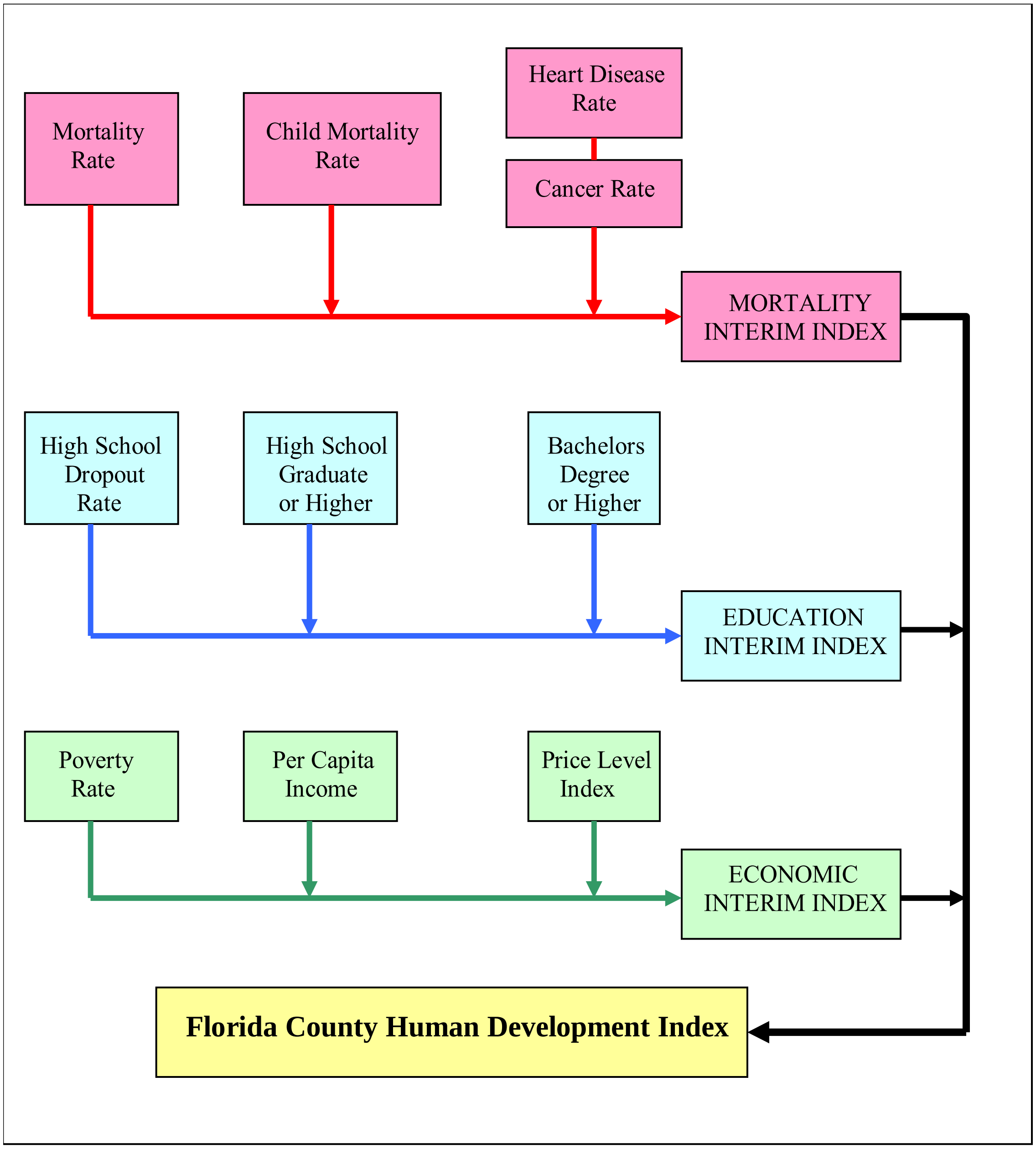


Figure 3-1: Conceptual model for calculating the FCHDI

FCHDI Calculation

With the ten variables for the nine indicators established, and the values for each collected from the data source listed above, the FCHDI is calculated using Microsoft Office Excel 2003. Although there are several spreadsheet programs available, Excel is chosen with the intent of using one of the most common or accessible programs available to the widest number of potential users of a modified human development index. To facilitate organization, the task of calculating the FCHDI is broken into fourteen worksheets: one worksheet for each of the nine indicators where descriptive statistics and normalizing of the raw data is calculated, three worksheets for calculating the interim indices, one worksheet for calculating the FCHDI, and one worksheet for ranking the Florida counties. Breaking the calculation down in this fashion also facilitates transferring the data from table format to the choropleth maps.

The values of each of the nine indicators are normalized using the same conventional linear scaling transformation (LST) method used for the HDI:

$$y = (x - x_{min}) / (x_{max} - x_{min})$$

Where:
y = normalized indicator value
x = observed or adjusted indicator value
x_{min} = minimum value of the indicator set
x_{max} = maximum value of the indicator set

These normalized values are then recalculated using an arithmetic average to produce an interim index value for the three dimensions. Following the UNDP general principle of uniform weighting for the social and economic factors, each of these indicator values carries equal weight during calculation of the interim index value. The interim indices are summed and averaged, again with uniform weighting, to produce the FCHDI. The

Florida counties are then ranked by the FCHDI value as a percentage of the sixty-seven county data set.

Adjusting for net-positive results

When constructing an index of social well-being, it is necessary to consider the issue of value directionality: whether the attribute has a positive or negative effect on social well-being (Salzman, 2003). In a socioeconomic index such as the FCHDI, the term for the highest positive measurement (100 percent) is *unity*, and each gradation below it is a measure of *deprivation*. Before normalizing the interim indicator values for the FCHDI, a subjective positive/negative value judgment is set for each of the indicators, depending on whether that indicator will have a positive or negative effect on the overall socioeconomic well-being of Florida's counties. The goal here is to ensure that when ranked, the higher numbers represent positive socioeconomic well-being, while progressively lower numbers represent correspondingly less positive socioeconomic well-being. For example, poverty is considered a deprivation or negative social condition. A poverty level of 6.2 percent is generally accepted as better than a poverty level of 12.4 percent, yet numerically the 6.2 percent is lower. This situation is remedied by subtracting the deprivation from unity; in this case, the poverty level in decimal form is subtracted from the number one (100 percent):

1 – 0.062 = 0.938 (or 93.8 percent *non*-poverty)

1 – 0.124 = 0.876 (or 87.6 percent *non*-poverty)

By making this adjustment, a 6.2 percent poverty level becomes *higher* on the ranking scale. In this thesis, positive indicator values used directly from the data sets are referred to as “observed values” and those requiring modification such as the poverty level described above are termed “adjusted values.”

Indicator weighting during calculation

One criticism leveled against the HDI is the UNDP’s choice to use uniform weighting of the interim indices when calculating the HDI (Kelly, 1991; Booysen, 2002; Hagerty and Land, 2004). Kelly (1991) emphasizes that, “while a priori it is difficult to justify any set of weights, testing the sensitivity of the HDI to alternative weights would have been useful” (318). Similarly, Booysen’s concerns lay in the fact that the further apart the minimum and maximum values used in calculating the HDI, the more difficult it is to maintain relative increases in the indicators between nations without increasing the implicit weighting (2002, p. 125). The issue of weighting indicators or interim indices in a summary index such as the FCHDI is a thorny one, since it is suggested by Cutter, Michael, and Scott (2000) that establishing non-uniform weighting schemes between social indicators (in their study case, social vulnerability) and non-social indicators (such as biophysical risk or economic indicators) tends to be subjective, or biased toward the agenda of the research. Of course, as stated in the works of Anand and Sen (1994) and ul Haq (2003), reducing or eliminating the economic standard bias in ranking national progress is one of the objectives of the HDI, so it is, they argue, logical to use uniform weighting. Bowen and Moesen (2005) counter that predetermined uniform weighting schemes applied universally to countries having differing policymaking priorities will in fact bias the measurements.

At a global scale, where the 2004 HDI values range from a high of 0.956 for Norway to a low of 0.273 for Sierra Leone, the wide spread of values within the closed scale of zero-to-one is great enough to validate both Booysen's concerns that implicit weights in the HDI are being introduced during scaling, and the potential for policy priority bias as discussed by Bowen and Moesen. On the other hand, at a county-level scale within a comparatively homogeneous unit such as the State of Florida, calibrating the FCHDI with explicit weights would overly complicate the index, particularly when efforts to increase the sensitivity of the scale are made by increasing the number of relative indicators within each interim index. In addition, by using the linear scaling transformation to normalize the observed indicator values, the minimum/maximum spread is narrowed, and thus the need for explicit weighting is reduced (Salzman, 2003; Smith, 1975). Booysen refers to Earl Babbie (The Practice of Social Research, 1995: Wadsworth Publishing) arguing that "equal weighting should be the norm and the burden of proof should fall on differential weighting" (Booysen, 2002. pp 127-128). With this in mind, it is deemed too problematic to justify, and therefore impractical to establish a non-uniform, explicit weighting scheme for the FCHDI.

Standard score as an alternative to linear scaling transformation

The linear scaling transformation (LST) formula used in the FCHDI is one of two common methods for standardizing and aggregating un-scaled variables. The LST works best when the value range of a data set is relatively centered about the mean and is not heavily impacted by outliers, a condition that skews the spread of indicator values in the index and diminishes the usefulness of the data set. A second common transformation method is the z-score, also known as Gaussian normalization, which is not as strongly influenced by extremes in the range of a data set (Smith, 1977). An example of this second method is the Natural Amenities Scale created by the Economic Research Service of the USDA, which uses z-scores to standardize an array of six indicators ranging from the mean temperature in January to land surface typography at the county level for the 48 contiguous United States (McGranahan, 1999). As can be imagined, the range of mean January temperatures between Koochiching County, Minnesota (International Falls) and Monroe County, Florida (Key West) is quite wide, a condition where z-score normalization provides more uniformity around the mean than using LST.

Standardization of raw indicator values into z-scores involves first finding the mean and standard deviation for the indicator data set, then using the formula:

$$\text{z-score} = (\text{observed value} - \text{mean}) / \text{standard deviation}$$

A z-score can be a negative value, indicating the observed value is below the mean of the data set, a positive value indicating the value is above the mean, or zero indicating the value is equal to the mean. Since composite indices complicate determining the symmetry of indicator value distribution around the mean, the z-score helps simplify the matter by using Chebyshev's Inequity, which states that for any given distribution of variables, the probability of a z-score value being outside the range of 2 and -2 is at most 25 percent, and the probability of being outside the range of 3 and -3 is at most 11 percent. The problem here is that the z-score represents the value away from the mean of that particular data set, and does not standardize all data sets within a composite index to a common range as is the case using LST (Salzman, 2003).

Ranking the z-scores is basically a matter of sorting the values in descending order, and representing the z-scores through choropleth mapping using, in the example shown in Figure 3-2, a seven-hue divergent color scale. In this example taken from Isserman (2005) and using the ERS/USDA Natural Amenities Scale, z-scores representing the average percentage of humidity in July for each county in the 48 contiguous United States are considered either a positive factor (blue), or a negative factor (red), so those humid counties in the Southeast, particularly in Florida are shown with a darker shade of red, representing a humidity z-score between -1 and -2 standard deviations, while arid Great Basin states such as Nevada and Utah are shown in dark blue, representing a humidity z-score between +2 and +3 standard deviations.

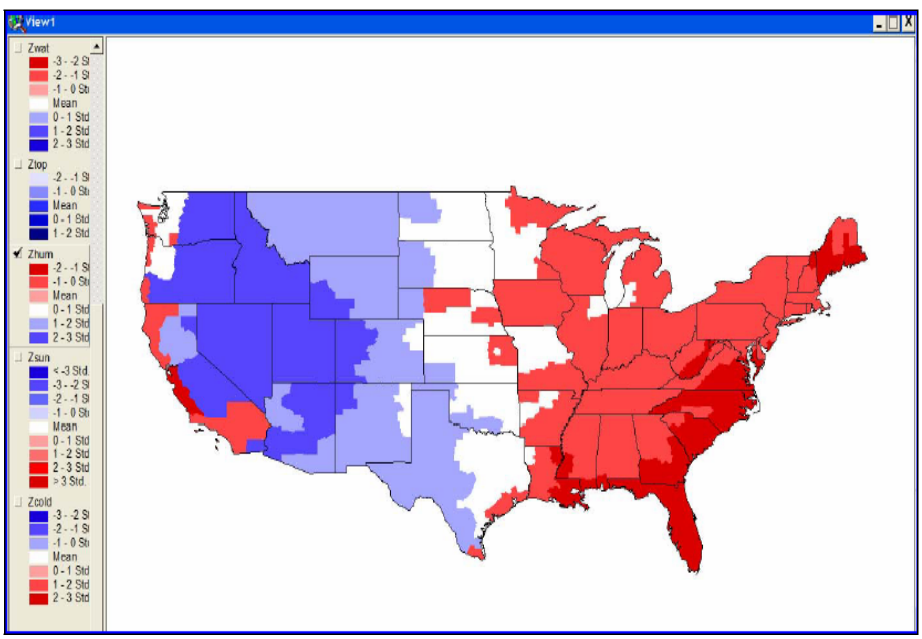


Figure 3-2: Example of a z-score choropleth map using humidity data for the 48 contiguous states at the county level from the ERS/USDA Natural Amenities Scale. (Source: Isserman, 2005)

The FCHDI could easily be calculated using the Gaussian normalization, however, Salzman found that between the two methods, the LST is the 'best practice' for standardizing variables, which assigns the lowest implicit weights and efficiently contends with the directionality issue of net-positive results for aggregated data (Salzman, 2003, p. 26). Since the FCHDI is fashioned after the UNDP model, the LST method is used on the indicator values ensuring that the ranges of the values are all positive and fall between the set bounds of zero to one (0.000 to 1.000) for ranking purposes.

Mapping the FCHDI

There are many, many mapping software packages on the market at the time of this writing, with new and improved releases constantly on the horizon; some are merely modified drawing programs, others are complex, multi-faceted, fully integrated GIS programs requiring extensive training to optimize the full scope and potential of their capabilities. High-end GIS software offers fantastic possibilities, not only for mapping data values, but also for customizing data compilation, analysis and comparison. Solutions to problems such as selecting an appropriate data value class interval (natural breaks, standard deviation, equal interval, quantile, et cetera), color scheme, font type, line quality, or even which data layers should be visible and which should be suppressed, all can be explored with a click of the mouse. Unfortunately, budget, facilities, and/or training restraints often limit justification for these types of GIS programs, particularly in the private sector when the primary function of the agency or department is not geographically orientated. For pragmatic purposes then, all of the FCHDI choropleth maps presented in this thesis were created using a simple vector graphic program (Adobe Illustrator 10), with the full understanding that while this is not the optimal method for mapping, it is quite possible to create choropleth maps suitable for this type of project using non-GIS graphic design tools.

Choosing the data set class interval

> "In an era when maps are made from large databases with software that allows queries of individual polygons and iterative changes in classifications, it seems that facilitating map comparison is now more important than optimizing classification for a single map. Quantiles seem to be one of the best methods for facilitating comparison as well as aiding general map reading."
> (Brewer and Pickle, 2002, p. 679)

As discussed in the literature review, for purposes of displaying data sets with a large number of data values in choropleth mapping, it is necessary to break the data sets into groups or classes. There are several methods available for grouping data values into classes, seven of which were evaluated by Brewer and Pickle (2002). Through their testing of *observed* and *predicted* percent accuracy of mapped epidemiologic data interpretation by classification method, the quantile method proved the most accurate at 75.6 percent overall, followed by the minimum boundary error method at 72.6 percent overall. The Jenks, or natural breaks method had an overall accuracy of 69.9 percent.

While it is true that cartographic researchers find quantiles less effective for certain data displays, Brewer and Pickle demonstrate that for general comparative map-reading tasks of ranked data, the quantile method produces an accuracy level "not significantly different from or better than two of the most optimal methods..." (p. 678).

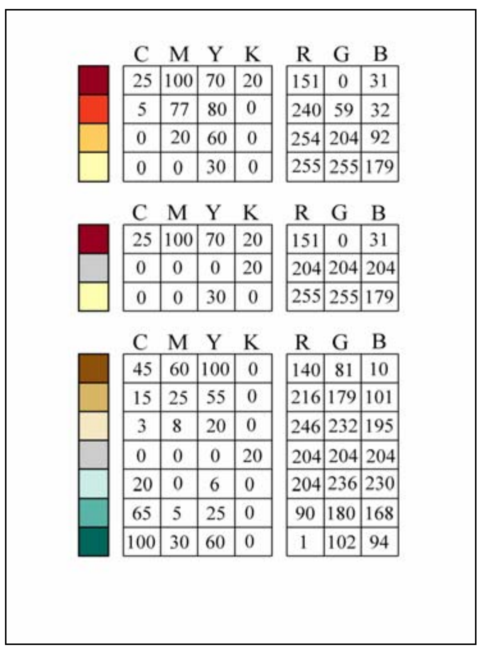
In both the Hanham et al. and the Bukenya and Frasier studies, quantile classification is used to display the ranked data. The data sets are broken into quintiles, or 20 percent increments, meaning that only five colors are required to show the results of the modified index. Quintiles were also considered for the FCHDI, however, due to the use of frequency histograms and box-and-whisker diagrams as described later in this chapter, quartiles were selected in order to provide a clear median point. Though there are several classifications to choose from, in this initial stage of research, quartiles highlight clusters and spatial patterns in the data, which hopefully will inspire and act to focus future research, research that may require another interval classification. Of utmost concern is the need to use one interval classification on all data sets for consistency throughout this stage of research.

Choosing the color schemes

As discussed earlier, the color scheme used on a choropleth map is more than a function of design, it is also a critical means for conveying an interpretation of data, and as such, care must be taken not to introduce confusion or misinterpretation to the map and consequently the map reader through poor or unconventional color choices.

In the interest of simplifying the interpretation of the rank distribution, the index results are grouped by quartiles, meaning that only four sequential colors are required for the maps. The web-based ColorBrewer, created by Cynthia Brewer and Mark Harrower, is used to select a sequential color scheme that does not lose definition or contrast across multi-functional uses such as desktop printing, power-point projection, or CRT display (http://www.ColorBrewer.org). Initially the four-class sequential yellow-orange-brown scheme was selected, however it was determined that the brown hue is not clearly distinguishable from dark orange when printed on an inkjet printer, so the saturation value for brown is increased.

For the alternative indicator map, where it is necessary to show standard deviation from the mean, a seven-class divergent color scheme is required: one neutral color representing the mean, three gradations of one hue representing the positive standard deviations, and three gradations of another hue representing the negative standard deviations. This divergent color scheme follows the National Center for Health Statistic's *Atlas of United States Mortality*, which finds that the scheme brings to light extremes of data distribution and aids in cluster recognition (Pickle, 2004). Figure 3-3 shows the colors selected for this project and each color's CMYK (cyan, magenta, yellow, black) and RGB (red, green, blue) values.



C	M	Y	K	R	G	B
25	100	70	20	151	0	31
5	77	80	0	240	59	32
0	20	60	0	254	204	92
0	0	30	0	255	255	179

C	M	Y	K	R	G	B
25	100	70	20	151	0	31
0	0	0	20	204	204	204
0	0	30	0	255	255	179

C	M	Y	K	R	G	B
45	60	100	0	140	81	10
15	25	55	0	216	179	101
3	8	20	0	246	232	195
0	0	0	20	204	204	204
20	0	6	0	204	236	230
65	5	25	0	90	180	168
100	30	60	0	1	102	94

Figure 3-3: FCHDI colors and CMYK/RGB values used on the choropleth maps.

Frequency Histograms and Box-and-Whisker Graphs

> "One of the main objectives of a choropleth map is to provide an overall understanding of the spatial patterns of the mapped variable. Reader's understanding of these patterns can be easily influenced by map design components and the skewed distribution of the visual weight of mapping units. Thus it becomes critical that the statistical information be embedded in the map to assist readers to develop (objective) statistical understanding of the mapped variable" (Kumar, 2004, p. 217).

Mapping the state of Florida in its entirety is a challenge, that is to say, mapping it without lopping off the western panhandle and placing the amputated appendage somewhere else in order to give balance to the map design. Confined within a rectangular neatline, the empty expanse of the Gulf of Mexico gives Florida an unstable look. This thesis takes advantage of the vacant space with the placement of two additional statistical graphics as legend aids to the map: frequency histograms and box-and-whisker graphs.

Both Kumar (2004), proponent of the frequency histogram legend (FHL), and Kostbade (1981), proponent of the box-and-whisker legend (BWL), make compelling arguments for the use of these information enhancers on choropleth maps. Kumar recognizes the typical issue of having to compromise map space when adding components, and suggests completely replacing the standard legend with the FHL. However, as stated above, the layout of Florida maps is well suited for additional graphics and therefore this thesis follows the example in the *Atlas of Mortality from Selected Diseases* where Mason et al. (1981) supplement the standard legend with the FHL. The map layout for each FCHDI indicator used in this thesis includes two maps of Florida counties; one showing all four ranked quartiles, and, to aid cluster recognition, one showing only the upper and lower quartiles. This approach allows both the FHL and BWL to be added to the map layout.

Although a frequency histogram by itself is useful for understanding the distribution of data values, the FHL is further enhanced here by breaking the bars of the graph down into their respective quartile and applying the color assigned to that quartile so that the distribution curve clearly shows the transition from the lower quartile to the upper quartile. The box-and-whisker diagram developed by J.W. Tukey also describes frequency distribution of variables, but gives a clearer picture of the quartiles and how they are grouped around the median of the data set, and identifies the position of any outliers. Figure 3-4 is an example of the FHL and BWL using the malignant neoplasm data set for Florida (FDOH, 2001). The FHL shows the lower quartile distributed between values 0.000 and 0.396, the 2nd quartile between 0.400 and 0.460, the 3rd quartile between 0.468 and 0.590, and the upper quartile between values 0.598 and 1.000.

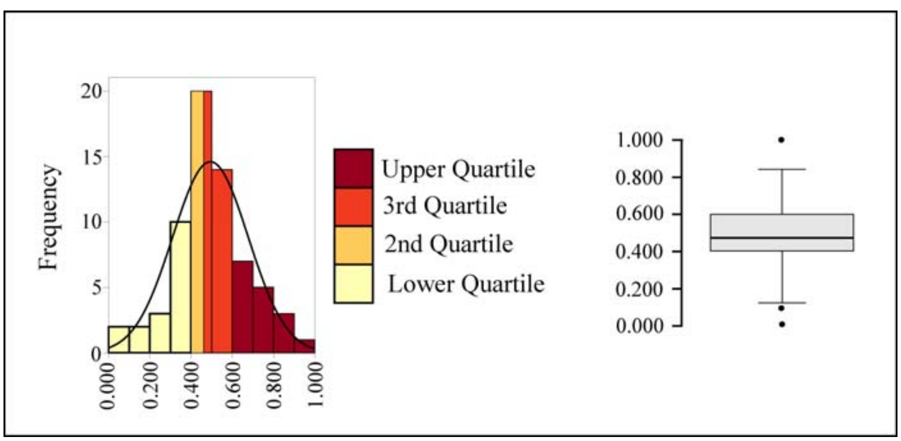


Figure 3-4: Example of Frequency Histograms and Box-and-Whisker Diagrams.

The BWL in Figure 3-4 shows the distribution for the same data set, but identifies the median to be 0.468, and also three outlier data points: two at the lower end of the scale (0.000 and 0.089) and one at the upper end of the scale (1.000). As will be seen in

Chapter Four, the FHL and BWL help the map-reader get a better sense of the county rankings by providing a visual display of frequency distributions to complement spatial patterns. Box-and-whiskers graphing is not included in the Office Excel 2003 chart wizard, nor is a frequency curve plotted on Excel's frequency histograms, so the graphs found on the maps were generated using SPSS 13.0 statistical software.

Alternative variable: the natural amenities indicator

In several recent studies of rural development and domestic migration trends in the United States, natural amenities are cited as a major pull factor (McGranahan, 1999; Shumway and Otterstrom, 2001; Green, 2002; Kwang-Koo et al., 2005). This is particularly true in a retirement and tourist destination state such as Florida. In their study on the effects of Florida's economic and population growth on natural lands conservation, Kiker and Hodges (2002) find the state leads much of the nation in terms of non-traditional growth, that is, growth based on services and natural amenities (tourism) rather than on natural resource extraction, agriculture, and manufacturing. If the idea that natural amenities affect in-migration and tourism is accepted as true, and in-migration and tourism are beneficial to local economics, then it follows that natural amenities affect socioeconomic conditions.

Bukenya and Fraser (2002) take an alternative view of natural amenities in their human development index for Alabama counties; that environmental factors affect human development itself. As a measure of Alabama's environmental factors, Bukenya and Fraser used a proxy indicator based on the Natural Amenities Scale published by the Economic Research Service, U.S. Department of Agriculture (McGranahan, 1999). This natural amenities scale is a county-level composite index of six measurements including climate, topographic variation, and surface water area, which, according to the authors, represent the natural attractiveness of an area as a place to live.

Based on 1999 data from all counties in the lower 48 states, the indicators described by ERS (1999) represent measures of:

Warm winter (average January temperature)
Winter sun (average January days of sun)
Temperate summer (low winter-summer temperature gap)
Summer humidity (low average July humidity)
Water area (water area as proportion of total county area)
Topographic variation (topography scale)

As can be imagined, Florida does not rank high on the topographic variation indicator, which classifies counties by land-surface form codes ranging from 1 (flat plains) to 21 (high mountains). Eleven counties are rated 4 (irregular plains), while the remaining fifty-six are rated 1. However, as McGranahan (2005) notes, the “six characteristics do not tend to be found together; often there are tradeoffs... The natural amenities scale is designed to reflect these tradeoffs by combining these characteristics into a single scale” (p.43). After combining the indicator values, the natural amenities scale ranks each county according to its standard deviation from the overall mean:

1 = Over -2 (Low)
2 = -1 to -2
3 = 0 to -1
4 = 0 to 1
5 = 1 to 2
6 = 2 to 3
7 = Over 3 (High)

In Florida, all counties rank above a 4 on the natural amenities scale, ranging from Monroe County (overall scale value: 6.05, rank: 6) to Liberty County (overall scale value: 0.36, rank: 4). In Florida there are fifteen Rank 6 counties, twenty-four Rank 5 counties, and twenty-eight Rank 4 counties.

Although the subjectivity of what constitutes “attractiveness” may come into play here, and the fact that this is a national-level scale rather than a Florida-specific scale, as a standardized measure (z-score) the Natural Amenities Scale values fits the format requirements of the FCHDI quite well.

In summary, Chapter Three describes the primary components and issues of the FCHDI, establishing a blueprint for the modified index. Specifically, the nine proxy socioeconomic indicators used in building the mortality, education, and economic dimensions are discussed along with their secondary data sources. The method for normalizing the data (linear scaling transformation) and, where required, the method for adjusting the raw data for net-positive results is discussed. The issue of uniform weighting versus explicit weighting of the indicator values is addressed, as well as considerations for interval classification, color scheme choices, and the inclusion of both frequency histograms and box-and-whisker graphs to supplement the map legends. The calculation and mapping software (Excel 2003; SPSS 13.0; and Adobe Illustrator 10) is also briefly discussed. In the final section of Chapter Three, the natural amenities alternative variable indicator is introduced, and its statistical format fit with the FCHDI is discussed.

Chapter Four: Results

This chapter presents the results of the indexing process as described in Chapter Three, which is: normalizing the raw data for each indicator, calculating the three interim indices, calculating the FCHDI, and ranking the counties. In addition, the outcome from testing the natural amenities alternative indicator against the base FCHDI values is presented, along with the resulting change in the Florida county ranking.

The processing of data through the FCHDI entails calculating, plotting, and to some degree interpreting the indicator rankings, however it is important to keep in mind the original postulates of the thesis:

1. Can the FCHDI be effectively applied to Florida at the county-level?
2. Is choropleth mapping advantageous in discerning territorial patterns and trends?

The results are presented in choropleth mapping format, and are represented as net-positive, that is, each indicator, interim index, summary index, and test indicator is ranked and plotted with the index values most positive to social well-being in the upper quartile, and those least positive values in the lower quartile. To standardize the choropleth representation throughout the thesis, four sequential hues are used, with the darker hues representing the upper quartiles and the lighter hues representing the lower quartiles. To spatially highlight the upper and lower quartile distribution, a second choropleth map is plotted showing only the respective upper and lower quartiles, the mid-quartiles are combined and converted to gray-scale. As recommended by Kostbade (1981) and Kumar (2004), box-and-whiskers diagrams and simplified frequency histograms are included on each map, further highlighting data distribution around the median, and indicating whether the distribution is skewed or whether outliers are present in the data sets.

Reference data tables created in Excel are found in Appendix A, which include the observed and adjusted data collected from the sources for each of the ten indicators, along with the calculations for the three interim indices, the FCHDI, and the Florida county rankings per the FCHDI.

The purpose of applying the alternative variable to the FCHDI is not only to determine what rank position the counties move to, but also to analyze whether and to what degree the variable impacts the FCHDI rankings. Therefore, the data results for the alternative natural amenities indicator are presented somewhat differently than the basic FCHDI indicators. The indicator value map, shown with the standard format used for the previous indicators, is followed by a figure showing the original FCHDI map and the FCHDI plus natural amenities. The final figure has the upper choropleth map showing whether each county's ranking is raised or lowered, and the lower map showing the degree of change (if any) in plus/minus standard deviations. These maps visually describe whether or not the alternative indicators affect the FCHDI rankings, by how much, and whether there is a spatial component to the effect.

Mortality Interim Index

The FCHDI mortality interim index is a proxy for the 'long and healthy life' dimension used by the UNHDP, and is comprised of three indicators: mortality rate; child mortality rate; and the leading cause of death indicator, which is a composite of the two most common causes of death in Florida: heart disease and malignant neoplasm.

Mortality Rate (per 1,000 population)

Death is by most accounts a negative social factor, so in the FCHDI mortality index (Figure 4-1) a high mortality rate corresponds to a low index value and is assigned a light hue. The 2000 death rate per 1,000 population for resident Floridians is 8.0, slightly less than the national death rate of 8.5, ranging from a low of 6.4 in Leon County to a high of 16.6 in Citrus County. Of the seventeen upper-quartile counties (low mortality rate), eleven are found in the northern tier of the state. A cluster of three low mortality rate counties (Orange, Seminole, and Osceola) is found in the central section of peninsular Florida, with the remaining three low mortality counties (Miami-Dade, Monroe and Hendry) in the south. The majority of high mortality rate counties are located in the central section of the peninsula. Interestingly, the five counties with the highest death rates (#63: Sarasota, #64: Hernando, #65: Charlotte, #66: Pasco, and #67: Citrus) are all located on Florida's central Gulf Coast. These counties also correlate closely to the counties with the highest ratio of population over the age of 65:

#1: Charlotte County (34.72 percent)
#3: Citrus County (32.19 percent)
#4: Sarasota County (31.47 percent)
#5: Hernando County (30.85 percent)
#10: Pasco County (26.80 percent)

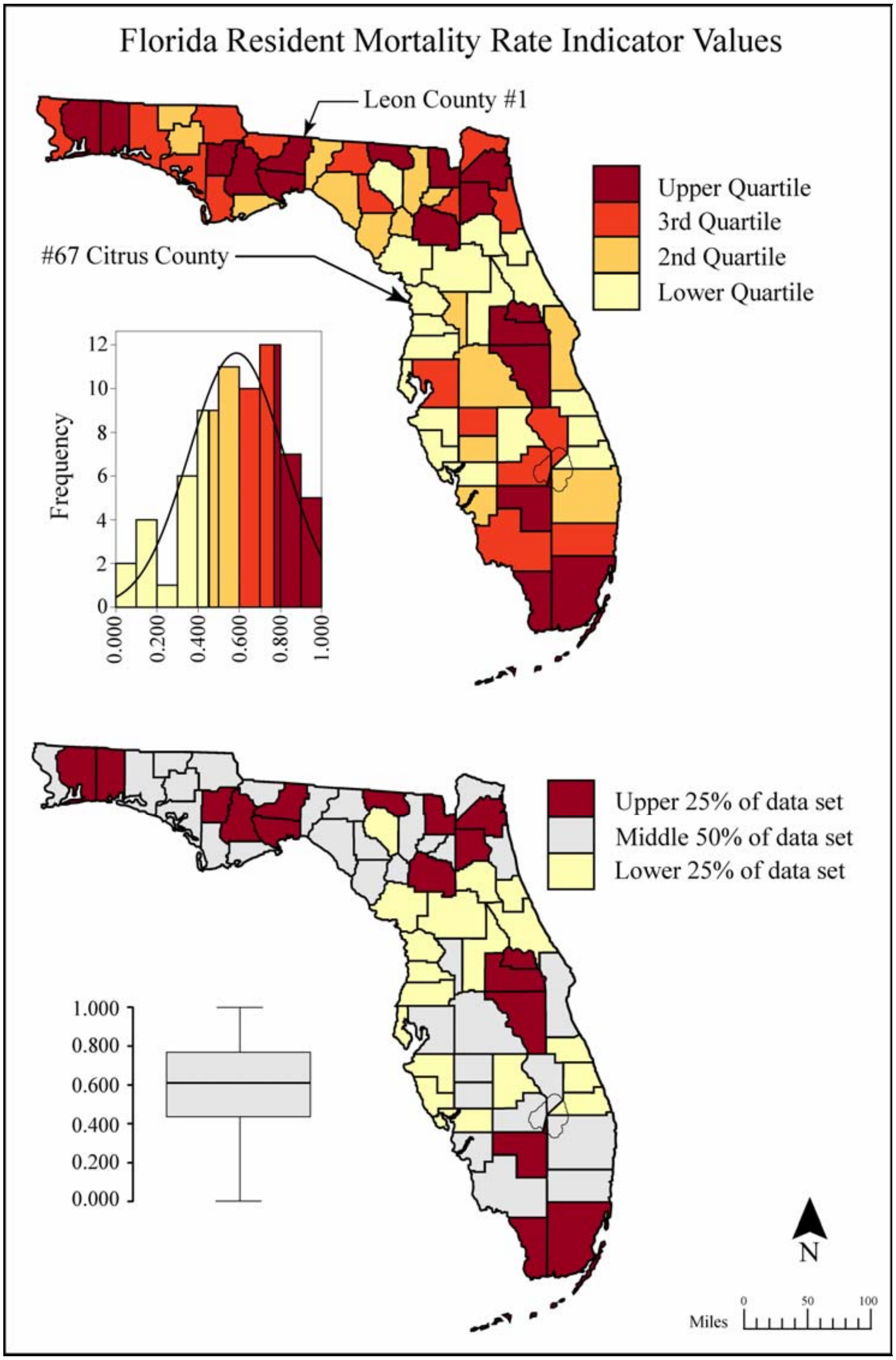


Figure 4-1: Florida Resident Mortality Rate Indicator Values. A choropleth map of the Florida resident mortality rate indicator values in spatial context, showing the highest ranked counties (lowest resident mortality rates) in dark brown and the lowest ranked counties (highest mortality rates) in pale yellow.

Child Mortality Rate

As with resident mortality, child mortality is also a negative social indicator and therefore a high child mortality rate is shown in the lower quartile with a light yellow hue. The child mortality rate is calculated by dividing the number of child deaths (under the age of five years) per county from the Florida Department of Health 2000 vital statistics report by the number of under five year-old children by county per the 2000 U.S. Census. The child mortality rate in Figure 4-2 ranged from 0.00 percent to 0.65 percent, a relatively narrow range. Three of the northern counties (Hamilton, Jefferson, and Lafayette) reported no child deaths in 2000 for a 100 percent survival rate. Glades County in the south-central section of the peninsula had a 0.65 percent child mortality rate (or a 99.35 percent survival rate), the lowest in the state. Judging by the choropleth maps alone, it would appear that the upper and lower quartiles are quite mixed in the northern tier of the state, with an odd cluster of low quartile counties in close proximity to Lake Okeechobee in the south-central peninsula. The frequency histogram for this indicator shows a negative or left-skew in the distribution, and the box-and-whisker diagram shows a narrow interquartile range centered closely on the median. The disturbing results of the box-and-whisker diagram are the three outliers (Okeechobee, Gadsden, and Suwannee counties) and two extreme outliers (Gulf and Glades counties) in the data set. This raises questions on the soundness of using child mortality rate as an indicator in the FCHDI, suggesting that in future research either more analysis be done, or another proxy indicator should be sought.

See Table A-2 in Appendix A for values and conversion of the child mortality indicator.

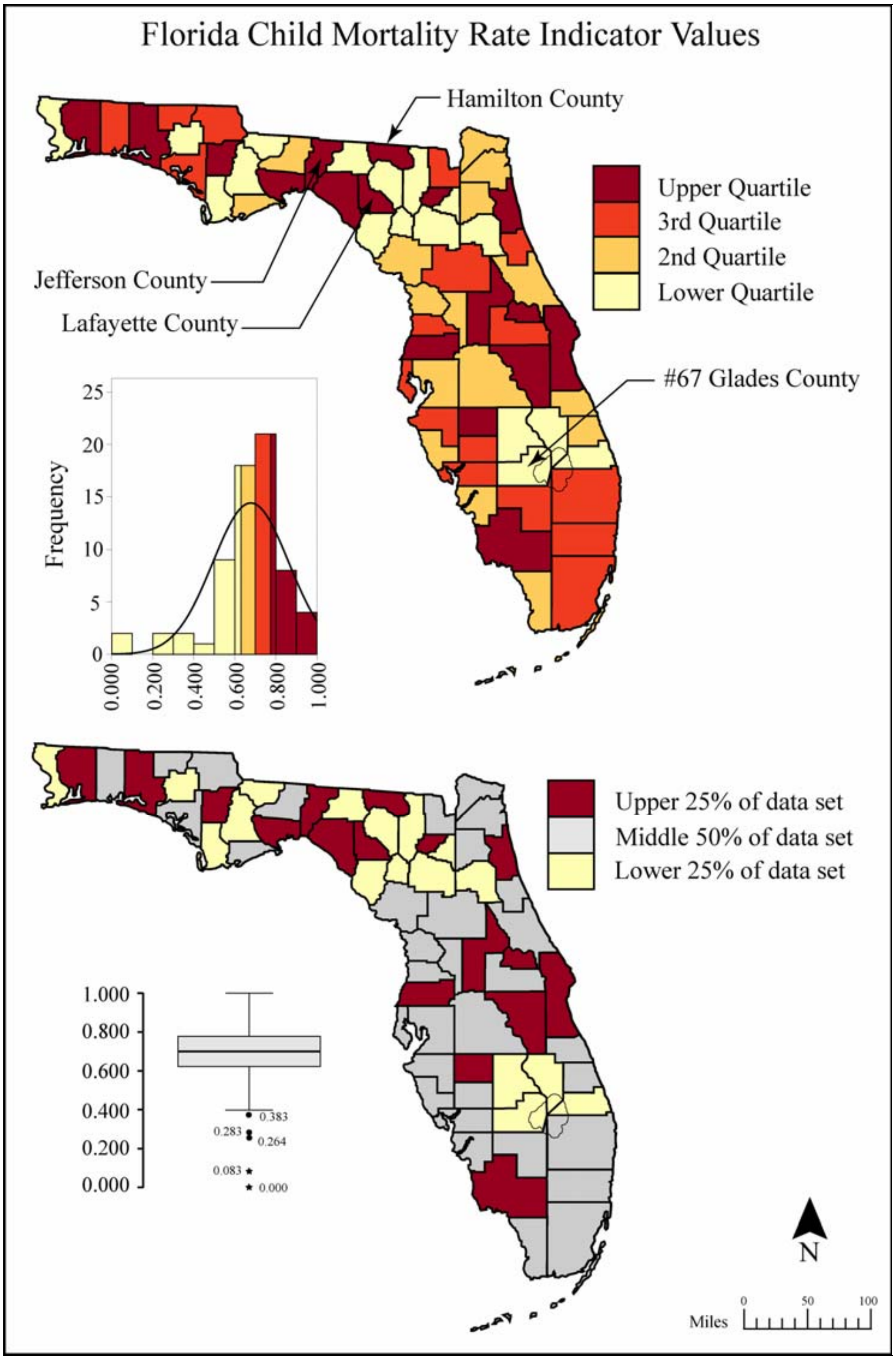


Figure 4-2: Florida Child Mortality Rate Indicator Values. A choropleth map of the Florida child mortality rate indicator values in spatial context, showing the highest ranked counties (lowest child mortality rates) in dark brown and the lowest ranked counties (highest child mortality rates) in pale yellow.

Heart Disease

As shown in Figure 4-3, with the exception of Monroe County at the southern tip of Florida, all of the counties with the lowest incidence of death attributed to heart disease are found in the northern tier of the state. The rate of deaths attributed to heart disease range from a low of 16.4 percent in Union County to a high of 34 percent in Charlotte County. Charlotte County has Florida's highest percentage of its population over the age of 65, however, the age factor does not appear as closely correlated to heart disease across the rest of the state as it does with the resident mortality rate. The largest cluster of counties with low incidence of heart disease is in the north-central region, centered roughly on Union County. The major cluster of counties with a high number of deaths due to heart disease is in south Florida, quite noticeably along the Atlantic coast (See St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade counties). Both the frequency histogram and the box-and-whisker diagram indicate that the majority of indicator values are in the lower end of the scale, the distribution being skewed to the right (positive), with the lowest heart disease rate county (Union County) actually falling as an outlier.

See Table A-3 in appendix A for values and conversion of the heart disease indicator.

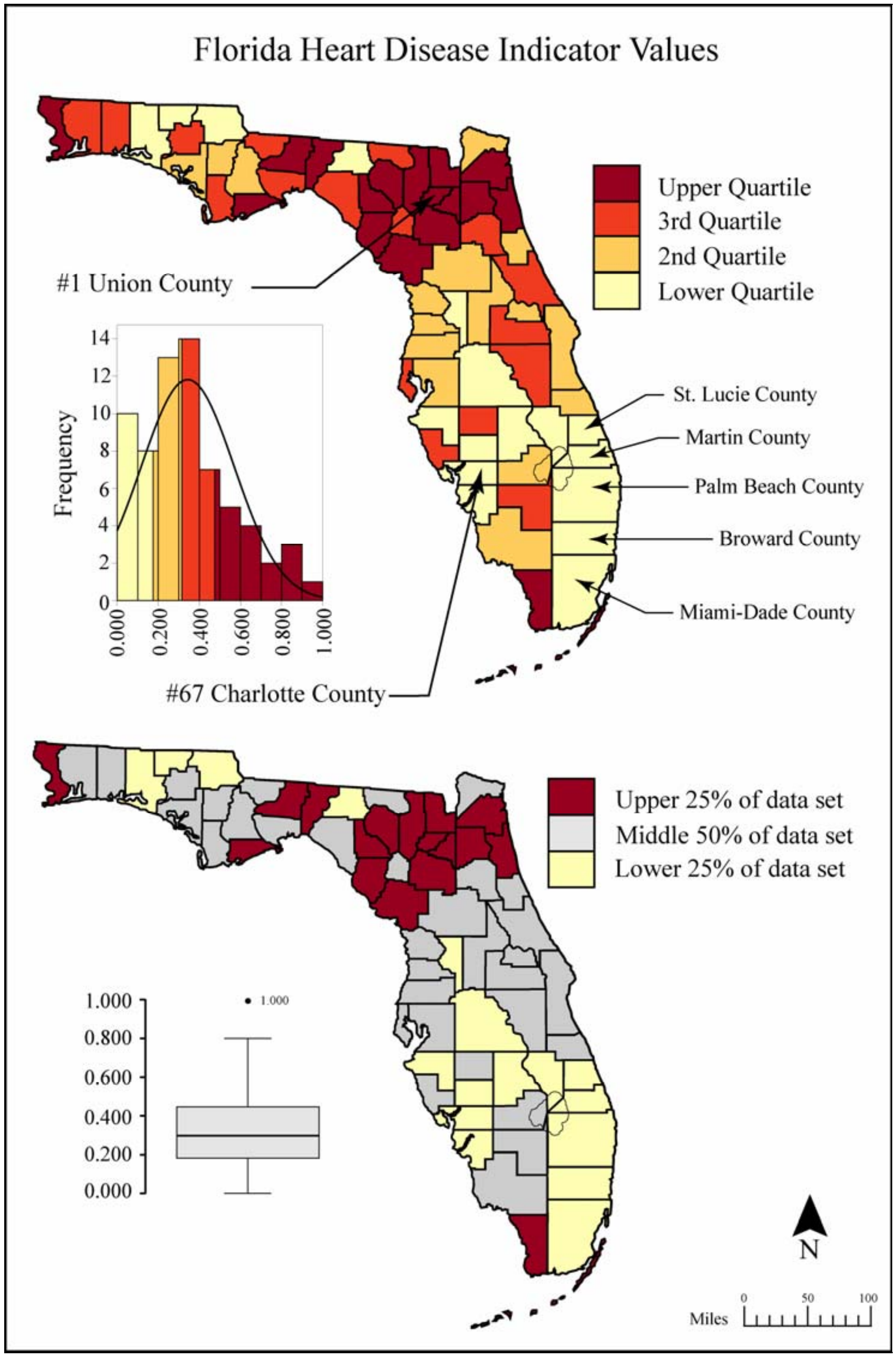


Figure 4-3: Florida Heart Disease Indicator Values. A choropleth map of the Florida heart disease death rate indicator values in spatial context, showing the highest ranked counties (lowest heart disease rates) in dark brown and the lowest ranked counties (highest heart disease rates) in pale yellow.

Malignant Neoplasm (Cancer)

The death rate due to malignant neoplasm, or cancer, in Florida ranges from a low of 16.9 percent in Hardee County to a high of 30.8 percent in Glades County. It is interesting that the counties representing the two opposite extremes on this scale are situated in close proximity to each other in south-central peninsular Florida (Figure 4-4), suggesting that the prevalence or absence of cancer may not be strongly correlated to location. However, thirteen of the seventeen counties with the highest cancer levels are situated along the coast, while only five of the seventeen counties with the lowest cancer levels are coastal counties. There are too many unknown variables from the source data table such as type of cancer, race factors, or the accessibility to cancer treatment facilities to place more significance to the distribution pattern other than to note that clusters of counties with high cancer levels are more prevalent along the coast.

It is interesting to note that comparing the distribution between heart disease and cancer, seven counties completely swap quartiles. Most notable is Union County, which is in the number one position on the heart disease scale (low rate), but drops to sixty-sixth position on the cancer scale (high rate). The remaining six counties that reverse quartiles are Miami-Dade and Monroe counties at the southern tip of the peninsula, Holmes, Jackson, and Madison counties along the State's northern border, and St. Johns County on the northern Atlantic Coast.

The box-and-whisker diagram shows one outlier (Hardee County) in the upper range of the indicator scale and two outliers (Union County and Glades County) in the lower range. See Table A-4 in appendix A for values and conversion of the malignant neoplasm indicator.

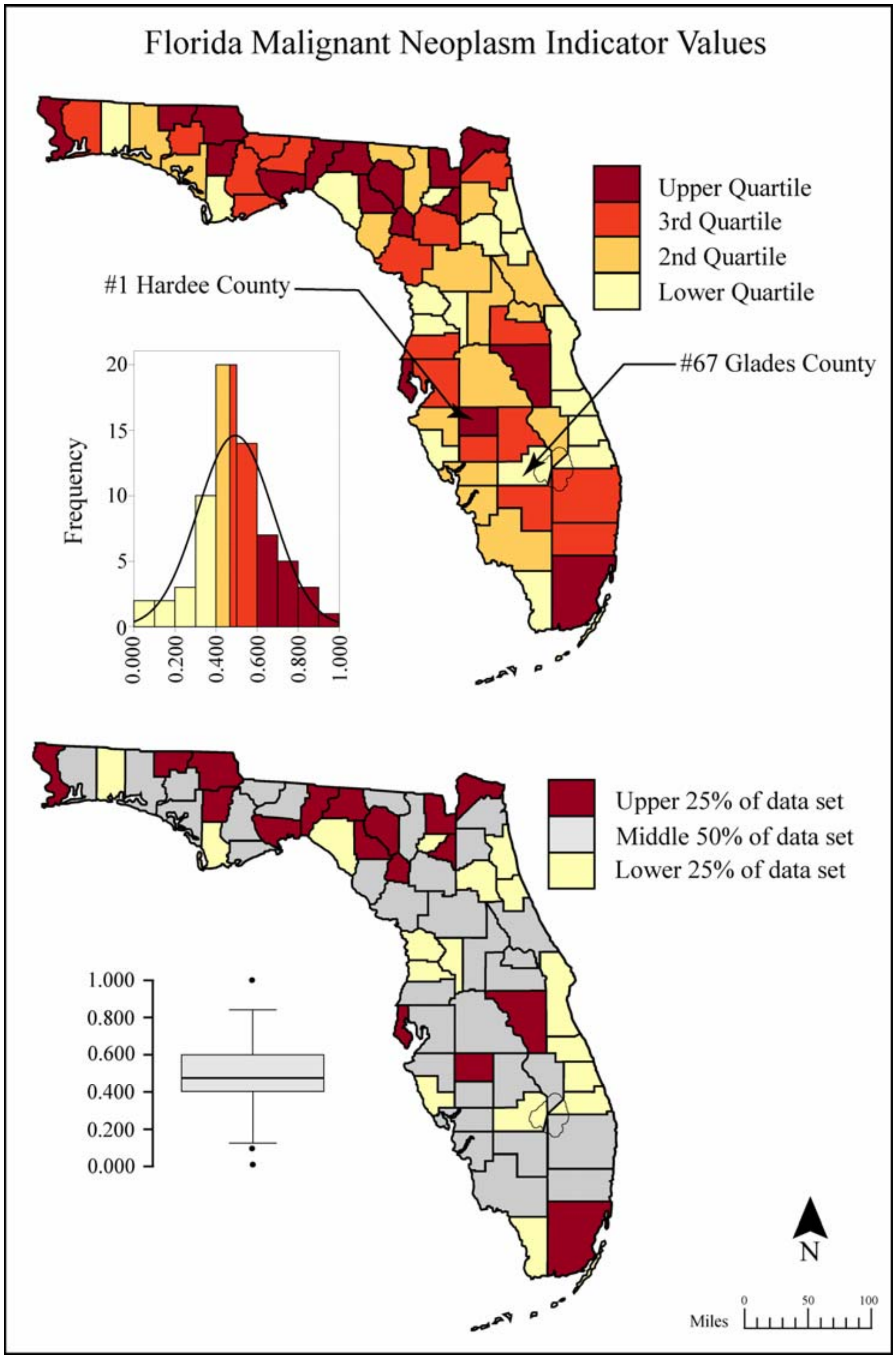


Figure 4-4: Florida Malignant Neoplasm Indicator Values. A choropleth map of the Florida cancer rate indicator values in spatial context, showing the highest ranked counties (lowest cancer rates) in dark brown and the lowest ranked counties (highest cancer rates) in pale yellow.

Combined Heart Disease and Malignant Neoplasm Values

After the heart disease data and cancer data are normalized, combined, and averaged, the resulting indicator values show a distinct distribution pattern in Figure 4-5: all upper quartile counties with the exception of Hardee County are located in the northern tier of the state; and all lower quartile counties with the exception of Walton County are spread throughout the peninsula.

Although no county maintained its exact rank position through all three permutations of the heart disease, malignant neoplasm, and composite indices, six counties (Baker, Bradford, Escambia, Jefferson, Lafayette and Suwannee) remain in the upper quartile throughout, and three counties (Martin, St. Lucie, and Sumter) remain in the lower quartile. When the county ranking for each index is compared against the other two and the cumulative position change up or down the scale for each county is summed, (a possible 201 rank changes) the range between the greatest and least overall number of rank changes in Table 4-1 is from 130 changes (Union County) to 6 changes (Lake County):

Table 4-1: Extremes in rank changes after combining heart disease and cancer

Counties with greater rank changes	Counties with fewer rank changes
Union... 130	Lake.. 6
Holmes 118	Duval 8
Miami-Dade 110	Escambia 8
Monroe 108	Orange 8
Madison.. 106	Baker 10
St. Johns 100	Gadsden.. 10
	Hendry.. 10
	Jefferson 10
	Volusia 10

See Table A-5 in appendix A for values and conversion of the combined heart disease and malignant neoplasm indicators.

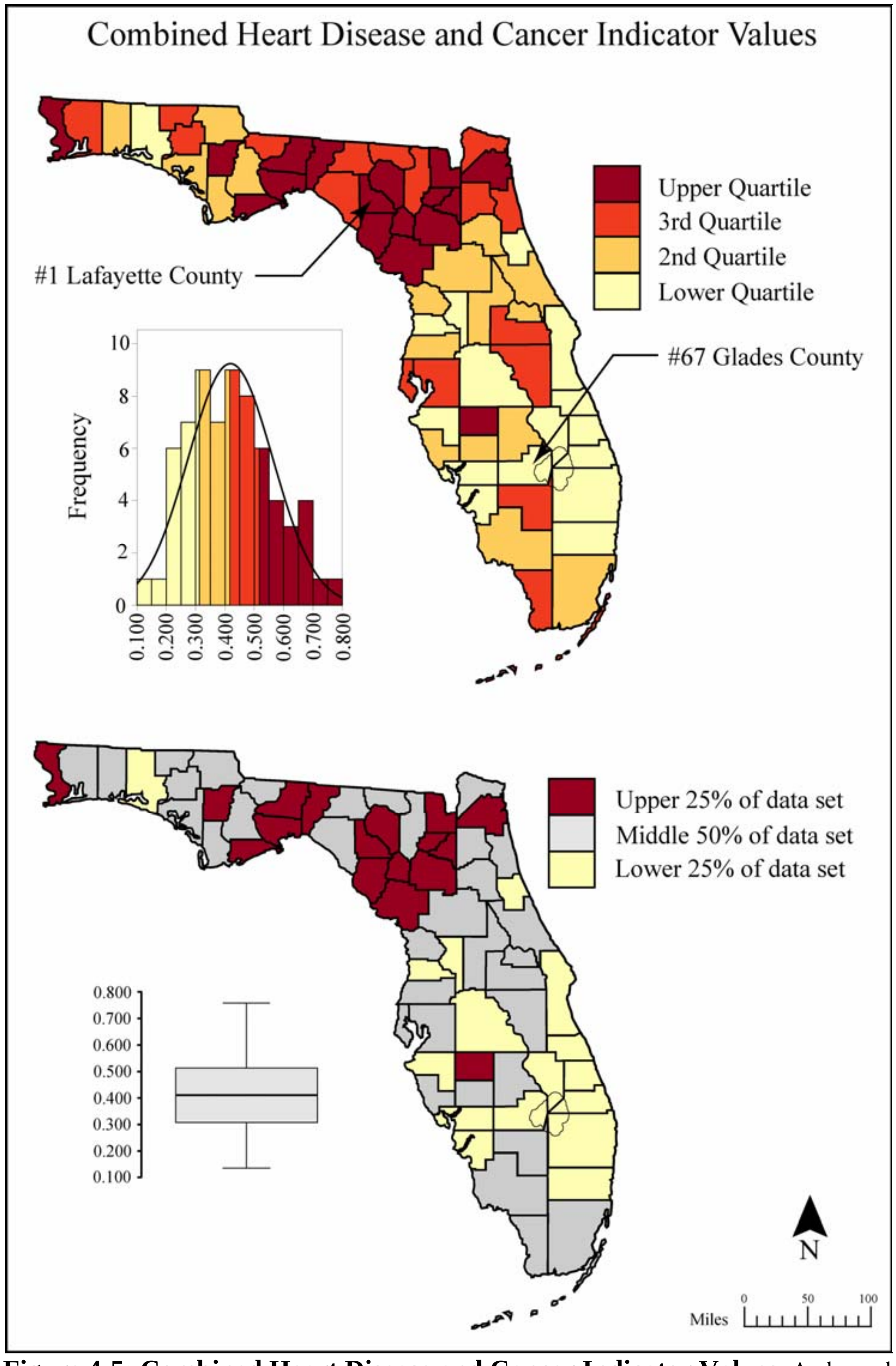


Figure 4-5: Combined Heart Disease and Cancer Indicator Values. A choropleth map of the leading causes of death values in spatial context, showing the highest ranked counties (low death rate from heart disease or cancer) in dark brown and the lowest ranked counties (high death rate from heart disease or cancer) in pale yellow.

Mortality Interim Index

The mortality interim index is calculated by averaging the three mortality indicator values using the formula:

$$\frac{\text{Resident Mortality Indicator} + \text{Child Mortality Indicator} + \text{Combined Heart Disease/Cancer Indicator}}{3}$$

Table A-12 in appendix A shows the calculation of the mortality interim index for all of the Florida counties. The box-and-whisker diagram in Figure 4-6 clearly illustrates how using this method modifies the indicator values by reducing skew of distribution around the mean and reducing the effect of outliers. In the mortality interim index, the values range from a high of 0.834 (Lafayette County) to a low of 0.247 (Glades County).

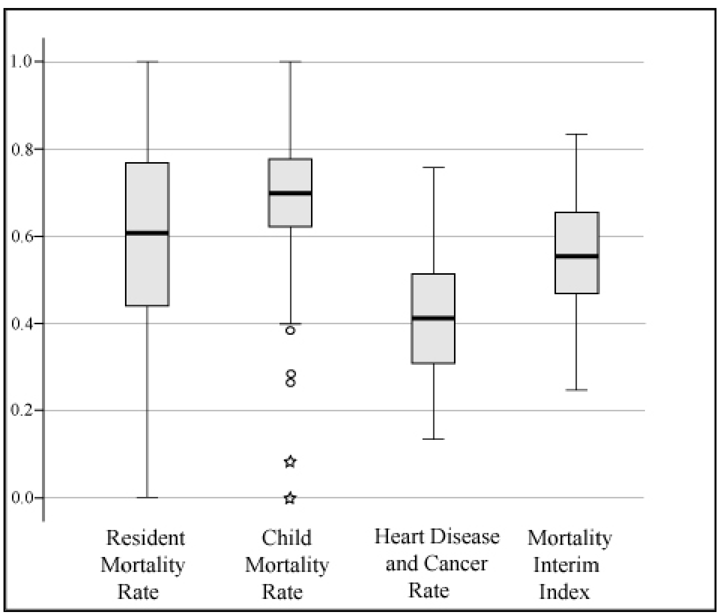


Figure 4-6: Box-and-whisker diagrams for the Mortality Interim Index

The map layout for the interim indices is changed in Figure 4-7 to show the quartile spatial patterns, and also identify the counties by rank and include their corresponding index value.

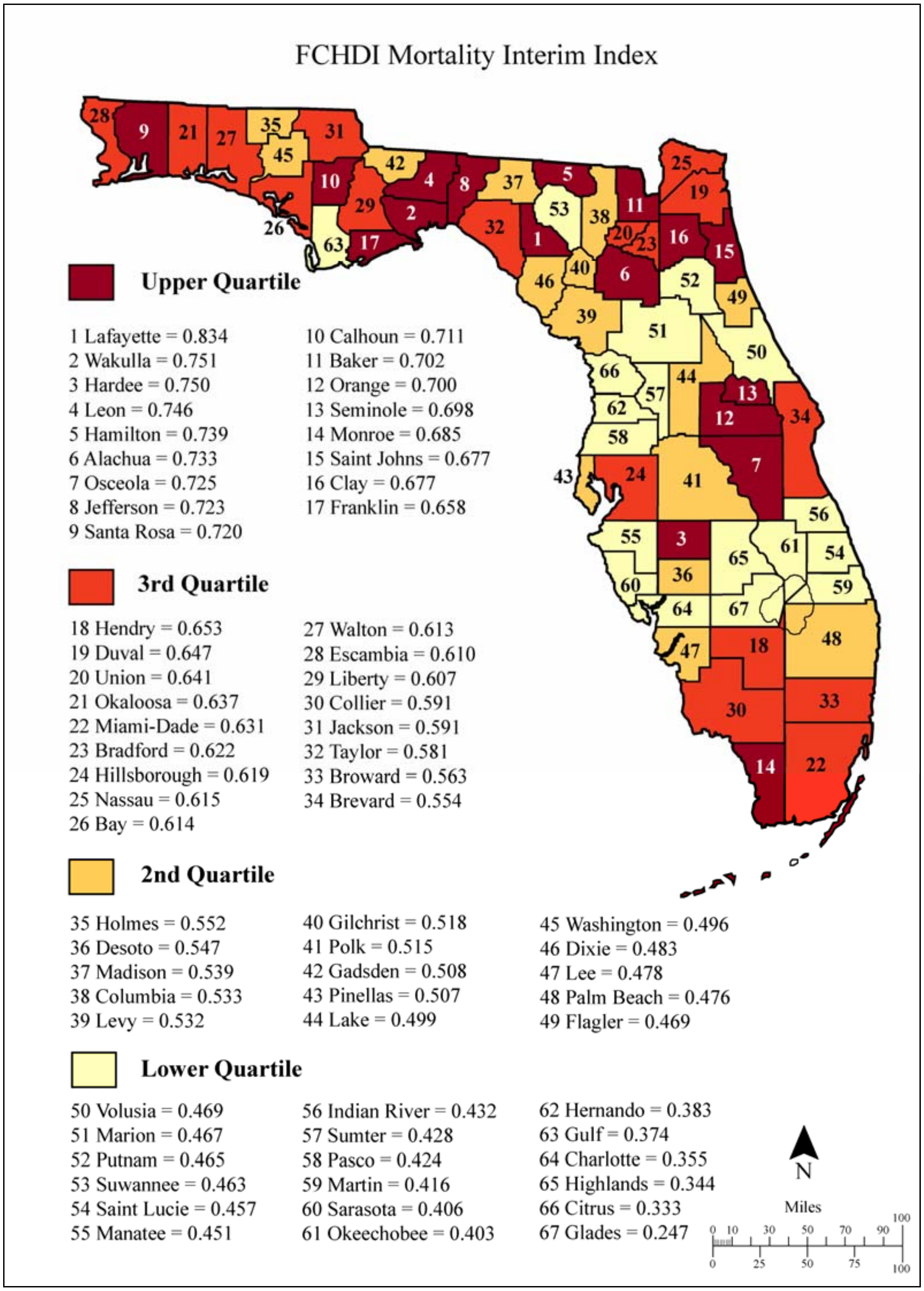


Figure 4-7: Florida County Mortality Interim Index. A choropleth map of the mortality interim index values in spatial context, showing the highest ranked counties for low mortality rates (per the FCHDI indicators) in dark brown and the lowest ranked counties in pale yellow.

Education Interim Index

The FCHDI education interim index is a proxy measurement for the 'knowledge' dimension used by the UNDP. As previously noted, the focus of this index is education attainment, and is comprised of three indicators: non-high school graduates, high school graduation or higher, and bachelor's degree or higher.

Non-High School Graduate

Preferring not to use the subjective term "dropout," this indicator measures only the percentage of what the U.S. Census Bureau defines as each county's population of 16 to 19 year olds who are not enrolled in school and are not high school graduates. Since lacking a high school diploma can have a negative social and economic impact on the individual, the percentage of this age-specific population of non-graduates affects the overall socioeconomic well-being of the county. As with the other negative socio-economic indicators, a high indicator value correlates to a low quartile ranking.

The state average of non-high school graduates in 2000 is 11.9 percent, somewhat higher than the national average of 10.9 percent. At the county level, as shown in Figure 4-8, the non-high school graduate percentages range from a low of 3.6 in Leon County to a high of 46.3 in DeSoto County. Loose clusters of upper quartile counties are located in the northwestern panhandle, the northeastern counties, and the southern peninsula. There is a cluster of low quartile counties in the north central region of the state, but by far, the largest cluster is in the central region of the peninsula. The box-and-whisker diagram shows a high median value and a narrow range of interquartile values with DeSoto and Lafayette as outliers.

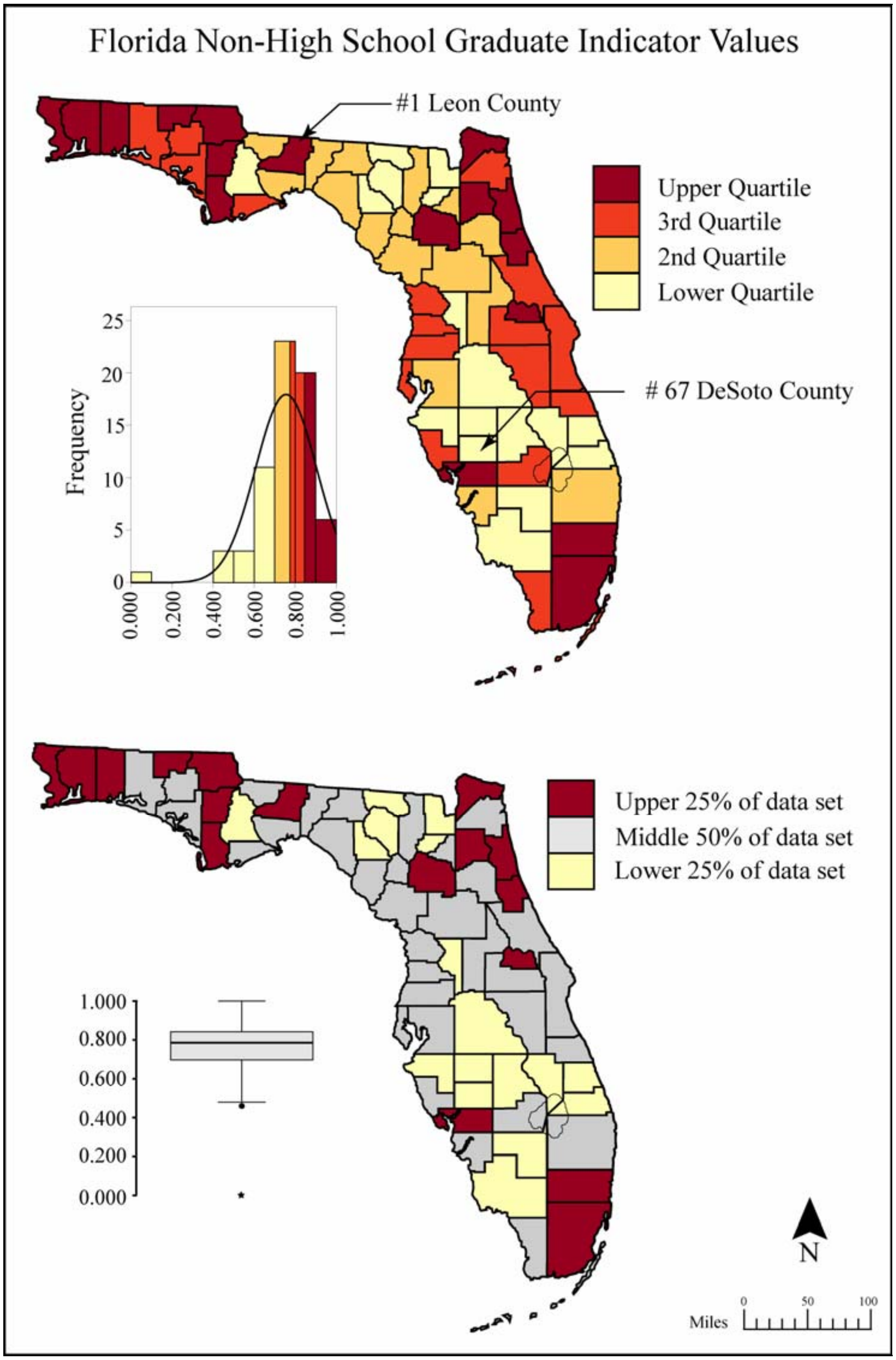


Figure 4-8: Florida Non-High School Graduate Indicator Values. A choropleth map of the Florida high school non-graduate indicator values in spatial context, showing the highest ranked counties (lowest non-graduate rates) in dark brown and the lowest ranked counties (highest non-graduate rates) in pale yellow.

Education Attainment: High School Graduation and Higher

The ‘high school graduation and higher’ indicator measures a positive socioeconomic attribute and requires no net-positive conversion. The indicator uses the percentage of each county’s population 25 years or older who have either graduated from high school or graduated and continued their education. The percentages for this group range from 89.1 in Leon County to 47.8 in Polk County. The distribution in Figure 4-9 of upper and lower quartiles is interesting in that the upper quartile counties tend to be coastal counties while the lower quartile counties tend to be interior counties in the central region of the peninsula and in the north-central panhandle. The three counties with the highest indicator values are Leon County (1.000), Seminole County (0.990), and Alachua County (0.976), all interior counties. It is tempting to conclude that Leon and Alachua counties have such high values because Florida State University and the University of Florida are located in these counties respectively, particularly in the case of Leon County, which is in close proximity to predominately lower quartile counties. However, other factors must be taken into consideration such as high-skill employment and, in the case of Leon County, the political establishment of the capitol city: Tallahassee.

The frequency histogram and the box-and-whisker diagram also show an unusual negative or left-skewed distribution pattern coinciding with the interquartile located above the mid-scale point, with Polk County being the only negative outlier.

See Table A-7 in appendix A for values and conversion of the education attainment: high school graduate or higher indicator.

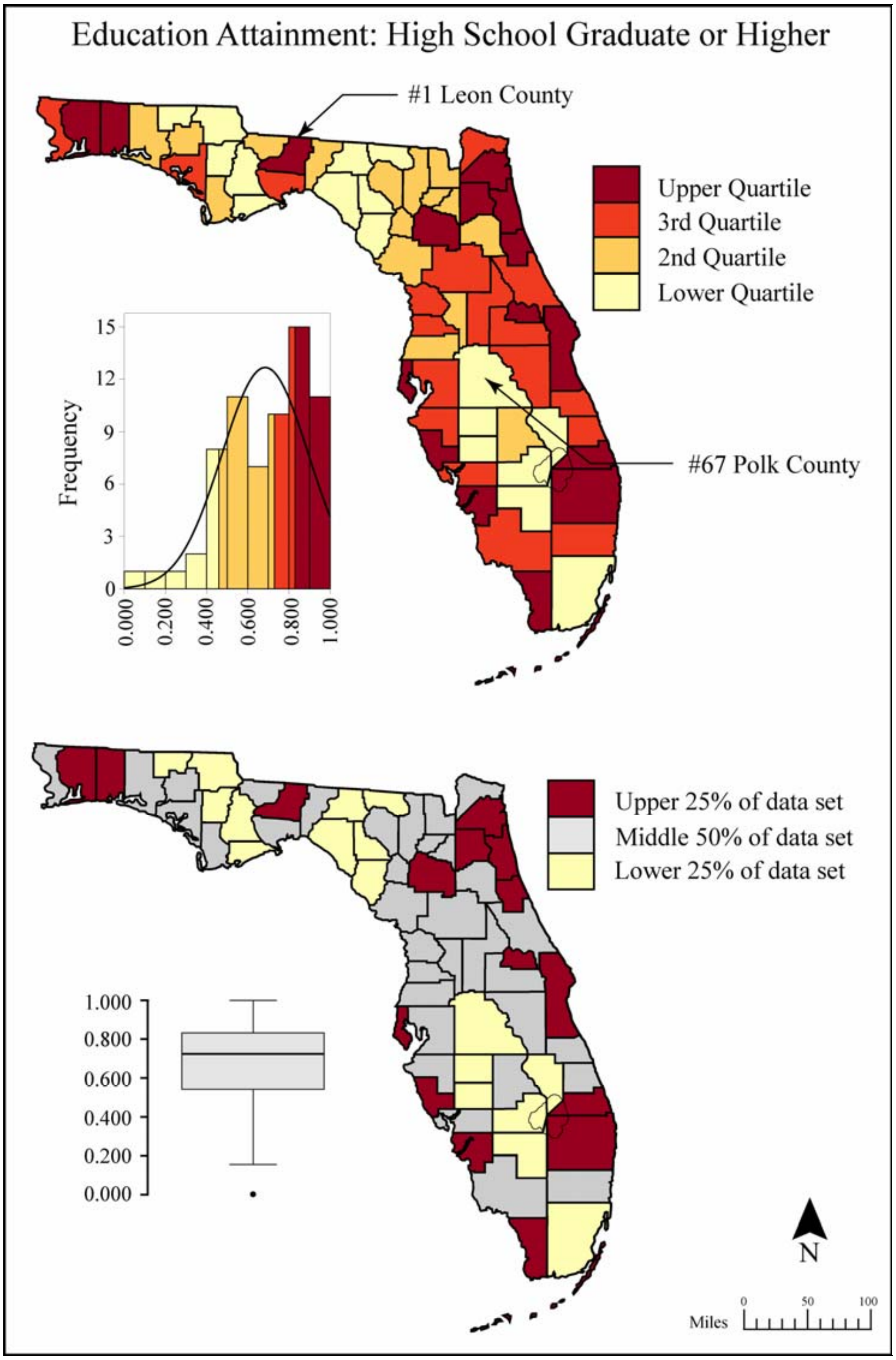


Figure 4-9: Education Attainment: High School Graduate or Higher. A choropleth map of the education attainment (high school graduate or higher) indicator values in spatial context, showing the highest ranked counties in dark brown and the lowest ranked counties in pale yellow.

Education Attainment: Bachelor's Degree and Higher

The 'bachelor's degree and higher' indicator is a refinement of the previous education attainment indicator in that these levels of education are not state mandated like compulsory elementary education. Access to these levels of education can be restricted for economically marginalized populations, and therefore, measures of this level of attainment indicate a county's general socioeconomic health that either promotes, supports, or hinders higher education.

As shown in Figure 4-10, the percentage of Florida's 2000 population that is 25 years of age or older who have received a bachelor's degree or higher ranges from a high of 41.7 in Leon County to a low of 6.8 in Dixie County. As might be expected, the distribution pattern of the upper 50 percent of the indicator values show a strong correlation to the proximity of institutes of higher education, while those in the lower 50 percent tend to be more removed. The two counties that appear to highlight this trend are Leon County (ranked number one with an indicator value of 1.000) and Alachua County (ranked number two with an indicator value of 0.914).

Both the frequency histogram and the box-and-whisker diagrams show a strong positive or right-skewed distribution. The distribution curve in the histogram is relatively flat compared to other histograms in the FCHDI model (kurtosis = 0.468), and the frequency distribution does not fit the curve well. The box-and-whisker diagram shows a relatively wide interquartile with a median that is located quite low on the indicator scale, a long upper whisker indicating a right-skew, and one outlier (Leon County).

See Table A-8 in appendix A for values and conversion of the education attainment: Bachelor's Degree or higher indicator.

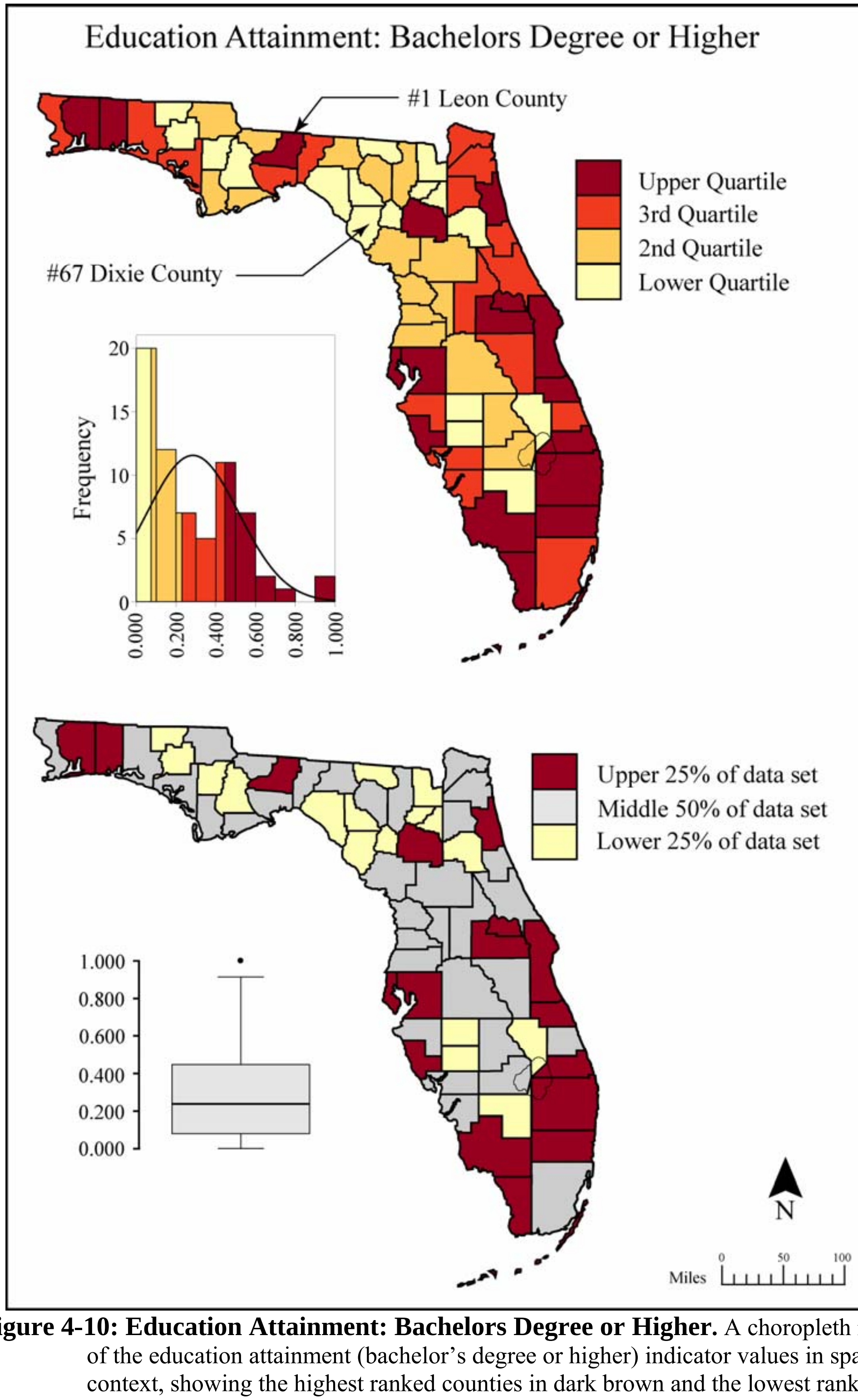


Figure 4-10: Education Attainment: Bachelors Degree or Higher. A choropleth map of the education attainment (bachelor's degree or higher) indicator values in spatial context, showing the highest ranked counties in dark brown and the lowest ranked counties in pale yellow.

Education Interim Index

The education interim index is calculated by averaging the three education indicator values using the formula:

$$\frac{\text{Non-High School Graduate Indicator} + \text{High School Plus Indicator} + \text{Bachelor's Degree Plus Indicator}}{3}$$

Table A-13 in appendix A shows the calculation of the education interim index for all of the Florida counties. The box-and-whisker diagram in Figure 4-11 shows the median for the interim index to be slightly above mid-scale (0.573), and a wider range between maximum and minimum value than in the mortality interim index. In the education interim index (Figure 4-12), the values range from a high of 1.000 (Leon County) to a low of 0.142 (DeSoto County).

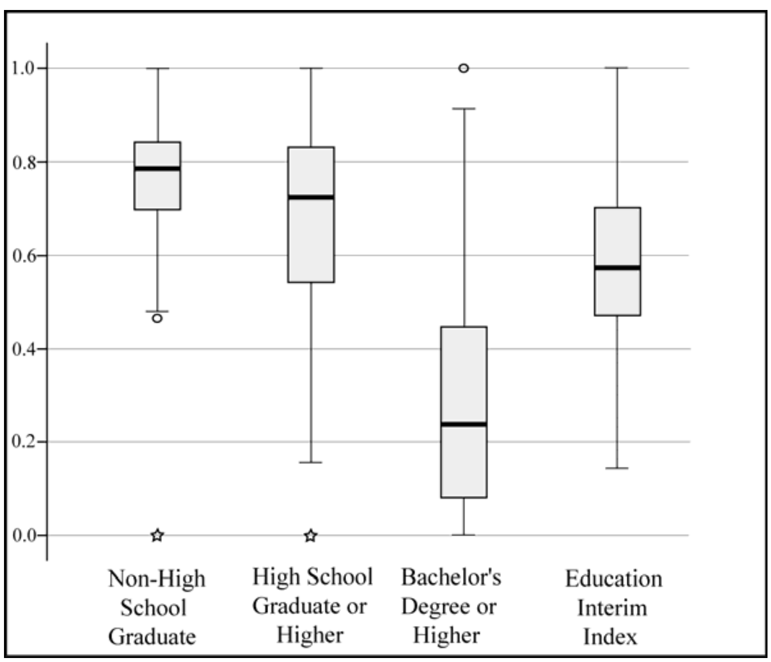


Figure 4-11: Box-and-whisker diagrams for the Education Interim Index

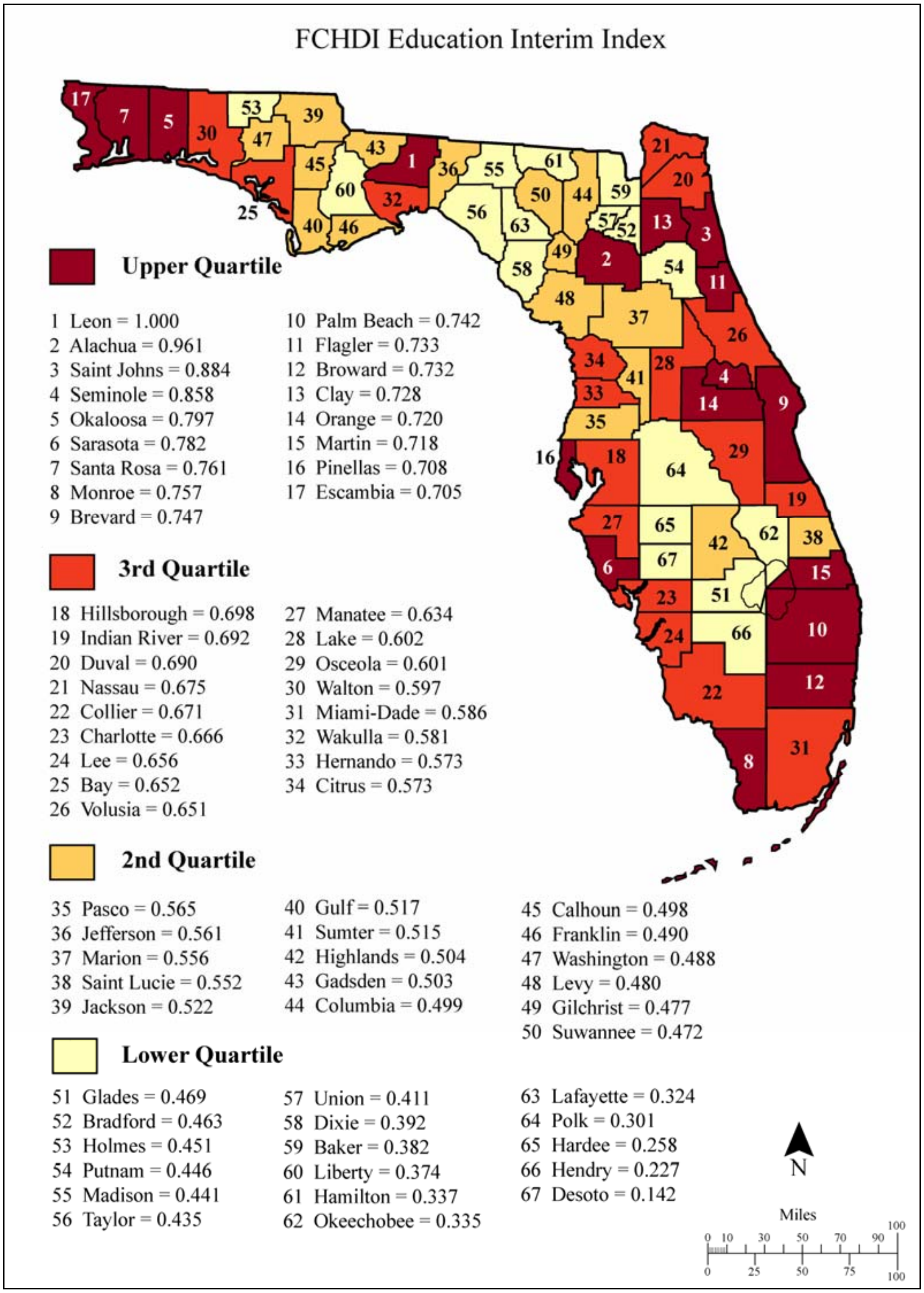


Figure 4-12: Florida County Education Interim Index. A choropleth map of the interim education index values in spatial context, showing the highest ranked counties for education attainment (per the FCHDI indicators) in dark brown and the lowest ranked counties in pale yellow.

Economic Interim Index

The FCHDI economic interim index is a proxy measurement for the 'decent standard of living' dimension used by the UNDP. The focus of this index is the economic well-being not directly addressed in the previous indices, and is comprised of three indicators: county poverty level, per capita income, and a price level index value.

Poverty

Once again, because poverty has a negative socioeconomic impact, the source data values are adjusted for net-positive results. In Figure 4-13 the percent of poverty at the county level ranges from a low of 6.8 in Clay County (upper quartile) to a high of 26.0 in Hamilton County (lower quartile). There is a major cluster of low quartile counties in the central region of the northern tier and panhandle, with a scattering of four counties (Hardee, DeSoto, Hendry, and Miami-Dade) in the central and southern area of the peninsula. The majority of the central peninsula is in the two upper quartiles (low poverty), with a cluster in the north-east section of the state and a cluster in the western area of the panhandle. In this indicator, the clustering is more prominent when comparing the upper two quartiles against the lower two rather than only the fourth and first quartiles.

The box-and-whisker diagram indicates a negative or left-skew with a wide quartile range of indicator values covering the scale from 1.000 to 0.000 (no outliers), and a high median point of 0.641.

See Table A-9 in appendix A for values and conversion of the poverty indicator.

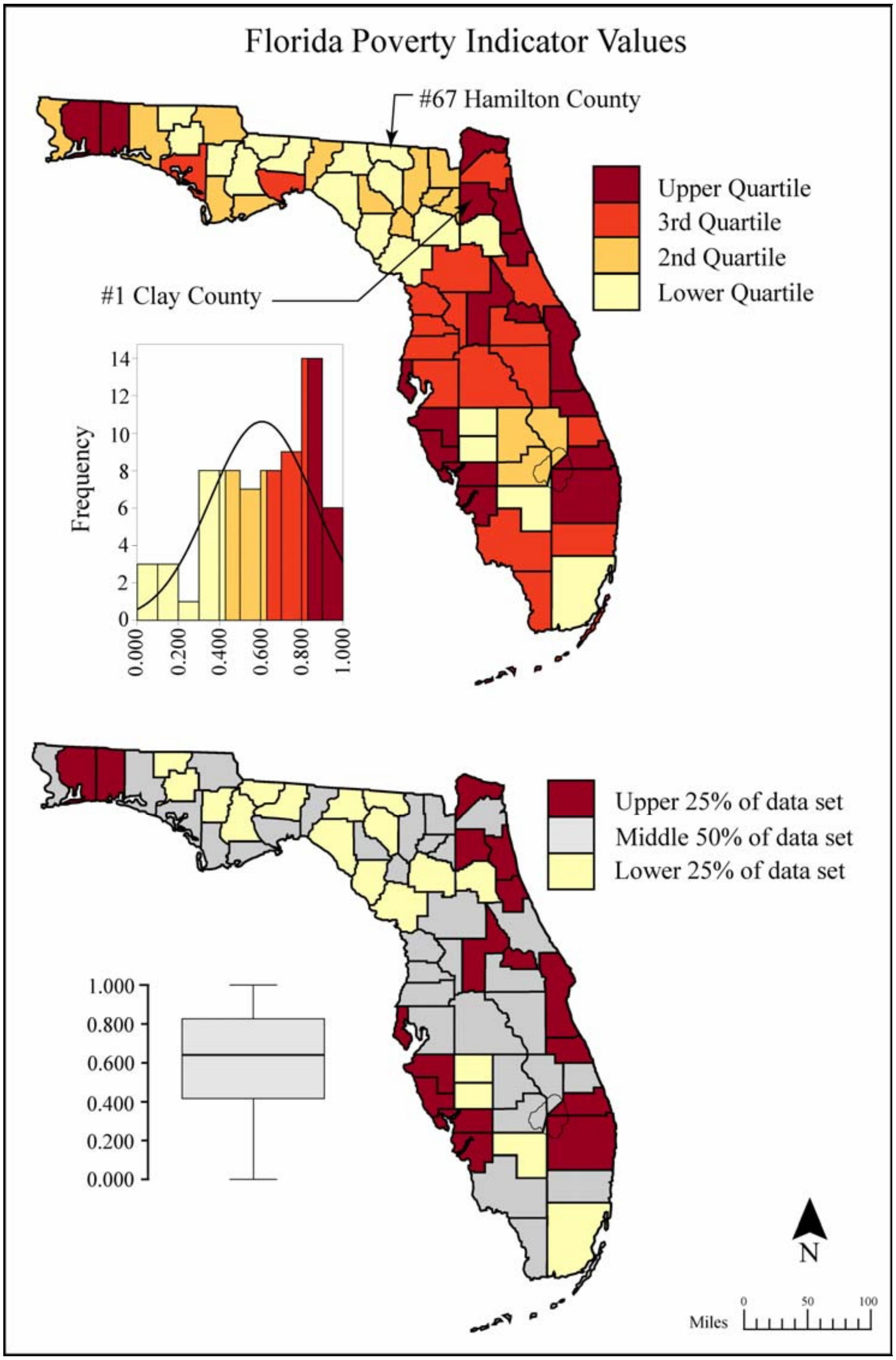


Figure 4-13: Florida Poverty Indicator Values. A choropleth map of the Florida poverty rate indicator values in spatial context, showing the highest ranked counties (lowest poverty rates) in dark brown and the lowest ranked counties (highest poverty rates) in pale yellow.

Per Capita Income

Since in most of the world, and certainly in Florida, a higher per capita income is associated with a higher level of socioeconomic well-being, this indicator uses the observed data values with no adjustment for net-positive results. Issue may be taken with this indicator in that it uses aggregated data and therefore is not sensitive to disparities of income distribution within the counties. Previous studies compensate for this by using a Gini coefficient to emphasize inequities (Bukenya and Fraser, 2002, Hanham et al., 2002), however, in that this thesis is concerns itself with the overall ranking of each county and not inequities, the aggregated per capita income values were deemed sufficient.

In Figure 4-14 there is a substantial range of county-level per capita income, from a low of $10,562 in Hamilton County to a high of $31,195 in Collier County. With the exception of Seminole County in the east-central peninsula, all upper quartile counties are located along the coast. The majority of lower quartile counties are in the central section of the panhandle with a smaller, looser cluster in the south-central peninsula (Hardee, DeSoto, Hendry, and Okeechobee).

Both the box-and-whisker and frequency histogram show a distinctly positive or right-skewed distribution with a low median. Collier County is the only outlier, with the quartiles ranging from 0.000 (Hamilton) to 0.922 ($29,584 – Martin County).

See Table A-10 in appendix A for values and conversion of the per capita income indicator.

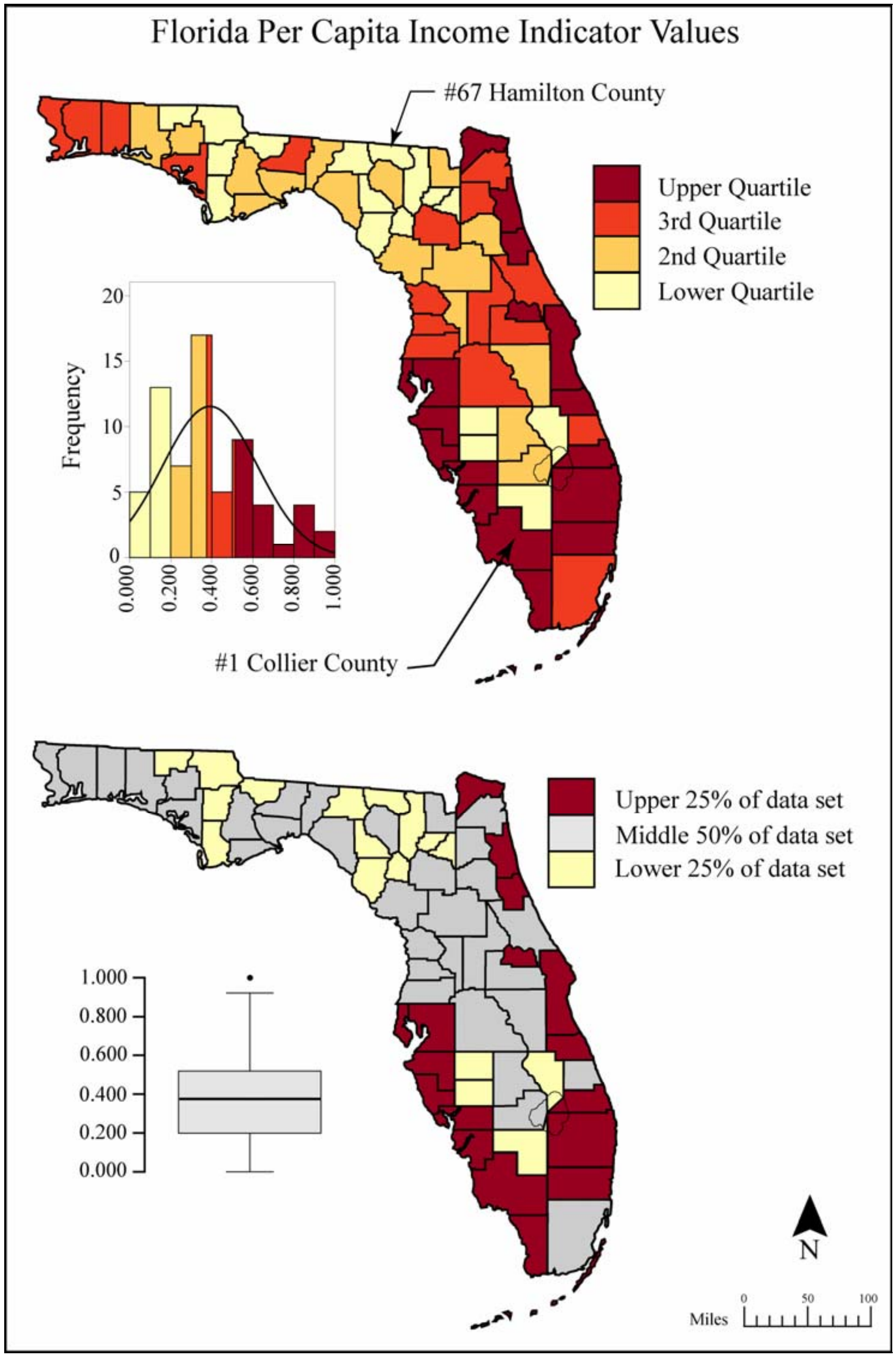


Figure 4-14: Florida Per Capita Income Indicator Values. A choropleth map of the Florida per capita income indicator values in spatial context, showing the highest ranked counties in dark brown and the lowest ranked counties in pale yellow

Price Level Index

The Price Level Index developed by the Bureau of Economic and Business Research at the University of Florida measures the dissimilarity in the cost of living (purchasing a specific set of goods and services) across the state at the county level. Because a high cost of living negatively affects social well-being, adjusted indicator values are used. These adjusted values ranged from a low of 90.68 percent of the state averaged cost of living in Suwannee County to 108.53 percent in Palm Beach County. In Figure 4-15 the cluster patterns of the price level index show distinct delineation between the western and central panhandle to the southern peninsula. The more populous southern coastal counties have a higher average cost of living than the less populous interior counties of the central peninsula, and much higher than the predominantly rural northern counties.

Assuming the median in the box-and-whisker diagram is a fair measure of the state averaged cost of living, there is a negative or left-skew distribution supported by the histogram, and three outliers representing counties with a high cost of living (Palm Beach, Monroe, and Broward counties).

See Table A-11 in appendix A for the data of the Price Level Index.

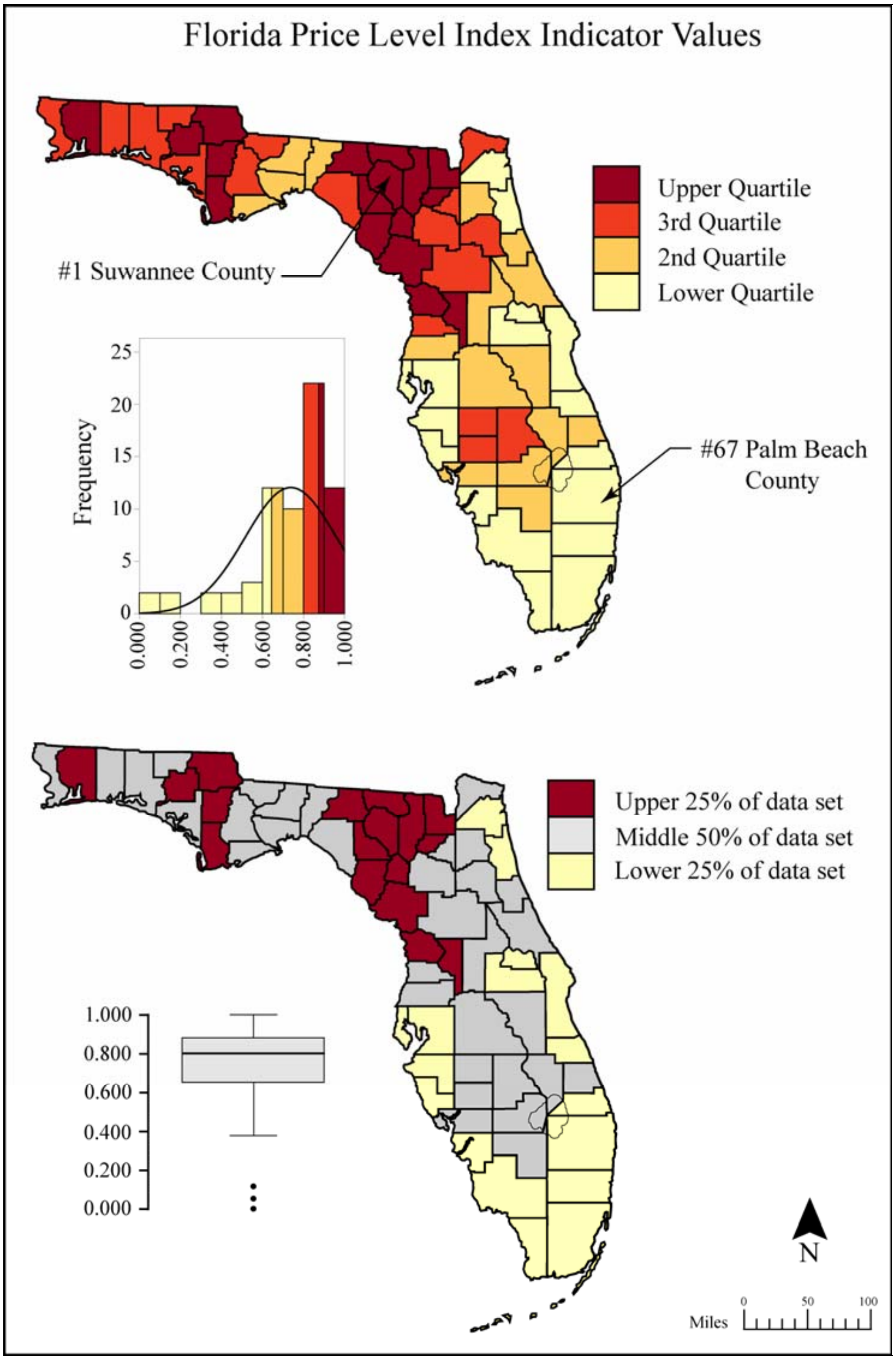


Figure 4-15: Florida Price Level Index Indicator Values. A choropleth map of the Florida Price Level Index values in spatial context, showing the highest ranked counties (lowest cost of living) in dark brown and the lowest ranked counties (highest cost of living) in pale yellow.

Economic Interim Index

The economic interim index is calculated by averaging the three economic indicator values using the formula:

$$\frac{\text{Poverty Indicator} + \text{Per Capita Income Indicator} + \text{Price Level Index Indicator}}{3}$$

Table A-14 in appendix A shows the calculation of the economic interim index for all of the Florida counties. The box-and-whisker diagram in Figure 4-16 shows the median for the interim index to be slightly above mid-scale (0.574), but with a narrower range between maximum and minimum value than in the mortality interim (0.834 to 0.247) and education interim (1.000 to 0.142) indices. In the economic interim index shown in Figure 4-17, the education interim index values range from a high of 0.818 (Saint Johns County) to a low of 0.302 (Hendry County).

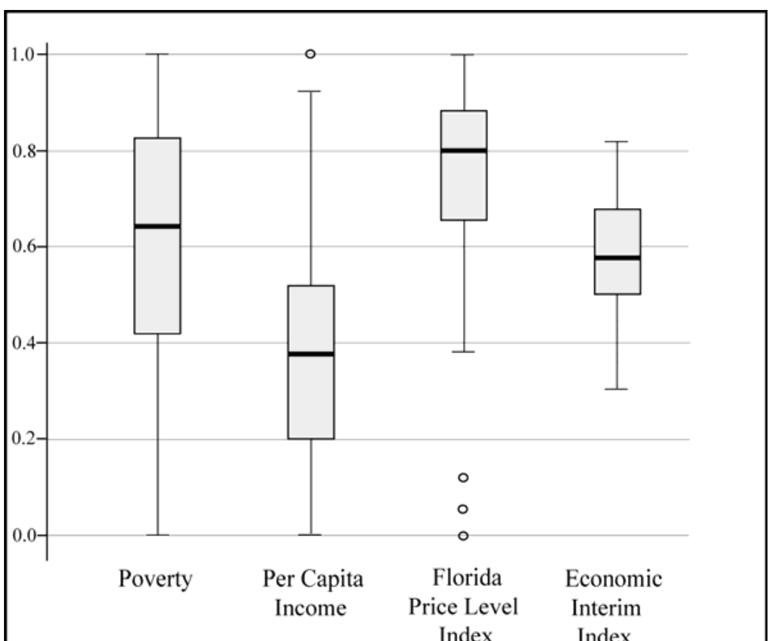


Figure 4-16: Box-and-whisker diagrams for the Economic Interim Index

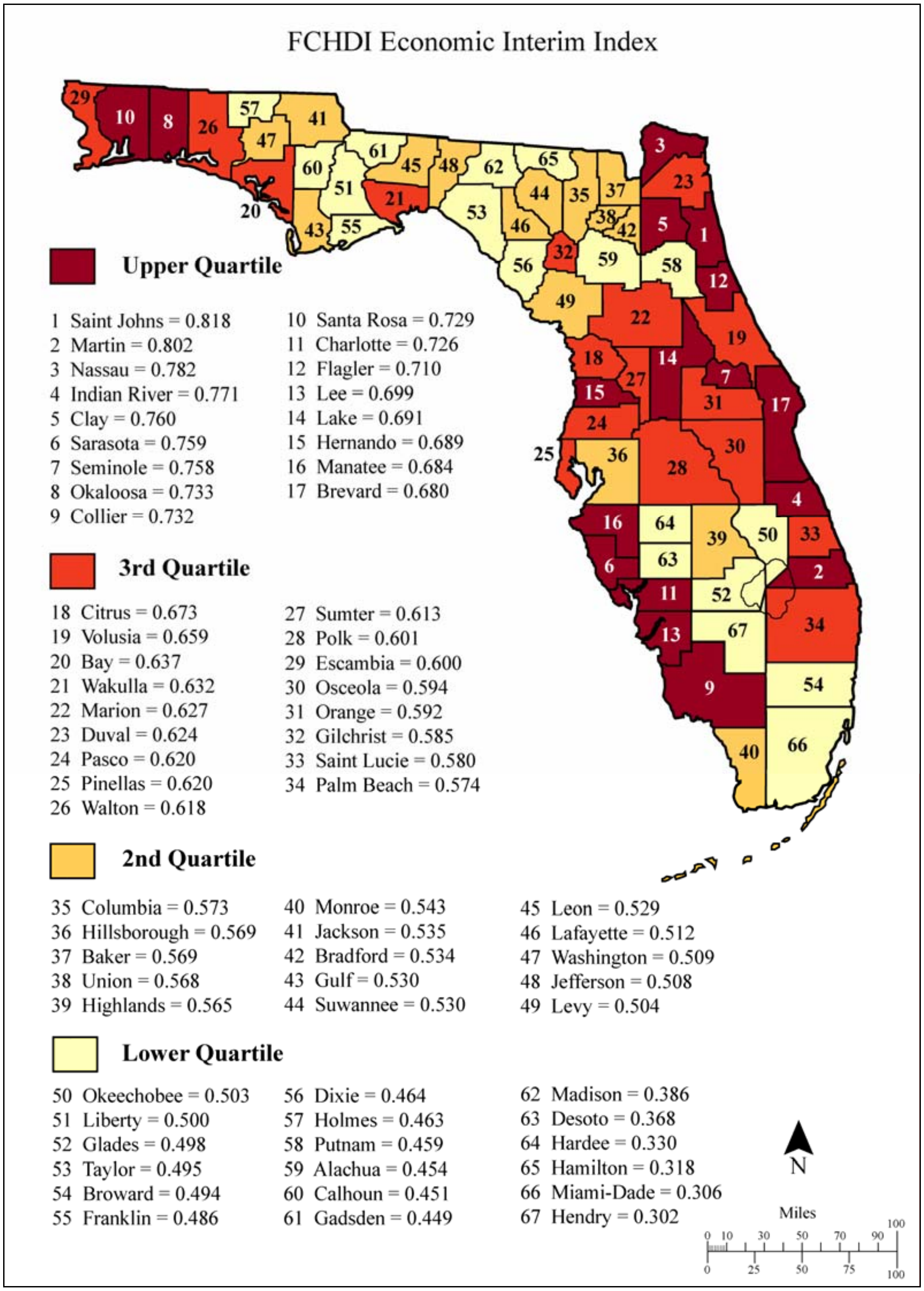


Figure 4-17: Florida County Economic Interim Index. A choropleth map of the interim economic index values in spatial context, showing the economically highest ranked counties (per the FCHDI indicators)in dark brown and the lowest ranked counties in pale yellow.

The Florida County Human Development Index (FCHDI)

The final FCHDI is calculated by averaging the three interim indices using the formula:

$$\frac{\text{Mortality Interim Index} + \text{Education Interim Index} + \text{Economic Interim Index}}{3}$$

For the FCHDI, the data tables are shown in context with the choropleth map. Table 4-2 shows the calculation and ranking of counties for the FCHDI (see also Table A-15 in appendix A). On a 0.000 to 1.000 scale, the index values in Table 4-2 and Figure 4-18 range from a high of 0.793 (St. Johns County) to a low of 0.352 (DeSoto County) with a median value of 0.554 (Calhoun County).

Table 5-2: Calculating the Florida County Human Development Index.
Saint Johns County to Bay County

Rank	County	Mortality Interim Index	Education Interim Index	Economic Interim Index	Sum	FCHDI (sum / 3)
1	Saint Johns	0.677	0.884	0.818	2.380	**0.793**
2	Seminole	0.698	0.858	0.758	2.314	**0.771**
3	Leon	0.746	1.000	0.529	2.276	**0.759**
4	Santa Rosa	0.720	0.761	0.729	2.210	**0.737**
5	Okaloosa	0.637	0.797	0.733	2.168	**0.723**
6	Clay	0.677	0.728	0.760	2.165	**0.722**
7	Alachua	0.733	0.961	0.454	2.148	**0.716**
8	Nassau	0.615	0.675	0.782	2.072	**0.691**
9	Orange	0.700	0.720	0.592	2.012	**0.671**
10	Collier	0.591	0.671	0.732	1.995	**0.665**
11	Monroe	0.685	0.757	0.543	1.984	**0.661**
12	Brevard	0.554	0.747	0.680	1.980	**0.660**
13	Wakulla	0.751	0.581	0.632	1.963	**0.654**
14	Duval	0.647	0.690	0.624	1.961	**0.654**
15	Sarasota	0.406	0.782	0.759	1.947	**0.649**
16	Martin	0.416	0.718	0.802	1.936	**0.645**
17	Osceola	0.725	0.601	0.594	1.919	**0.640**
18	Escambia	0.610	0.705	0.600	1.916	**0.639**
19	Flagler	0.469	0.733	0.710	1.912	**0.637**
20	Bay	0.614	0.652	0.637	1.904	**0.635**

Table 5-2: Calculating the Florida County Human Development Index.
Indian River County to DeSoto County

Rank	County	Mortality Interim Index	Education Interim Index	Economic Interim Index	Sum	FCHDI (sum / 3)
21	Indian River	0.432	0.692	0.771	1.894	**0.631**
22	Hillsborough	0.619	0.698	0.569	1.887	**0.629**
23	Pinellas	0.507	0.708	0.620	1.835	**0.612**
24	Lee	0.478	0.656	0.699	1.833	**0.611**
25	Walton	0.613	0.597	0.618	1.828	**0.609**
26	Jefferson	0.723	0.561	0.508	1.792	**0.597**
27	Palm Beach	0.476	0.742	0.574	1.792	**0.597**
28	Lake	0.499	0.602	0.691	1.791	**0.597**
29	Broward	0.563	0.732	0.494	1.789	**0.596**
30	Volusia	0.469	0.651	0.659	1.778	**0.593**
31	Manatee	0.451	0.634	0.684	1.769	**0.590**
32	Charlotte	0.355	0.666	0.726	1.747	**0.582**
33	Lafayette	0.834	0.324	0.512	1.670	**0.557**
34	Calhoun	0.711	0.498	0.451	1.661	**0.554**
35	Baker	0.702	0.382	0.569	1.653	**0.551**
36	Marion	0.467	0.556	0.627	1.651	**0.550**
37	Jackson	0.591	0.522	0.535	1.648	**0.549**
38	Hernando	0.383	0.573	0.689	1.646	**0.549**
39	Franklin	0.658	0.490	0.486	1.634	**0.545**
40	Union	0.641	0.411	0.568	1.621	**0.540**
41	Bradford	0.622	0.463	0.534	1.620	**0.540**
42	Pasco	0.424	0.565	0.620	1.609	**0.536**
43	Columbia	0.533	0.499	0.573	1.604	**0.535**
44	Saint Lucie	0.457	0.552	0.580	1.589	**0.530**
45	Gilchrist	0.518	0.477	0.585	1.580	**0.527**
46	Citrus	0.333	0.573	0.673	1.578	**0.526**
47	Sumter	0.428	0.515	0.613	1.556	**0.519**
48	Miami-Dade	0.631	0.586	0.306	1.523	**0.508**
49	Levy	0.532	0.480	0.504	1.516	**0.505**
50	Taylor	0.581	0.435	0.495	1.511	**0.504**
51	Washington	0.496	0.488	0.509	1.492	**0.497**
52	Liberty	0.607	0.374	0.500	1.481	**0.494**
53	Holmes	0.552	0.451	0.463	1.466	**0.489**
54	Suwannee	0.463	0.472	0.530	1.465	**0.488**
55	Gadsden	0.508	0.503	0.449	1.460	**0.487**
56	Gulf	0.374	0.517	0.530	1.421	**0.474**
57	Polk	0.515	0.301	0.601	1.417	**0.472**
58	Highlands	0.344	0.504	0.565	1.413	**0.471**
59	Hamilton	0.739	0.337	0.318	1.394	**0.465**
60	Putnam	0.465	0.446	0.459	1.370	**0.457**
61	Madison	0.539	0.441	0.386	1.366	**0.455**
62	Dixie	0.483	0.392	0.464	1.339	**0.446**
63	Hardee	0.750	0.258	0.330	1.338	**0.446**
64	Okeechobee	0.403	0.335	0.503	1.241	**0.414**
65	Glades	0.247	0.469	0.498	1.215	**0.405**
66	Hendry	0.653	0.227	0.302	1.182	**0.394**
67	Desoto	0.547	0.142	0.368	1.057	**0.352**

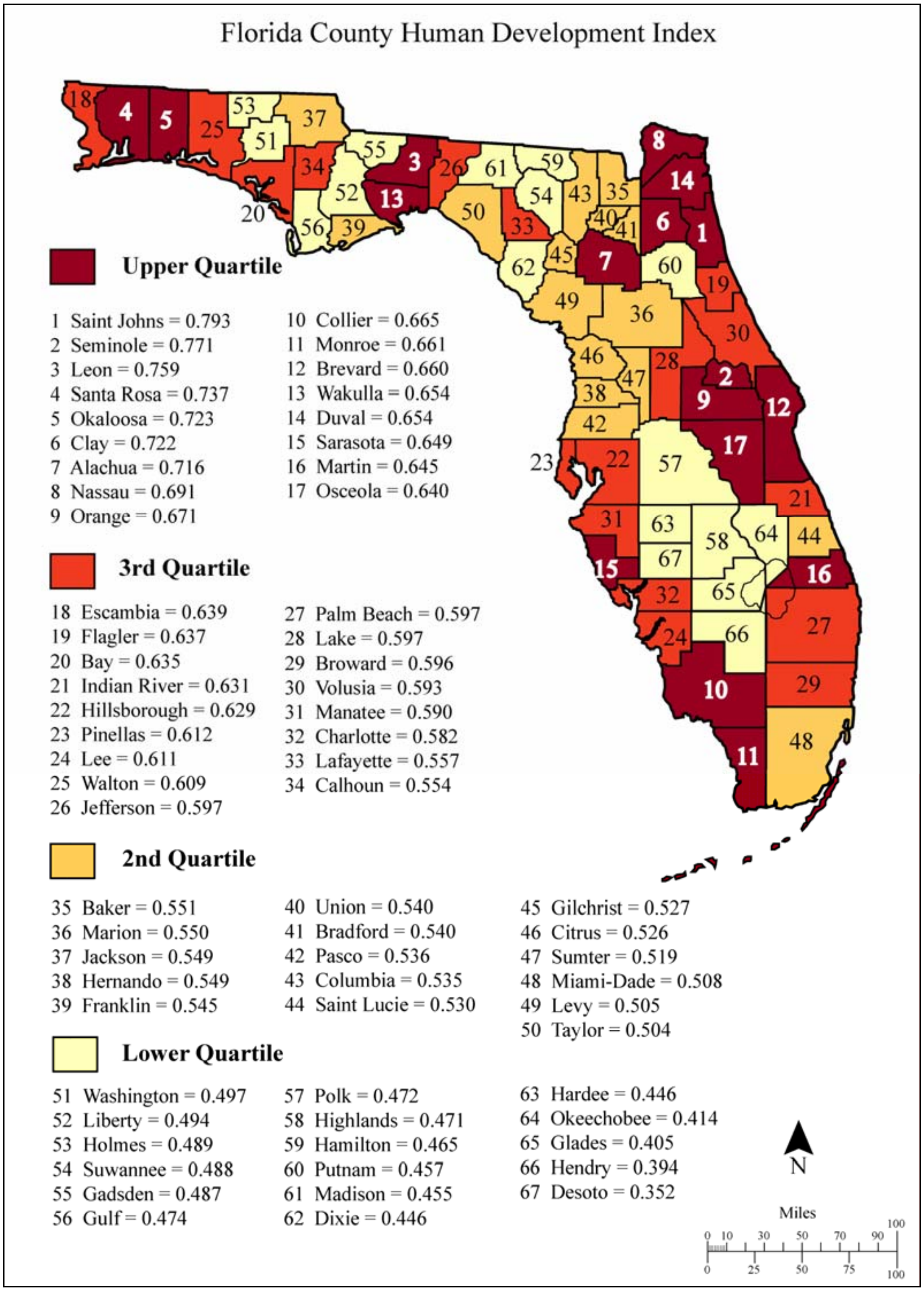


Figure 4-18: Florida County Human Development Index. A choropleth map of the FCHDI values in spatial context, showing the highest ranked socioeconomic well-being counties in dark brown and the lowest ranked socioeconomic well-being counties in pale yellow.

The choropleth map of the FCHDI in Figure 4-18 shows several interesting patterns of socioeconomic conditions. The cluster-patterns for the upper and lower quartiles appear quite different between the panhandle/northern-tier region of the state where clustering is smaller and generally looser, and the peninsular/Atlantic Coast region where the clusters are larger and more defined. Three of the more prominent of these distinguishable groups are the upper quartile clusters in the north-east corner around Jacksonville and central-east around Orlando, and the large lower quartile cluster to the west of Lake Okeechobee in the central region of the peninsula. A prominent mid-quartile clustering is the group of second quartile (lower-mid) counties that run north to south from the Georgia border west of Jacksonville to the north of the Tampa Bay area on the Gulf Coast.

Two aspects of these cluster patterns are that the lower and lower-mid quartile clusters tend to be larger than the upper quartile clusters, and they are more homogenous in terms of rank. For example, the large upper quartile cluster near Jacksonville has counties ranked #1, #6, #8 and #14, a spread of fourteen rank positions across four counties, and the Orlando cluster has counties ranked #2, #9, #12, and #17, a spread of sixteen rank positions, again, across four counties. In comparison, the Georgia to Gulf Coast cluster has eleven of the quartile's sixteen counties, ranked #35- 36, #38, #40-43, #45-47, and #49, for a narrower (more homogenous) ranking spread, while the Lake Okeechobee cluster is made up of counties ranked #57 and #58 along with the five lowest ranked counties: #63 - #67. The quartile clustering is more recognizable in Figure 4-19 where each FCHDI quartile is broken out and plotted separately, allowing for comparisons that are visually less cluttered.

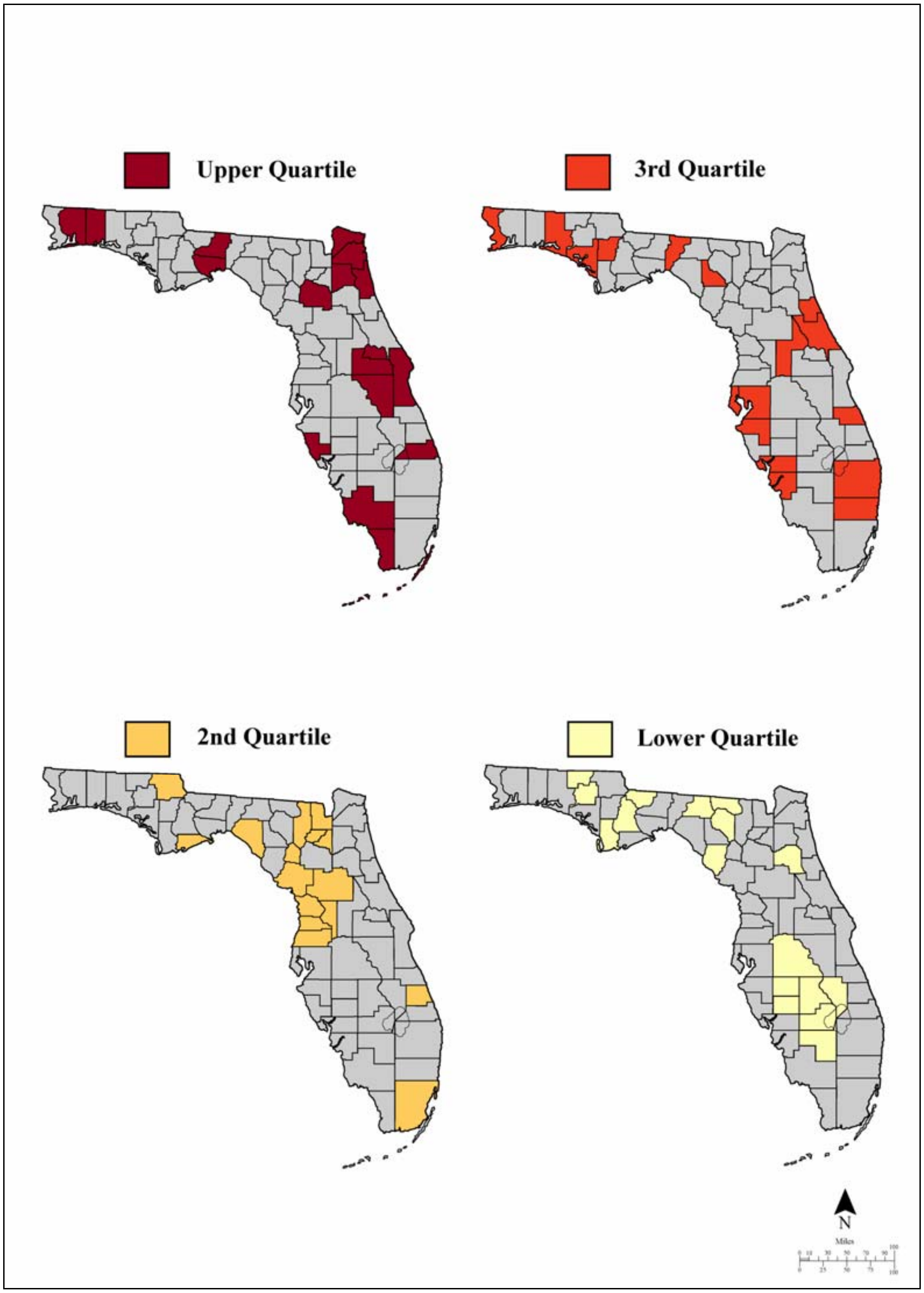


Figure 4-19: FCHDI results broken out by quartile. By breaking the quartiles out, one quartile per map, the clustering patterns become more evident

It is in this grouping that the visual relationship between the FCHDI and urban areas begins to emerge. To highlight this pattern, Florida's urban areas are mapped in

Figure 4-20 according to metropolitan statistical area (MSA) counties as defined by the Federal Office of Management and Budget.

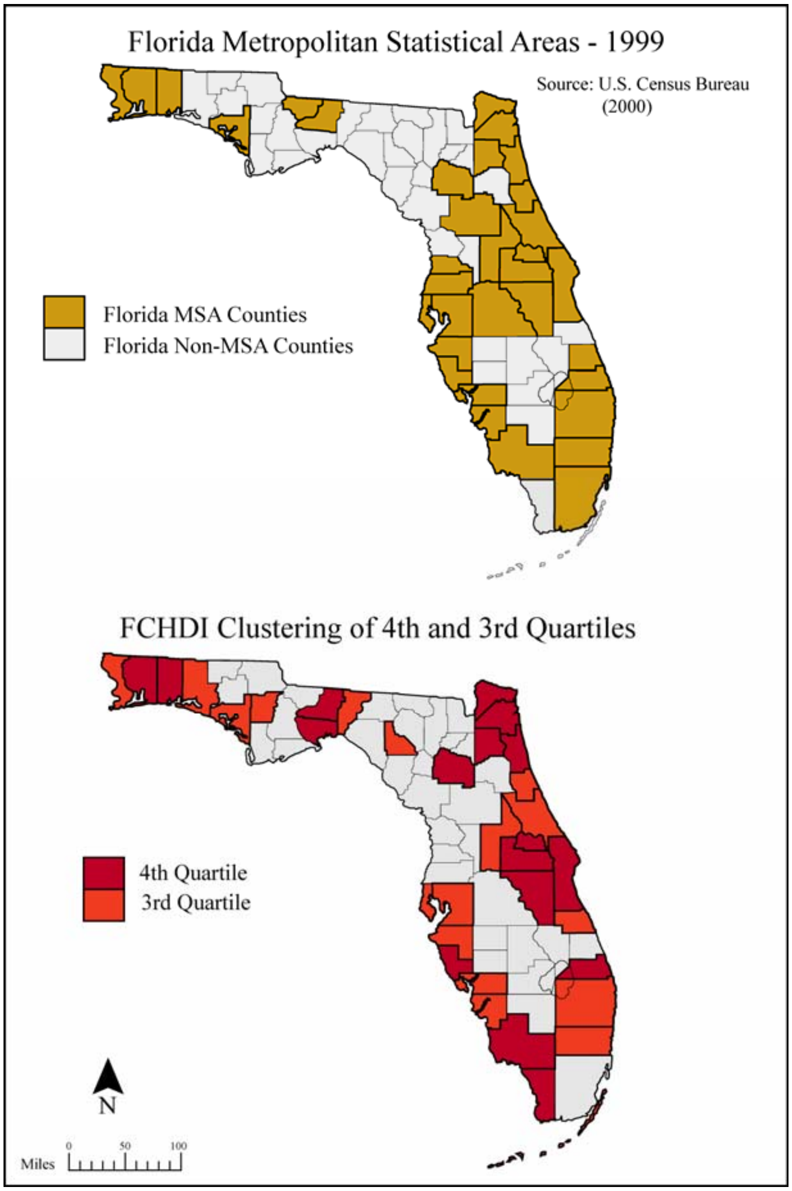


Figure 4-20: Comparing the upper quartiles of the FCHDI to MSA counties

The Federal Office of Management and Budget (OMB) define these large urbanized areas as "an area containing a recognized population nucleus and adjacent communities that have a high degree of integration with that nucleus" (OMB, 2000, p.82228), specifically a high degree of social and economic integration. These areas are not constrained by county boundaries, and often consist of more than one county. For example, the Orlando MSA incorporates Osceola, Orange, Seminole, and Lake County. According to the OMB's 1999 standards, there are 20 MSAs in Florida, spreading across 34 of the state's 67 counties as shown in Figure 4-20 above. When the pattern of MSA counties is compared to the pattern of combined third and fourth quartile FCHDI counties, definite similarities are seen, suggesting a pattern linking urban areas and socioeconomic well-being.

As noted in the text, there are data tables in Appendix A that correspond to the FCHDI indicators and indices. The tables for each of the nine indicators (plus the two sub-indicators: heart disease and cancer) contain the raw data, adjusted data where required for net-positive, and the calculated FCHDI values. At the bottom of these tables are descriptive statistics information generated in Excel for the raw data (observed or adjusted) and the calculated FCHDI values, and the upper quartile delineation values. The indicator tables are followed by interim index and FCHDI calculation tables, which in the case of the interim indices are the converted indicator values summed and averaged, and in the case of the FCHDI, are the three interim indices summed and averaged. Table A-16 shows the county rankings according to each county's FCHDI value, the quartile, and the rank value as a percentage of the FCHDI data set.

FCHDI plus Natural Amenities

Using the FCHDI data set as a base standard for the dimensions of mortality, education, and economics, the addition of an environmental dimension to the model can now be analyzed. As described earlier, the Natural Amenities Scale (NAS) developed by the USDA Economic Research Service is used for the environment indicator. It is important to reiterate that this is a national county-level scale and does not indicate the subjective quality of a Florida county's environment. Rather, the scale measures to what degree a combined set of climate and topologic factors exist within the counties of the lower 48 United States. As with the previously selected indicators, the data values for Florida counties taken directly from the NAS are normalized to the FCHDI model using the linear scaling transformation formula. This not only formats the data to the FCHDI model, but also confines the data set to Florida minimum/maximum values rather than national values.

The normalized values for the Florida counties are plotted onto the choropleth map in Figure 4-21 using the same layout as the previous FCHDI indicators. The Florida natural amenities values from the NAS range from a high of 6.05 in Monroe County to a low of 0.36 in Liberty County (see Table A-17 in appendix A). As can be seen in Figure 4-21, the clustering of the quartiles is not only quite strong, but also highly regional, with the upper quartiles grouped predominantly in southern peninsular Florida, and the lower quartiles in the northern tier of the state. Only two counties break from this general pattern: Wakulla County in the north panhandle and Hardee County in the south-central peninsula.

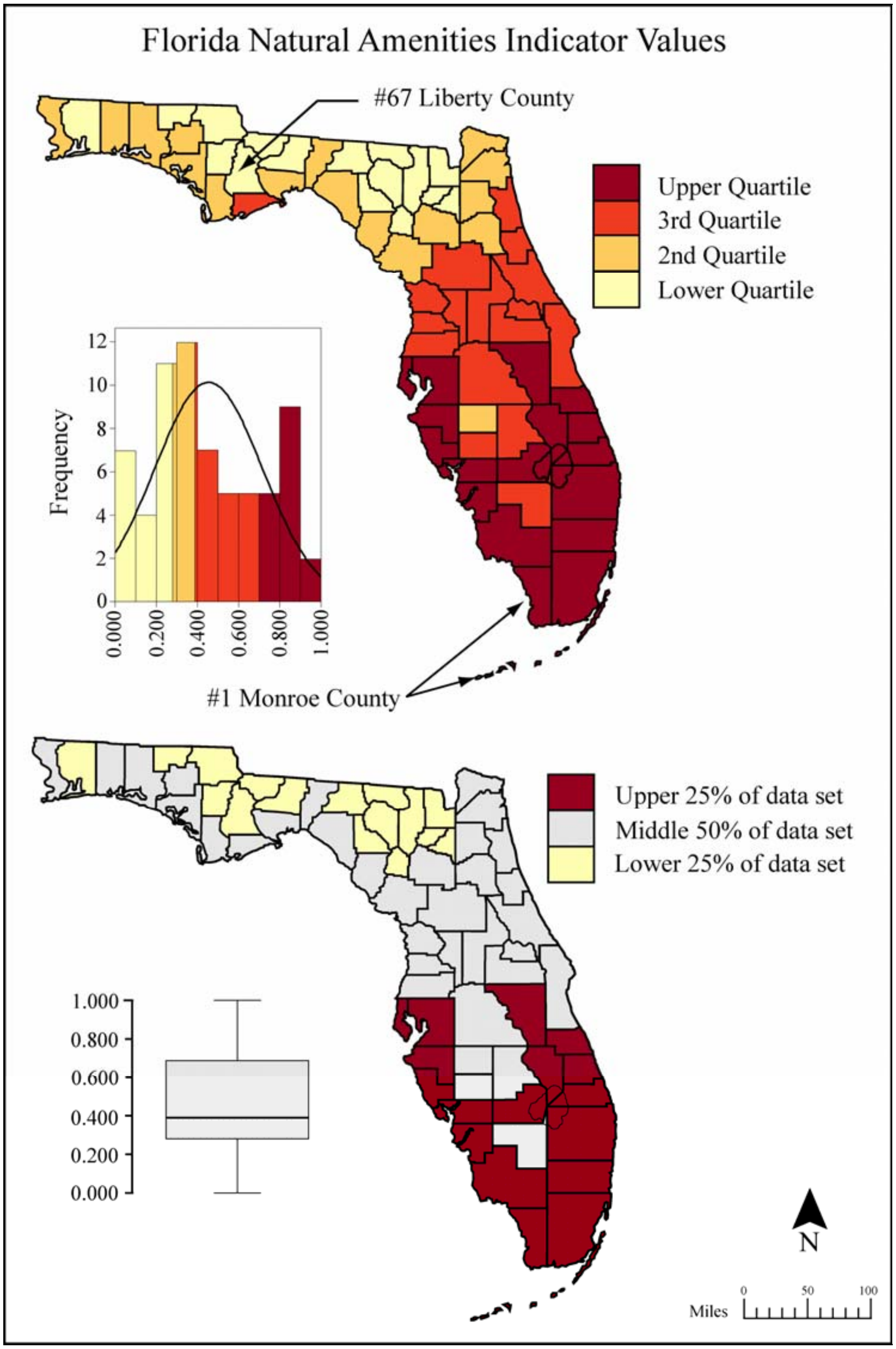


Figure 4-21: Florida Natural Amenities Indicator Values. A choropleth map of the Florida Natural Amenities Index values in spatial context, showing the highest ranked counties in dark brown and the lowest ranked counties in pale yellow

Now that the Florida natural amenities indicator values are established, they can be applied to the FCHDI model. Because the FCHDI is calculated using averaged interim index values, which in turn are calculated using averaged indicator values, the natural amenity interim values can not simply be added to the FCHDI. First the FCHDI must be disaggregated to the level of its nine indicators, and then these nine values for each county are summed. It is at this point that the Florida natural amenities indicator values are added as shown in Table 4-3. This combined value is then averaged to provide the FCHDI plus Natural Amenity (FCHDINA) values.

It is interesting to note that when the Florida natural amenities values are added to the FCHDI, the highest ranked county (Saint Johns) and the lowest ranked county (DeSoto) maintain their rank positions. When the values for the FCHDI and the FCHDINA models are plotted by quartiles onto comparative choropleth maps as shown in Figure 4-22, the natural amenities values do not appear to have quit the impact on the combined values that their strong north-south regional pattern suggested when taken alone. This is not to conclude that natural amenities do not significantly influence the FCHDI ranking, but to spatially analyze the influence, a method other than quartile choropleth mapping is required

Table 4-3: Calculation of FCHDI plus Florida Natural Amenities Values. The FCHDI is disaggregated to the level of its nine indicators, and the natural amenities values are added.

County	9 FCHDI Indicators (summed)	Natural Amenity Indicator	Sum / 10	County	9 FCHDI Indicators (summed)	Natural Amenity Indicator	Sum / 10
Alachua	6.444	0.366	**0.681**	Lee	5.499	0.856	**0.636**
Baker	4.959	0.051	**0.501**	Leon	6.827	0.244	**0.707**
Bay	5.711	0.315	**0.603**	Levy	4.549	0.371	**0.492**
Bradford	4.859	0.172	**0.503**	Liberty	4.443	0.000	**0.444**
Brevard	5.940	0.627	**0.657**	Madison	4.098	0.165	**0.426**
Broward	5.366	0.812	**0.618**	Manatee	5.306	0.756	**0.606**
Calhoun	4.982	0.134	**0.512**	Marion	4.952	0.392	**0.534**
Charlotte	5.241	0.833	**0.607**	Martin	5.809	0.875	**0.668**
Citrus	4.735	0.540	**0.527**	Miami-Dade	4.570	0.900	**0.547**
Clay	6.494	0.290	**0.678**	Monroe	5.952	1.000	**0.695**
Collier	5.984	0.815	**0.680**	Nassau	6.217	0.295	**0.651**
Columbia	4.813	0.040	**0.485**	Okaloosa	6.503	0.290	**0.679**
Desoto	3.171	0.418	**0.359**	Okeechobee	3.722	0.763	**0.448**
Dixie	4.016	0.362	**0.438**	Orange	6.037	0.457	**0.649**
Duval	5.883	0.343	**0.623**	Osceola	5.757	0.728	**0.648**
Escambia	5.747	0.348	**0.609**	Palm Beach	5.376	0.840	**0.622**
Flagler	5.736	0.411	**0.615**	Pasco	4.826	0.529	**0.535**
Franklin	4.903	0.404	**0.531**	Pinellas	5.506	0.824	**0.633**
Gadsden	4.381	0.227	**0.461**	Polk	4.251	0.636	**0.489**
Gilchrist	4.741	0.149	**0.489**	Putnam	4.109	0.350	**0.446**
Glades	3.645	0.842	**0.449**	Saint Johns	7.139	0.460	**0.760**
Gulf	4.264	0.332	**0.460**	Saint Lucie	4.767	0.821	**0.559**
Hamilton	4.182	0.039	**0.422**	Santa Rosa	6.630	0.278	**0.691**
Hardee	4.014	0.332	**0.435**	Sarasota	5.841	0.777	**0.662**
Hendry	3.547	0.678	**0.423**	Seminole	6.941	0.489	**0.743**
Hernando	4.938	0.589	**0.553**	Sumter	4.668	0.436	**0.510**
Highlands	4.239	0.664	**0.490**	Suwannee	4.395	0.060	**0.445**
Hillsborough	5.660	0.696	**0.636**	Taylor	4.533	0.344	**0.488**
Holmes	4.399	0.093	**0.449**	Union	4.862	0.218	**0.508**
Indian River	5.683	0.766	**0.645**	Volusia	5.335	0.543	**0.588**
Jackson	4.944	0.246	**0.519**	Wakulla	5.889	0.279	**0.617**
Jefferson	5.376	0.288	**0.566**	Walton	5.484	0.320	**0.580**
Lafayette	5.009	0.084	**0.509**	Washington	4.477	0.279	**0.476**
Lake	5.374	0.534	**0.591**				

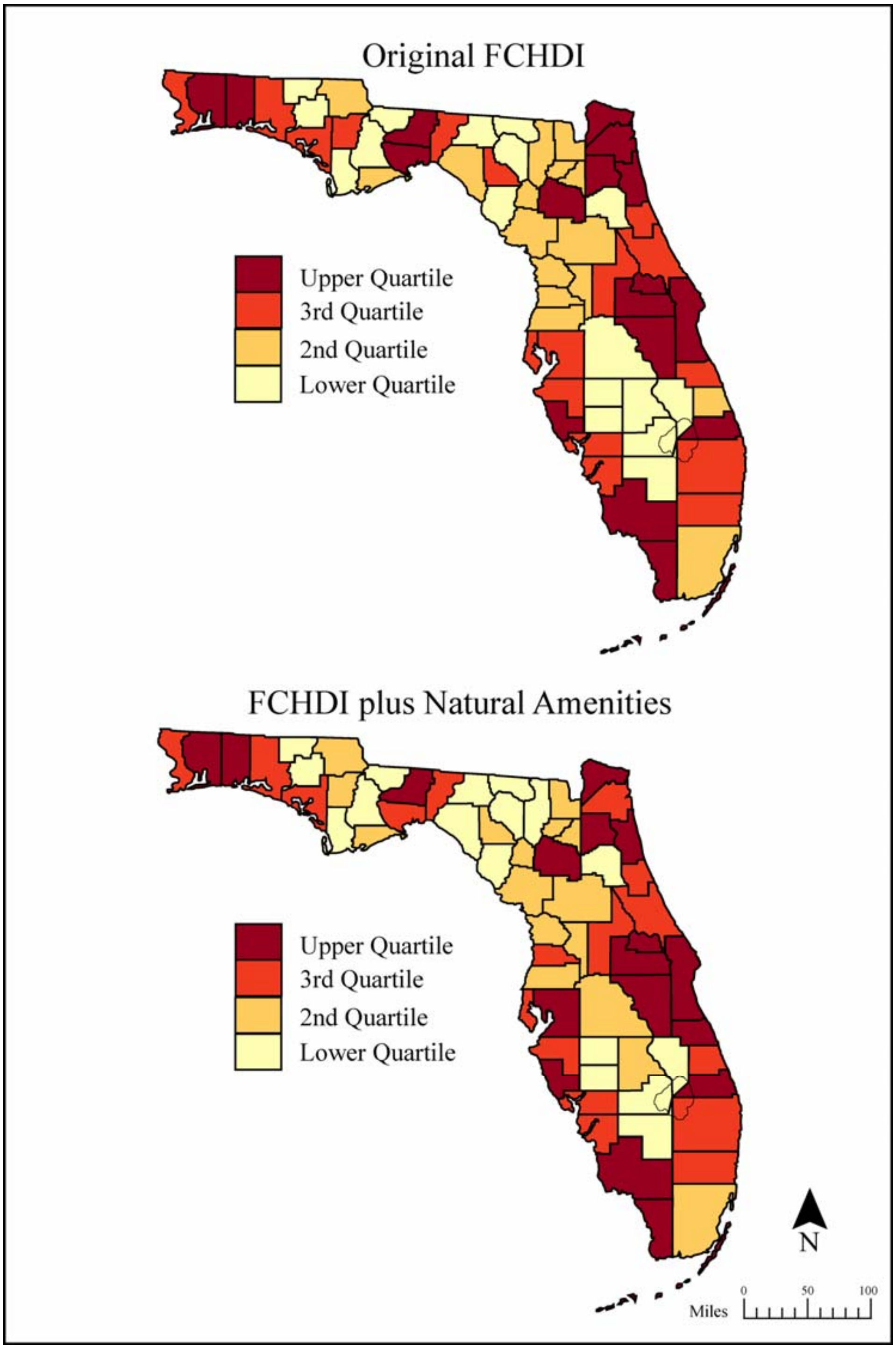


Figure 4-22: Comparing the FCHDI to the FCHDI plus Natural Amenities. This set of choropleth maps compares the original FCHDI rankings to the FCDHI rankings where natural amenities indicator values are added.

In Table 4-4, Florida's sixty-seven counties are first listed with their ranking by the original FCHDI, and second, with their ranking by the FCHDINA model. When the FCHDINA ranks are subtracted from the FCHDI ranks, the number of any rank position changes is found, and the changes are measured as either increasing (positive number) or decreasing (negative number). From Table 4-4 it is clear that with the addition of natural amenities, 29 counties decrease in rank, 30 counties increase, and in 8 counties, no change in rank takes place. These changes range from a drop of 11 (Baker County) to a gain of 13 rank positions (Miami-Dade County). In Figure 4-23, the counties where rank position increased are plotted in dark brown, where rank position decreased in pale yellow, and neutral gray where no change takes place.

Using the Descriptive Statistics function in Excel, the standard deviation (STDV) for this data set of rank changes is calculated at 5.562, providing a method to measure the changes in rank relative to the data set. Therefore, a change between zero and ± 6 equals one STDV, between ±7 and ±11 equals two STDV, and between ±12 and ±17 equals three STDV. All together there is 1 increasing county at 3 STDV (Miami-Dade), 16 counties at 2 STDV (7 increasing and 9 increasing counties) at 2 STDV, 42 counties at 1 STDV, and 8 unchanged. Using the seven-class divergent color scheme discussed earlier in Chapter Three, these three standard deviations of rank change are plotted in Figure 4-23 with neutral gray representing no change, three progressively darker shades of brown representing positive STDV, and three progressively darker shades of green representing negative STDV.

Table 4-4: Overall Change in Rank between the FCHDI Model and the FCHDINA Model. Each county in this table is listed by its FCHDI rank followed by its FCHDINA rank. Subtracting the FCHDINA from the FCHDI gives the number of position changes in rank.

	FCHDI		FCHDI + Natural Amenity	Change in Rank		FCHDI		FCHDI + Natural Amenity	Change in Rank
7	Alachua	6	Alachua	**1**	24	Lee	18	Lee	**6**
35	Baker	46	Baker	**-11**	3	Leon	3	Leon	**0**
20	Bay	28	Bay	**-8**	49	Levy	47	Levy	**2**
41	Bradford	45	Bradford	**-4**	52	Liberty	61	Liberty	**-9**
12	Brevard	12	Brevard	**0**	61	Madison	64	Madison	**-3**
29	Broward	22	Broward	**7**	31	Manatee	27	Manatee	**4**
34	Calhoun	41	Calhoun	**-7**	36	Marion	37	Marion	**-1**
32	Charlotte	26	Charlotte	**6**	16	Martin	10	Martin	**6**
46	Citrus	39	Citrus	**7**	48	Miami-Dade	35	Miami-Dade	**13**
6	Clay	9	Clay	**-3**	11	Monroe	4	Monroe	**7**
10	Collier	7	Collier	**3**	8	Nassau	13	Nassau	**-5**
43	Columbia	52	Columbia	**-9**	5	Okaloosa	8	Okaloosa	**-3**
67	Desoto	67	Desoto	**0**	64	Okeechobee	58	Okeechobee	**6**
62	Dixie	62	Dixie	**0**	9	Orange	14	Orange	**-5**
14	Duval	20	Duval	**-6**	17	Osceola	15	Osceola	**2**
18	Escambia	25	Escambia	**-7**	27	Palm Beach	21	Palm Beach	**6**
19	Flagler	24	Flagler	**-5**	42	Pasco	36	Pasco	**6**
39	Franklin	38	Franklin	**1**	23	Pinellas	19	Pinellas	**4**
55	Gadsden	54	Gadsden	**1**	57	Polk	50	Polk	**7**
45	Gilchrist	49	Gilchrist	**-4**	60	Putnam	59	Putnam	**1**
65	Glades	57	Glades	**8**	1	Saint Johns	1	Saint Johns	**0**
56	Gulf	55	Gulf	**1**	44	Saint Lucie	33	Saint Lucie	**11**
59	Hamilton	66	Hamilton	**-7**	4	Santa Rosa	5	Santa Rosa	**-1**
63	Hardee	63	Hardee	**0**	15	Sarasota	11	Sarasota	**4**
66	Hendry	65	Hendry	**1**	2	Seminole	2	Seminole	**0**
38	Hernando	34	Hernando	**4**	47	Sumter	42	Sumter	**5**
58	Highlands	48	Highlands	**10**	54	Suwannee	60	Suwannee	**-6**
22	Hillsborough	17	Hillsborough	**5**	50	Taylor	51	Taylor	**-1**
53	Holmes	56	Holmes	**-3**	40	Union	44	Union	**-4**
21	Indian River	16	Indian River	**5**	30	Volusia	30	Volusia	**0**
37	Jackson	40	Jackson	**-3**	13	Wakulla	23	Wakulla	**-10**
26	Jefferson	32	Jefferson	**-6**	25	Walton	31	Walton	**-6**
33	Lafayette	43	Lafayette	**-10**	51	Washington	53	Washington	**-2**
28	Lake	29	Lake	**-1**					

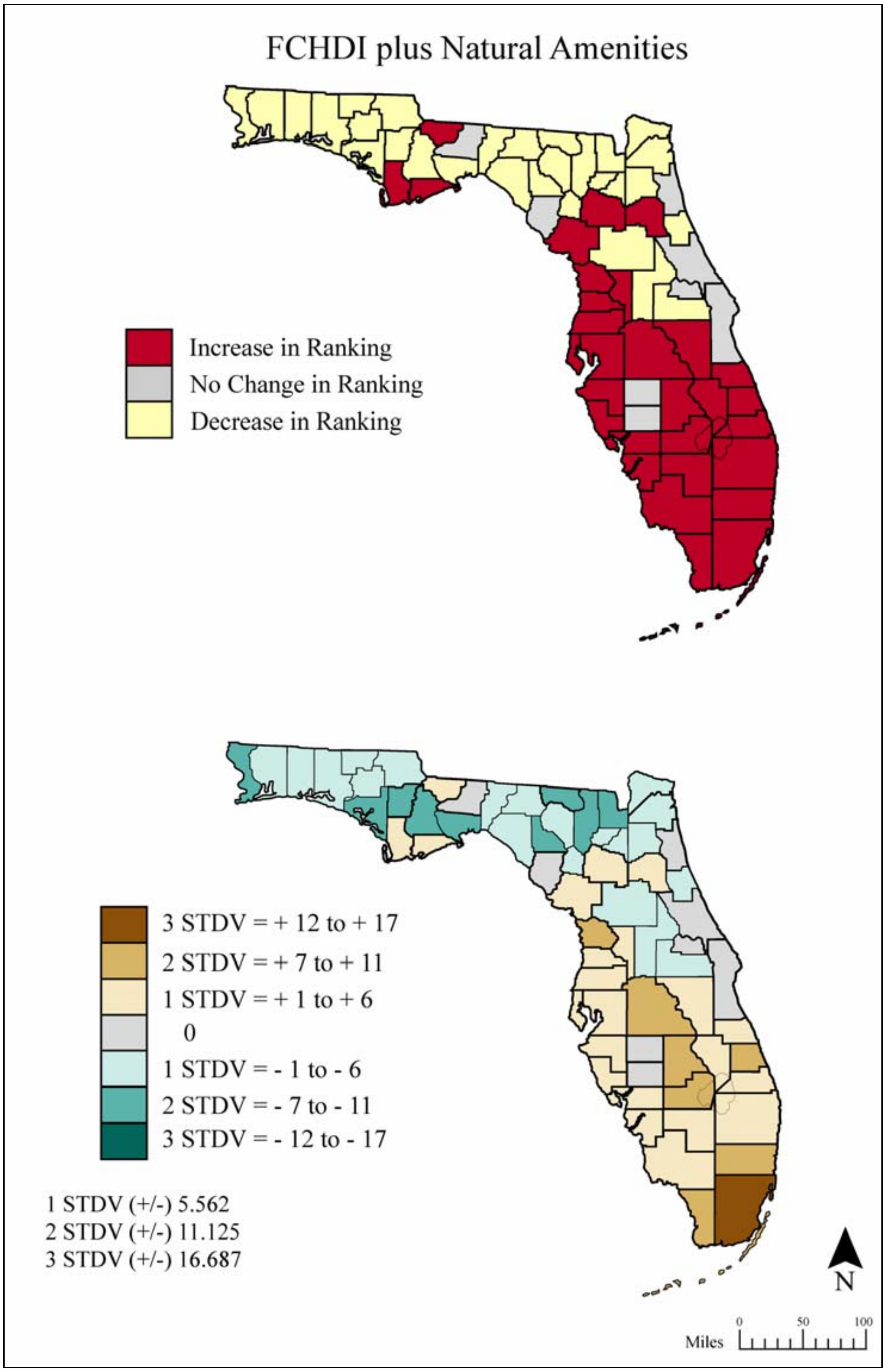


Figure 4-23: FCHDI plus Natural Amenities. The upper map describes whether the addition of a natural amenities indicator to the FCHDI has a positive (increase), negative (decrease), or neutral effect to the FCHDI rankings. The lower map uses increments of standard deviation to measure the changes in rank.

The upper choropleth map in Figure 4-23 simply indicates whether there is an increase, a decrease, or no change in rank position when natural amenities values are added to the FCHDI. In this map, the strong regional influence noted in Figure 4-21 (Florida Natural Amenities Indicator Values) is more apparent than in the quartile map in Figure 4-22.

The lower choropleth map in Figure 4-23 indicates the amount of increase or decrease in rank position change, effectively illustrating the degree of influence natural amenities has on the FCHDI, or in the case of eight counties, the lack of influence.

In summary, Chapter Four covers the piece-by-piece construction of the FCHDI; from calculating the nine indicator values, three interim index values, and the cumulative ranking of the FCHDI itself, to a method of displaying the calculated results of the FCHDI so that spatial relationships and patterns can be discerned. The adaptability of the FCHDI model to incorporate additional socioeconomic dimensions is demonstrated with the inclusion of an environmental indicator, natural amenities.

Chapter Five: Summary and Conclusions

This chapter concludes the current effort with a summary of goals, methods, and results. This thesis began as a search for a composite measure of socioeconomic conditions for comparing Florida regions. In the socioeconomic indices literature, perhaps the most studied and best documented model is the Human Development Index (HDI) created by the United Nations Development Programme in 1989. Lanteigne (2005) states that the HDI is one of the most universally accepted index models available for examining and comparing socioeconomic conditions across nations, and Sharpe and Smith (2005) go so far as to refer to the HDI as the 'gold standard' for composite indicators.

The HDI is a combined measurement of three key dimensions: health and longevity (mortality); knowledge (literacy); and a decent standard of living based on income and purchasing power (ul Haq, 2003). For reasons stated in the literature, it seemed logical to use these same three dimensions to compare socioeconomic conditions across Florida using the sixty-seven counties as territorial units. A problem arose in data acquisition due to data constraints at the county-level: data readily available at the national level such as life expectancy at birth were either difficult to find or non-existent at the county level. For this reason proxy indicators using county-level data were selected for the three dimensions to create a modified version of the HDI. Precedent for this was found in two previous studies, one for a West Virginia HDI (Hanham, Berhanu, and

Loveridge, 2000) and one for an Alabama HDI (Bukenya and Frasier, 2002), both using county-level data.

Establishing a socioeconomic index only partially addressed territorial indicators since spatial patterns and relationships were difficult to discern from a numeric scale alone. Therefore choropleth thematic mapping was considered for spatial context. The research aims for this thesis were to answer the following questions:

> 1. Can a modified model of the HDI be effectively applied to measure socioeconomic well-being across a contiguous territorial unit such as the State of Florida at the county-level using readily available data? And,
>
> 2. Is the geographic representation of the model's rankings via choropleth mapping advantageous in discerning territorial patterns, relationships, and trends?

For the Florida Counties Human Development Index (FCHDI), nine indicators were used to calculate the mortality, education, and economic dimension indices, which in turn were used to compute the final FCHDI. The proxy indicators used here were similar to those used in the West Virginia and Alabama indices, and were intended to reflect those used in the HDI. The Florida county indicators selected were:

- Mortality
  - Resident mortality rate
  - Child mortality rate
  - Leading causes of death
- Education
  - Percent of high school non-graduates
  - Percent of high school graduates or higher
  - Percent of bachelor's degree or higher
- Economics
  - Poverty rate
  - Per capita income
  - Price level Index (cost of living)

Several of these indicators have a negative effect on socioeconomics. For example, the higher the poverty rate, the more negative the socioeconomic effect. For this reason, those indicators having an intrinsic negative effect were adjusted by subtracting the observed value from unity. The issue of implicit weighting (equal weighting) versus applying explicit weights on the indicators was looked into, however, it was impractical to establish and then justify a non-uniform, explicit weighting scheme for the FCHDI at this stage of research. The data sets were all normalized using the linear scaling transformation (LST) method rather than Gaussian normalization (z-score) for two reasons. First, the LST is the preferred method used in the HDI, and second, Salzman (2003) found that between the two methods, the LST is the 'best practice' for standardizing variables because it assigns the lowest implicit weights and efficiently contends with the directionality issue of net-positive results for aggregated data.

To geographically display the FCHDI data, five thematic mapping methods were considered (dot-distribution, proportional symbol maps, data maps, cartograms and choropleth maps); however, for the goals and requirements of this thesis, choropleth mapping was deemed the most suitable. As noted by Kumar, "Descriptive statistics and choropleth map design go hand-in-hand" (Kumar, 2004, p. 218). In order to further aid the spatial analysis of the FCHDI, two statistical graphs were incorporated into the choropleth maps to clarify data distribution: frequency histograms (Kumar, 2004) and box-and-whisker diagrams (Kostbade, 1981). Quantile intervals were selected for the choropleth maps based on research by Brewer and Pickle (2002) indicating that of seven classification methods tested, quantile intervals are easier to interpret by the general map-reader, and best suited for comparative study.

The results of the FCHDI calculations were presented in choropleth mapping format, and were represented as net-positive, that is, each indicator, interim index, summary index, and test indicator was ranked and plotted with the index values most positive to social well-being in the upper quartile, and those least positive values in the lower quartile. The results show interesting county-level spatial patterns of FCHDI data distribution (See Figure 5-1).

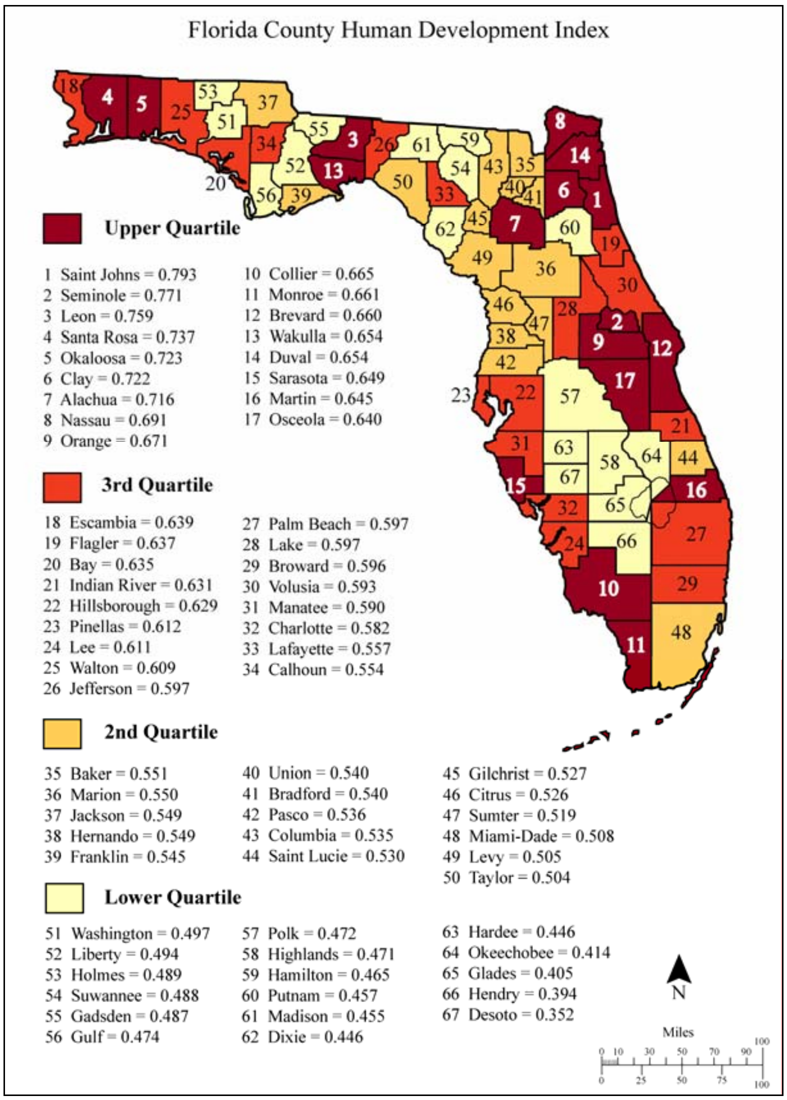


Figure 5-1: Florida County Human Development Index. The highest ranked socioeconomic well-being counties are shown in dark brown and the lowest ranked socioeconomic well-being counties in pale yellow

The cluster size and distribution patterns of the quartiles differ between smaller, looser patterns in Florida's northern tier and larger, more defined patterns in the peninsular region. This suggested a weaker socioeconomic influence between the counties in the northern tier, as in the cases of upper quartile Saint Johns County (#1), Clay County (#6) and Alachua County (#7) abutting low quartile Putnam County (#60); or upper quartile Leon County (#3) and Wakulla County (#13) abutting lower quartile Gadsden County (#55) and Liberty County (#52).

With the notable exception of the low-quartile cluster to the west and north-west of Lake Okeechobee, the distribution pattern in the peninsula tends to show more incremental diffusion from upper quartile clusters to third and second quartile clusters. The quartile clusters also tend to contain a greater number of counties in peninsular Florida, suggesting a stronger inter-socioeconomic influence between these counties, with less polarization between the upper and lower quartiles. The exception to this trend is the inland low-quartile cluster of Polk, Highlands, Hardee, Okeechobee, Glades, Hendry, and DeSoto counties. This is a clear illustration that the coastal counties of peninsular Florida fare better on the FCHDI scale than interior counties, however further research would be useful to validate this result.

There is evidence in Figure 5-1 that metropolitan areas tend to rank higher on the FCHDI, examples being the Jacksonville, Orlando, Naples, Tallahassee, and Pensacola-Fort Walton clusters. This suggests a link between urban areas and greater socioeconomic well-being. The most notable exception to this trend is Miami-Dade, which, although certainly a metropolitan area, ranks #48, low in the second quartile.

A degree of caution must be taken when interpreting Figure 5-1, since the actual distribution of socioeconomic well-being is not bound by county lines, nor is socioeconomic well-being homogeneously distributed across an entire county. The use of quartiles can also be called into question, however, the FCHDI does adequately suggest broad socioeconomic trends, and does draw attention to areas that might warrant further and more detailed research by several groups, including planners, policy makers, public managers, social activists, and politicians.

After compiling and processing selected socioeconomic data through the FCHDI, plotting the results on choropleth maps, and then referring to the initial postulations of this thesis, two conclusions can be drawn:

1. The FCHDI is a useful model for normalizing, aggregating, and ranking social and economic data at the county level, and these rankings are apposite for choropleth mapping.

2. When the FCHDI rankings are plotted on choropleth maps, clusters and location patterns (e.g. coastal versus inland counties) are easily recognizable and potential socioeconomic relationships between counties and within regions emerge.

The aim of this thesis was to detail the development of an index based on an existing model, and to geographically plot the index rankings. The resulting visualization of socioeconomic patterns and spatial relationships offer a provocative conclusion and suggest the value of further study. To this effect, there is a positive conclusion to the project.

LIST OF REFERENCES

Adams, C., Philippakos, E., Hodges, A., and Mulkey, D. (2001). An overview of the relative economic importance of Florida's coastal counties. *EDIS Document FE 306*. Institute of Food and Agricultural Sciences: University of Florida, Gainesville.

Agostini, S.J. and Richardson, S.J. (1997). A human development index for U.S. cities: Methodological issues and preliminary findings. *Real Estate Economics, 25*(1), 13-41.

Alexander, C., Ishikawa, S. and Silverstein, M. (1977). *A pattern language: Towns, buildings, construction*. New York: Oxford University Press

Anand, S. and Sen, A.K. (1994) Human Development Index: Methodology and measurement. *Occasional Papers, #12*. New York: United Nations Development Programme.
[Internet site: http://hdr.undp.org/publications/occasional_papers/oc12.pdf]

Andrews, F.M. and Whithey, S.B. (1976). Social indicators of well-being: America's perceptions of life quality. New York: Plenum Press.

BEBR (Bureau of Economic and Business Research). (2003). *The 2003 Florida price level index*. Gainesville: University of Florida.
[Internet site: http://bebr.ufl.edu/Publications/FPLI2003.pdf]

Board, C. and Taylor, R.M., (1977). Perception and maps: Human factors in map design and interpretation. *Transactions of the Institute of British Geographers*, New Series, 2(1), Contemporary Cartography, 19-36.

Booysen, F. (2002). An overview and evaluation of composite indices of development. *Social Indicators Research, 59*, 115-151.

Bowen, H.P. and Moesen, W. (2005). Benchmarking the competitiveness of nations: Non-uniform weighting and non-economic dimensions. *Vlerick Leuven Gent Working Paper Series 2005/2*. K.U. Leuven: Belgium

Brewer, C.A. and Pickle, L. (2002). Evaluation of methods for classifying epidemiological data on choropleth maps in series. *Annals of the Association of American Geographers, 92*(4), 662-681.

Bukenya, J.O. and Fraser, R. (2002) *Estimation of the human development index for Alabama counties*. [Research Paper # AGB2002-02: Draft] Alabama A&M University, AL. [Internet site: http://saes.aamu.edu/agb/AGB200202.pdf]

Cahill, M.B. (2002). Diminishing returns to the GDP and the Human Development Index. *Applied Economic Letters, 9*, 885-887.

Carr, D.B., White, D., MacEachren, and A.M., (2005). Conditioned choropleth maps and hypothesis generation. *Annals of the Association of American Geographers, 95*(1), 32-53.

Census (U.S. Census Bureau) (2003). *Florida: 2000. Summary social, economic, and housing characteristics* (PHC-2-11). Washington, DC: U.S. Census Bureau.

Cutter, S.L., Mitchell, J.T., and Scott, M.S. (2000). Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. *Annals of the Association of American Geographers, 90*(4), 713-737.

Dent, B.D. (1999). *Cartography thematic map design* (Fifth Edition). Boston: McGraw-Hill

Dougenik, J.A., Chrisman, N.R. and Niemeyer, D.R. (1985). An algorithm to construct continuous area cartograms. *Professional Geographer, 37*(1), 75-81.

Du, C. and Liu, L. (1999). Constructing contiguous area cartogram using ArcView Avenue. In Li, B., et al., (eds.) *Geoinformatics and Socioinformatics*: The Proceedings of Geoinformatics '99 Conference. Ann Arbor: Michigan, pp. 1-7.

ERS (Economic Research Service), (1997). *Natural Amenities Scale.* Washington, D.C.: United Stated Department of Agriculture.
[Internet site: http://www.ers.usda.gov/Data/Natural/Amenities/]

Estrada, J.K. (2005). Assessing community resources and economic development programming efforts using a modified human development index. *Journal of Extension, 43*(2) 2IAW1.
[Internet site: http://www.joe.org/joe/2005april/iw1.shtml.]

Fernald, E.A. and Purdum, E.D. (Eds.) (1996). *Atlas of Florida* (revised edition). Gainesville: University Press of Florida.

FCMP (Florida Coastal Management Program). (2005)
[Internet site: http://www.orcm.nos.noaa.gov/czm/czmflorida.html.]
[Internet site: http://www.dep.state.fl.us/cmp/.]

FDOH (Florida Department of Health). (2001). *Florida vital statistics annual report 2000*. Tallahassee: Office of Vital Statistics.

FDOH (Florida Department of Health). (2004). *Florida vital statistics annual report 2003*. Tallahassee: Office of Vital Statistics.

FNAI (Florida Natural Areas Inventory) (2005). [Internet site: http://www.fnai.org].

Geisel, T.S. (1939). *The Seven Lady Godivas*. New York: Random House

Green, G. P. (2001). Amenities and community economic development: Strategies for sustainability. *The Journal of Regional Analysis and Policy, 32*, (2), 61-75.

Grix, J. (2002). Introducing students to the generic terminology of social research. *Politics: 2002 22*(3), 175-186.

Hagerty, M.R. and Land, K.C. (2004). Constructing summary indices of social well-being: A model for the effect for heterogeneous importance weights. Revision of a paper presented at the annual meeting of the American Sociological Association, Chicago, IL, 2002.

Hanham, A.C., Berhanu, S. and Loveridge, S. (2002). *A human development index for West Virginia counties*. Research paper 2005. Center for Community, Economic, and Workforce Development. West Virginia University Extension Service.

ul Haq, M. (2003). The birth of the human development index. In *Readings in Human Development*, eds. S. Fukuda-Parr and A.K. Siva Kuma, Pp. 127-137. Oxford, UK: Oxford University Press.

Holcombe, R.G. (1995). *Florida's growth management experiment: An analysis*. Florida State University, Tallahassee, FL.

House, D.H. and Kocmoud, C.J. (1998). Continuous cartogram construction. *Proceedings IEEE Visualization*, 197-204.

Isserman, A. (2005). Rating places: Why and how. Department of Agricultural and Consumer Economics: University of Illinois at Urbana-Champaign [Internet site: http://www.ace.uiuc.edu/courses/up506/Feb_14_slides.pdf]

Ivanova, I., Arcelus, F.J. and Srinivasan, (1999). An assessment of the measurement properties of the Human Development Index. *Social Indicators Research, 46*, 157-179

Jenks, G.F. and Caspall, F.C. (1971). Error on choroplethic maps: Definition, measurement, reduction. *Annals of the Association of American Geographers, 61*(2), 217-244.

Keim, D.A., North, S.C and Panse, C. (2004). CartoDraw: A fast algorithm for generating contiguous cartograms. *IEEE Transactions on Visualization and Computer Graphics, 10*(1), 95-110.

Kelly, A.C. (1991). The human development index: "Handle with care." *Population and Development Review, 17*(2), 315-324.

Kiker, C. F., & Hodges, A. W., (2002). Economic benefits of natural land conservation: Case study of Northeast Florida. *Final Report Submitted to Defenders of Wildlife*.

Kostbade, J.T. (1981) Mapping frequency distributions by the box-and-whisker. *Professional Geographer, 33*(4), 413-418.

Kumar, N. (2004). Frequency histogram legend in the choropleth map: A substitute for traditional legends. *Cartography and Geography Information Science, 31*(4), 217-236.

Kwang-Koo, K., Marcouiller, D., and Deller, S.C. (2005). Natural amenities and rural development: Understanding spatial and distributional attributes. *Growth and Change, 36*(2), 273-297.

Lanteigne, C.A. (2005). *Quality of life in cities*. Thesis: University of New Brunswick.

Lloyd, R. and Steinke, T. (1977). Visual and statistical comparison of choropleth maps. *Annals of the Association of American Geographers, 67*(3), 429-436.

McGranahan, D.A. (1999). *Natural amenities drive rural population change*. AER-781; USDA/ERS: Washington.
[Internet site: http://www.ers.usda.gov/publications/aer781/]

McGranahan, D.A. (2005). Natural Amenities Scale. *Amber Waves, April 2005*; USDA/ERS: Washington.
[Internet site: http://www.ers.usda.gov/AmberWaves/April05/]

Mason, T.J., Fraumenie, J.F., Hoover, R., and Blot, W.J. (1981). *An atlas of mortality from selected diseases*. Washington: USGPO (NIH Publication No. 81-2397).

May, J. W. (1998). 1990 coastal population in Florida: A report to Florida's coastal managers.

Muehrcke, P.C., (1981). Whatever happened to geographic cartography? *Professional Geographer, 33*(4), 397-405.

NASS (National Agricultural Statistics Service) 2002 Census of Agriculture (FL). Washington: USDA. [Internet site: http://nass.usda.gov/].

Noorbakhsh, F. (1998). The human development index: Some technical issues and alternative indices. *Journal of International Development, 10,* 589 – 605.

NRC (National Research Council) (2002). *Community and quality of life: Data needs for informed decision making*. Washington: National Academy Press.

OEDR (Office of Economic and Demographic Research). (2005). Florida Demographic Summary. Tallahassee: Florida Legislature.[Internet site: http://www.state.fl.us/edr]

Olson, J.M. (1981). Spectrally encoded two-variable maps. *Annals of the Association of American Geographers, 71*(2), 259-276.

Olson, J.M. and Brewer, C.A. (1997). An evaluation of color selections to accommodate map users with color-vision impairments. *Annals of the Association of American Geographers, 87*(1), 103-134.

Pacione, M. (2003). Urban environmental quality and human wellbeing: A social geographical perspective. *Landscape and Urban Planning,65*, 19-30.

Pickle, L.W., (2004). Usability testing of map designs. *Proceedings of the symposium on the Interface of Computing Science and Statistics, 35*:42-56

Reynolds, J. E. (2001). Urbanization and land use change in Florida and the South. *Proceedings of a Regional Workshop SER-IEG-30*. Southern Rural Development Center and Farm Foundation, # 220 (pp. 28-49). Mississippi State, MS

Rittschof, K.A., Stock, W.A., Kulhavy, R.W., Verdi, M.P. and Johnson, J.T. (1996). Learning from cartograms: The effects of regional familiarity. *Journal of Geography, 95*(2), 50-58.

Robinson, A.H., Sale, R.D., Morrison, J.L. and Muehrcke, P.C. (1984). *Elements of Cartography* (Fifth Edition). New York: John Wiley and Sons

Salzman, J. (2003). *Methodological choices encountered in the construction of composite indices of economic and social well-being*. Center for the Study of Living Standards: Ottawa, Canada

Shumway, J.M. and Otterstrom, S.M. (2001). Spatial patterns of migration and income change in the mountain West: The dominance of service-based, amenity-rich counties. *Professional Geographer, 53*(4), 492-502.

Slottje, D.J. (1991). Measuring the quality of life across countries. *The Review of Economics and Statistics, 73*(4), 684-693.

Smith, D.M. (1973). *The Geography of Social Well-being in the United States: An Introduction to Territorial Social Indicators*. New York: McGraw-Hill Book Company.

Smith, D.M. (1975). *Patterns in Human Geography: An Introduction to Numerical Methods*. New York: Crane, Russak & Company, Inc.

Smith, R.M. (1986). Comparing traditional methods for selecting class intervals on choropleth maps. *Professional Geographer, 38*(1), 62-67.

Solecki, W.D. (2001). South Florida: The reality of change and the prospects for sustainability: The role of global-to-local linkages in land use/land cover change in South Florida. *Ecological Economics 37*(3), 339-356.

Straussfogel, D. (1997). Redefining development as humane and sustainable. *Annals of the Association of American Geographers, 87*(2), 280-305.

Tufte, E.R. (1990). *Envisioning Information*. Cheshire, CT: Graphics Press.

UNDP (United Nations Development Programme) (1990). *Human Development Report 1990*. Online. [Internet Site: http://hdr.undp.org/reports/global/1990/en/]

UNDP (United Nations Development Programme) (1994). *Human Development Report 1994*. Online. [Internet Site: http://hdr.undp.org/reports/global/1994/en/]

UNDP (United Nations Development Programme) (2002). *Human Development Report 2002*. Online. [Internet Site: http://hdr.undp.org/reports/global/2002]

UNDP (United Nations Development Programme) (2004a). *Human Development Report 2004*. Online. [Internet Site: http://hdr.undp.org/reports/global/2004]

UNDP (United Nations Development Programme) (2004b). *FAQ on HDR statistics: Examples from HDR 2004*.
Online. [Internet Site: http://hdr.undp.org/statistics/faq/]

Wright, J.K., (1944). The terminology of certain map symbols. *Geographical Review, 34*(4), 653-654.

APPENDICES

APPENDIX A: FCHDI Data Tables

The following tables, built from Excel worksheet calculations, include the observed and adjusted data collected from the sources listed in Chapter Three for each of the nine indicators, the three interim indices, and the FCHDI calculated in Chapter Four.

Table A-1: Florida Resident Mortality Rate and Indicator Value (2000)

This data table includes the observed and adjusted mortality rates for each county and the calculated indicator value used in building the Mortality Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Mortality Rate	Adjusted Mortality Rate	Indicator Value	County	Mortality Rate	Adjusted Mortality Rate	Indicator Value
Alachua	7.0	93.0	0.941	Lee	11.7	88.3	0.480
Baker	8.2	91.8	0.824	Leon	6.4	93.6	1.000
Bay	9.3	90.7	0.716	Levy	12.6	87.4	0.392
Bradford	10.1	89.9	0.637	Liberty	7.8	92.2	0.863
Brevard	10.8	89.2	0.569	Madison	10.1	89.9	0.637
Broward	10.4	89.6	0.608	Manatee	13.0	87.0	0.353
Calhoun	8.7	91.3	0.775	Marion	13.1	86.9	0.343
Charlotte	15.4	84.6	0.118	Martin	12.5	87.5	0.402
Citrus	16.6	83.4	0.000	Miami-Dade	8.6	91.4	0.784
Clay	7.5	92.5	0.892	Monroe	7.5	92.5	0.892
Collier	10.2	89.8	0.627	Nassau	8.9	91.1	0.755
Columbia	10.9	89.1	0.559	Okaloosa	7.2	92.8	0.922
Desoto	10.9	89.1	0.559	Okeechobee	10.4	89.6	0.608
Dixie	11.2	88.8	0.529	Orange	7.2	92.8	0.922
Duval	8.6	91.4	0.784	Osceola	7.6	92.4	0.882
Escambia	9.1	90.9	0.735	Palm Beach	12.0	88.0	0.451
Flagler	12.2	87.8	0.431	Pasco	15.6	84.4	0.098
Franklin	10.5	89.5	0.598	Pinellas	13.8	86.2	0.275
Gadsden	8.8	91.2	0.765	Polk	10.9	89.1	0.559
Gilchrist	11.5	88.5	0.500	Putnam	12.3	87.7	0.422
Glades	10.4	89.6	0.608	Saint Johns	9.5	90.5	0.696
Gulf	10.0	90.0	0.647	Saint Lucie	12.1	87.9	0.441
Hamilton	8.4	91.6	0.804	Santa Rosa	7.7	92.3	0.873
Hardee	9.4	90.6	0.706	Sarasota	14.7	85.3	0.186
Hendry	8.5	91.5	0.794	Seminole	7.2	92.8	0.922
Hernando	14.8	85.2	0.176	Sumter	11.9	88.1	0.461
Highlands	14.6	85.4	0.196	Suwannee	12.1	87.9	0.441
Hillsborough	8.8	91.2	0.765	Taylor	11.9	88.1	0.461
Holmes	11.4	88.6	0.510	Union	10.6	89.4	0.588
Indian River	13.0	87.0	0.353	Volusia	13.0	87.0	0.353
Jackson	10.4	89.6	0.608	Wakulla	8.7	91.3	0.775
Jefferson	11.2	88.8	0.529	Walton	10.4	89.6	0.608
Lafayette	9.0	91.0	0.745	Washington	11.3	88.7	0.520
Lake	13.4	86.6	0.314				
		Raw Data	FCHDI				
	Mean	89.381	0.586	Quartile 1	0.441		
	Standard Deviation	2.345	0.230	Quartile 2	0.608		
	Minimum	83.4	0.000	Quartile 3	0.770		
	Maximum	93.6	1.000	Quartile 4	1.000		

Table A-2: Florida Child Mortality Rate and Indicator Values (2000)

This data table includes the observed and adjusted child mortality rates for each county and the calculated indicator value used in building the Mortality Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Child Mortality	Adjusted Mortality Rate	Indicator Values	County	Child Mortality	Adjusted Mortality Rate	Indicator Values
Alachua	0.29	99.71	0.557	Lee	0.20	99.80	0.691
Baker	0.19	99.81	0.703	Leon	0.24	99.76	0.629
Bay	0.14	99.86	0.776	Levy	0.20	99.80	0.687
Bradford	0.28	99.72	0.572	Liberty	0.26	99.74	0.598
Brevard	0.13	99.87	0.794	Madison	0.28	99.72	0.568
Broward	0.15	99.85	0.775	Manatee	0.19	99.81	0.710
Calhoun	0.13	99.87	0.799	Marion	0.16	99.84	0.748
Charlotte	0.17	99.83	0.735	Martin	0.25	99.75	0.614
Citrus	0.20	99.80	0.689	Miami-Dade	0.16	99.84	0.757
Clay	0.21	99.79	0.682	Monroe	0.20	99.80	0.688
Collier	0.13	99.87	0.793	Nassau	0.22	99.78	0.653
Columbia	0.30	99.70	0.532	Okaloosa	0.18	99.82	0.715
Desoto	0.16	99.84	0.753	Okeechobee	0.40	99.60	0.383
Dixie	0.39	99.61	0.398	Orange	0.18	99.82	0.723
Duval	0.23	99.77	0.637	Osceola	0.12	99.88	0.815
Escambia	0.30	99.70	0.534	Palm Beach	0.18	99.82	0.715
Flagler	0.15	99.85	0.775	Pasco	0.14	99.86	0.778
Franklin	0.20	99.80	0.696	Pinellas	0.16	99.84	0.758
Gadsden	0.46	99.54	0.283	Polk	0.20	99.80	0.698
Gilchrist	0.36	99.64	0.440	Putnam	0.28	99.72	0.571
Glades	0.65	99.35	0.000	Saint Johns	0.11	99.89	0.836
Gulf	0.59	99.41	0.083	Saint Lucie	0.20	99.80	0.684
Hamilton	0.00	100.00	1.000	Santa Rosa	0.12	99.88	0.819
Hardee	0.10	99.90	0.850	Sarasota	0.21	99.79	0.674
Hendry	0.18	99.82	0.727	Seminole	0.10	99.90	0.839
Hernando	0.17	99.83	0.738	Sumter	0.24	99.76	0.634
Highlands	0.31	99.69	0.523	Suwannee	0.48	99.52	0.264
Hillsborough	0.21	99.79	0.673	Taylor	0.09	99.91	0.864
Holmes	0.19	99.81	0.699	Union	0.14	99.86	0.790
Indian River	0.21	99.79	0.677	Volusia	0.21	99.79	0.679
Jackson	0.16	99.84	0.758	Wakulla	0.07	99.93	0.886
Jefferson	0.00	100.00	1.000	Walton	0.05	99.95	0.928
Lafayette	0.00	100.00	1.000	Washington	0.32	99.68	0.512
Lake	0.09	99.91	0.859				
		Raw Data	FCHDI				
Mean		99.792	0.678	Quartile 1	0.621		
Standard Deviation		0.120	0.185	Quartile 2	0.699		
Minimum		99.353	0.000	Quartile 3	0.777		
Maximum		100.000	1.000	Quartile 4	1.000		

Table A-3: Florida Heart Disease and Indicator Values (2000)
This data table includes the observed and adjusted heart disease rates for each county and the calculated indicator value used in building the leading cause of death indicator. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Heart Disease Rate	Adjusted Rate	Indicator Values	County	Heart Disease Rate	Adjusted Rate	Indicator Values
Alachua	19.5	80.5	0.835	Lee	32.6	67.4	0.124
Baker	24.6	75.4	0.557	Leon	21.2	78.8	0.744
Bay	29.7	70.3	0.278	Levy	25.4	74.6	0.514
Bradford	21.9	78.1	0.703	Liberty	30.3	69.7	0.248
Brevard	29.8	70.2	0.273	Madison	33.7	66.3	0.065
Broward	34.0	66.0	0.048	Manatee	32.5	67.5	0.126
Calhoun	29.6	70.4	0.286	Marion	31.3	68.7	0.194
Charlotte	34.9	65.1	0.000	Martin	33.5	66.5	0.076
Citrus	30.3	69.7	0.247	Miami-Dade	34.8	65.2	0.005
Clay	26.0	74.0	0.482	Monroe	22.7	77.3	0.659
Collier	29.2	70.8	0.308	Nassau	30.1	69.9	0.257
Columbia	23.6	76.4	0.610	Okaloosa	28.8	71.2	0.330
Desoto	31.4	68.6	0.186	Okeechobee	34.8	65.2	0.002
Dixie	23.6	76.4	0.613	Orange	28.4	71.6	0.351
Duval	26.2	73.8	0.472	Osceola	28.5	71.5	0.347
Escambia	25.3	74.7	0.522	Palm Beach	33.9	66.1	0.053
Flagler	29.7	70.3	0.281	Pasco	30.0	70.0	0.266
Franklin	19.8	80.2	0.816	Pinellas	28.4	71.6	0.352
Gadsden	27.9	72.1	0.380	Polk	32.7	67.3	0.115
Gilchrist	26.7	73.3	0.443	Putnam	26.8	73.2	0.436
Glades	29.9	70.1	0.269	Saint Johns	22.8	77.2	0.654
Gulf	27.5	72.5	0.399	Saint Lucie	32.6	67.4	0.124
Hamilton	27.3	72.7	0.408	Santa Rosa	28.3	71.7	0.355
Hardee	27.7	72.3	0.389	Sarasota	29.0	71.0	0.319
Hendry	28.8	71.2	0.327	Seminole	30.9	69.1	0.213
Hernando	29.3	70.7	0.303	Sumter	34.0	66.0	0.048
Highlands	32.8	67.2	0.114	Suwannee	24.7	75.3	0.555
Hillsborough	29.5	70.5	0.289	Taylor	26.4	73.6	0.458
Holmes	33.8	66.2	0.058	Union	16.4	83.6	1.000
Indian River	30.3	69.7	0.250	Volusia	29.1	70.9	0.311
Jackson	33.4	66.6	0.080	Wakulla	27.1	72.9	0.420
Jefferson	24.8	75.2	0.544	Walton	32.1	67.9	0.150
Lafayette	19.7	80.3	0.824	Washington	29.0	71.0	0.320
Lake	30.8	69.2	0.223				
		Raw Data	FCHDI				
Mean		71.460	0.343	Quartile 1	0.190		
Standard Deviation		4.165	0.226	Quartile 2	0.311		
Minimum		65.136	0.000	Quartile 3	0.465		
Maximum		83.553	1.000	Quartile 4	1.000		

Table A-4: Florida Malignant Neoplasm and Indicator Values (2000)

This data table includes the observed and adjusted cancer rates for each county and the calculated indicator value used in building the leading cause of death indicator. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Malignant Neoplasm Rate	Adjusted Rate	Indicator Values	County	Malignant Neoplasm Rate	Adjusted Rate	Indicator Values
Alachua	22.9	77.1	0.567	Lee	25.3	74.7	0.400
Baker	22.5	77.5	0.601	Leon	24.2	75.8	0.477
Bay	25.0	75.0	0.420	Levy	23.6	76.4	0.523
Bradford	22.3	77.7	0.612	Liberty	24.2	75.8	0.473
Brevard	26.3	73.7	0.324	Madison	20.3	79.7	0.756
Broward	23.0	77.0	0.563	Manatee	24.5	75.5	0.453
Calhoun	19.2	80.8	0.835	Marion	24.9	75.1	0.428
Charlotte	24.9	75.1	0.426	Martin	25.4	74.6	0.387
Citrus	25.6	74.4	0.374	Miami-Dade	21.1	78.9	0.700
Clay	24.9	75.1	0.429	Monroe	26.8	73.2	0.289
Collier	25.3	74.7	0.400	Nassau	22.3	77.7	0.615
Columbia	25.2	74.8	0.405	Okaloosa	27.8	72.2	0.218
Desoto	24.2	75.8	0.475	Okeechobee	24.8	75.2	0.433
Dixie	24.8	75.2	0.430	Orange	23.1	76.9	0.557
Duval	22.9	77.1	0.569	Osceola	22.4	77.6	0.606
Escambia	22.5	77.5	0.599	Palm Beach	24.3	75.7	0.468
Flagler	29.2	70.8	0.119	Pasco	23.5	76.5	0.527
Franklin	23.3	76.7	0.543	Pinellas	22.1	77.9	0.628
Gadsden	22.9	77.1	0.570	Polk	24.4	75.6	0.460
Gilchrist	19.9	80.1	0.787	Putnam	25.7	74.3	0.366
Glades	30.8	69.2	0.000	Saint Johns	26.0	74.0	0.345
Gulf	25.5	74.5	0.383	Saint Lucie	25.8	74.2	0.365
Hamilton	25.0	75.0	0.419	Santa Rosa	22.7	77.3	0.582
Hardee	16.9	83.1	1.000	Sarasota	25.3	74.7	0.396
Hendry	23.2	76.8	0.547	Seminole	24.5	75.5	0.454
Hernando	28.5	71.5	0.168	Sumter	26.2	73.8	0.332
Highlands	23.7	76.3	0.515	Suwannee	19.5	80.5	0.811
Hillsborough	23.1	76.9	0.552	Taylor	25.6	74.4	0.375
Holmes	19.2	80.8	0.837	Union	29.6	70.4	0.089
Indian River	26.9	73.1	0.281	Volusia	24.8	75.2	0.436
Jackson	20.6	79.4	0.734	Wakulla	20.2	79.8	0.762
Jefferson	20.6	79.4	0.734	Walton	24.5	75.5	0.456
Lafayette	21.2	78.8	0.691	Washington	22.6	77.4	0.590
Lake	24.9	75.1	0.426				
		Raw Data	FCHDI				
Mean		76.044	0.494	Quartile 1	0.398		
Standard Deviation		2.552	0.183	Quartile 2	0.460		
Minimum		69.159	0.000	Quartile 3	0.594		
Maximum		83.099	1.000	Quartile 4	1.000		

Table A-5: Combined Florida Heart Disease and Cancer Indicator Values
This data table is the combined heart disease / cancer rates for each county used in building the Mortality Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Sum of Heart Disease / Malignant Neoplasm	Combined Indicator Value (Sum / 2)	County	Sum of Heart Disease / Malignant Neoplasm	Combined Indicator Value (Sum / 2)
Alachua	1.403	0.701	Lee	0.524	0.262
Baker	1.159	0.579	Leon	1.220	0.610
Bay	0.698	0.349	Levy	1.036	0.518
Bradford	1.315	0.657	Liberty	0.721	0.361
Brevard	0.597	0.299	Madison	0.822	0.411
Broward	0.611	0.306	Manatee	0.578	0.289
Calhoun	1.121	0.560	Marion	0.622	0.311
Charlotte	0.426	0.213	Martin	0.463	0.232
Citrus	0.622	0.311	Miami-Dade	0.705	0.353
Clay	0.911	0.456	Monroe	0.948	0.474
Collier	0.708	0.354	Nassau	0.872	0.436
Columbia	1.015	0.507	Okaloosa	0.548	0.274
Desoto	0.661	0.331	Okeechobee	0.435	0.218
Dixie	1.044	0.522	Orange	0.908	0.454
Duval	1.041	0.520	Osceola	0.952	0.476
Escambia	1.120	0.560	Palm Beach	0.521	0.260
Flagler	0.400	0.200	Pasco	0.793	0.396
Franklin	1.359	0.680	Pinellas	0.979	0.490
Gadsden	0.950	0.475	Polk	0.576	0.288
Gilchrist	1.229	0.615	Putnam	0.801	0.401
Glades	0.269	0.135	Saint Johns	1.000	0.500
Gulf	0.782	0.391	Saint Lucie	0.489	0.245
Hamilton	0.827	0.414	Santa Rosa	0.936	0.468
Hardee	1.389	0.695	Sarasota	0.715	0.358
Hendry	0.874	0.437	Seminole	0.667	0.333
Hernando	0.471	0.236	Sumter	0.380	0.190
Highlands	0.629	0.314	Suwannee	1.366	0.683
Hillsborough	0.842	0.421	Taylor	0.834	0.417
Holmes	0.895	0.448	Union	1.089	0.544
Indian River	0.531	0.265	Volusia	0.747	0.374
Jackson	0.814	0.407	Wakulla	1.183	0.591
Jefferson	1.278	0.639	Walton	0.606	0.303
Lafayette	1.514	0.757	Washington	0.910	0.455
Lake	0.649	0.324			
	FCHDI				
Mean	0.411		Quartile 1	0.308	
STDV	0.145		Quartile 2	0.411	
Minimum	0.135		Quartile 3	0.513	
Maximum	0.757		Quartile 4	0.757	

Table A-6: Florida Non-High School Graduate - (2000)

This data table includes the observed and adjusted non-high school graduate rates for each county and the calculated indicator value used in building the Education Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Non-H.S. Graduate	Adjusted Non-H.S. Graduate	Indicator Values	County	Non-H.S. Graduate	Adjusted Non-H.S. Graduate	Indicator Values
Alachua	3.9	96.1	0.993	Lee	15.4	84.6	0.724
Baker	24.0	76.0	0.522	Leon	3.6	96.4	1.000
Bay	10.4	89.6	0.841	Levy	16.5	83.5	0.698
Bradford	16.2	83.8	0.705	Liberty	17.5	82.5	0.674
Brevard	11.0	89.0	0.827	Madison	14.3	85.7	0.749
Broward	9.6	90.4	0.859	Manatee	16.9	83.1	0.689
Calhoun	5.6	94.4	0.953	Marion	14.9	85.1	0.735
Charlotte	9.7	90.3	0.857	Martin	16.9	83.1	0.689
Citrus	12.3	87.7	0.796	Miami-Dade	10.3	89.7	0.843
Clay	9.2	90.8	0.869	Monroe	10.6	89.4	0.836
Collier	21.3	78.7	0.585	Nassau	8.9	91.1	0.876
Columbia	15.2	84.8	0.728	Okaloosa	7.0	93.0	0.920
Desoto	46.3	53.7	0.000	Okeechobee	23.9	76.1	0.525
Dixie	14.8	85.2	0.738	Orange	12.8	87.2	0.785
Duval	12.5	87.5	0.792	Osceola	12.6	87.4	0.789
Escambia	8.8	91.2	0.878	Palm Beach	13.8	86.2	0.761
Flagler	9.4	90.6	0.864	Pasco	12.5	87.5	0.792
Franklin	11.6	88.4	0.813	Pinellas	12.7	87.3	0.787
Gadsden	13.0	87.0	0.780	Polk	17.6	82.4	0.672
Gilchrist	13.8	86.2	0.761	Putnam	15.7	84.3	0.717
Glades	12.6	87.4	0.789	Saint Johns	6.0	94.0	0.944
Gulf	9.7	90.3	0.857	Saint Lucie	16.6	83.4	0.696
Hamilton	19.4	80.6	0.630	Santa Rosa	7.4	92.6	0.911
Hardee	25.8	74.2	0.480	Sarasota	11.9	88.1	0.806
Hendry	25.5	74.5	0.487	Seminole	8.3	91.7	0.890
Hernando	11.8	88.2	0.808	Sumter	17.4	82.6	0.677
Highlands	17.7	82.3	0.670	Suwannee	16.6	83.4	0.696
Hillsborough	13.4	86.6	0.770	Taylor	16.1	83.9	0.707
Holmes	9.0	91.0	0.874	Union	20.0	80.0	0.616
Indian River	12.6	87.4	0.789	Volusia	11.5	88.5	0.815
Jackson	8.8	91.2	0.878	Wakulla	14.4	85.6	0.747
Jefferson	13.0	87.0	0.780	Walton	10.5	89.5	0.838
Lafayette	26.4	73.6	0.466	Washington	10.9	89.1	0.829
Lake	14.3	85.7	0.749				
		Raw Data	FCHDI				
	Mean	85.961	0.756	Quartile 1	0.697		
	Standard Deviation	6.365	0.149	Quartile 2	0.785		
	Minimum	53.700	0.000	Quartile 3	0.842		
	Maximum	96.400	1.000	Quartile 4	1.000		

Table A-7: Education Attainment - High School and Higher (2000)
This data table includes the observed high school graduate and higher rates for each county and the calculated indicator value used in building the Education Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Education Attainment HS +	Indicator Values	County	Education Attainment HS +	Indicator Values
Alachua	88.1	0.976	Lee	82.3	0.835
Baker	71.9	0.584	Leon	89.1	1.000
Bay	81.0	0.804	Levy	73.9	0.632
Bradford	74.2	0.639	Liberty	65.6	0.431
Brevard	86.3	0.932	Madison	67.5	0.477
Broward	82.0	0.828	Manatee	81.4	0.814
Calhoun	69.1	0.516	Marion	78.2	0.736
Charlotte	82.1	0.831	Martin	85.3	0.908
Citrus	78.3	0.738	Miami-Dade	67.9	0.487
Clay	86.4	0.935	Monroe	84.9	0.898
Collier	81.8	0.823	Nassau	81.0	0.804
Columbia	74.7	0.651	Okaloosa	88.0	0.973
Desoto	63.5	0.380	Okeechobee	65.1	0.419
Dixie	65.9	0.438	Orange	81.8	0.823
Duval	82.7	0.845	Osceola	79.1	0.758
Escambia	82.1	0.831	Palm Beach	83.6	0.867
Flagler	85.9	0.923	Pasco	77.6	0.722
Franklin	68.3	0.496	Pinellas	84.0	0.877
Gadsden	70.7	0.554	Polk	47.8	0.000
Gilchrist	72.4	0.596	Putnam	70.4	0.547
Glades	69.8	0.533	Saint Johns	87.2	0.954
Gulf	72.6	0.600	Saint Lucie	77.7	0.724
Hamilton	62.9	0.366	Santa Rosa	85.4	0.910
Hardee	58.0	0.247	Sarasota	87.1	0.952
Hendry	54.2	0.155	Seminole	88.7	0.990
Hernando	78.5	0.743	Sumter	77.3	0.714
Highlands	74.5	0.646	Suwannee	73.2	0.615
Hillsborough	80.8	0.799	Taylor	70.0	0.538
Holmes	65.2	0.421	Union	72.5	0.598
Indian River	81.6	0.818	Volusia	82.0	0.828
Jackson	69.1	0.516	Wakulla	78.4	0.741
Jefferson	73.2	0.615	Walton	76.0	0.683
Lafayette	68.2	0.494	Washington	71.2	0.567
Lake	79.8	0.775			
		Raw Data	FCHDI		
	Mean	76.075	0.685	Quartile 1	0.542
	Standard Deviation	8.707	0.211	Quartile 2	0.724
	Minimum	47.800	0.000	Quartile 3	0.831
	Maximum	89.100	1.000	Quartile 4	1.000

Table A-8: Education Attainment - Bachelors and Higher (2000)

This data table includes the observed bachelor's degree and higher rates for each county and the calculated indicator value used in building the Education Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Education Attainment BS +	Indicator Values	County	Education Attainment BS +	Indicator Values
Alachua	38.7	0.914	Lee	21.1	0.410
Baker	8.2	0.040	Leon	41.7	1.000
Bay	17.7	0.312	Levy	10.6	0.109
Bradford	8.4	0.046	Liberty	7.4	0.017
Brevard	23.6	0.481	Madison	10.2	0.097
Broward	24.5	0.507	Manatee	20.8	0.401
Calhoun	7.7	0.026	Marion	13.7	0.198
Charlotte	17.6	0.309	Martin	26.3	0.559
Citrus	13.2	0.183	Miami-Dade	21.7	0.427
Clay	20.1	0.381	Monroe	25.5	0.536
Collier	27.9	0.605	Nassau	18.9	0.347
Columbia	10.9	0.117	Okaloosa	24.2	0.499
Desoto	8.4	0.046	Okeechobee	8.9	0.060
Dixie	6.8	0.000	Orange	26.1	0.553
Duval	21.9	0.433	Osceola	15.7	0.255
Escambia	21.0	0.407	Palm Beach	27.7	0.599
Flagler	21.2	0.413	Pasco	13.1	0.181
Franklin	12.4	0.160	Pinellas	22.9	0.461
Gadsden	12.9	0.175	Polk	14.9	0.232
Gilchrist	9.4	0.074	Putnam	9.4	0.074
Glades	9.8	0.086	Saint Johns	33.1	0.754
Gulf	10.1	0.095	Saint Lucie	15.1	0.238
Hamilton	7.3	0.014	Santa Rosa	22.9	0.461
Hardee	8.4	0.046	Sarasota	27.4	0.590
Hendry	8.2	0.040	Seminole	31.0	0.693
Hernando	12.7	0.169	Sumter	12.2	0.155
Highlands	13.6	0.195	Suwannee	10.5	0.106
Hillsborough	25.1	0.524	Taylor	8.9	0.060
Holmes	8.8	0.057	Union	7.5	0.020
Indian River	23.1	0.467	Volusia	17.6	0.309
Jackson	12.8	0.172	Wakulla	15.7	0.255
Jefferson	16.9	0.289	Walton	16.2	0.269
Lafayette	7.2	0.011	Washington	9.2	0.069
Lake	16.6	0.281			
		Raw Data	FCHDI		
	Mean	16.734	0.285	Quartile 1	0.080
	Standard Deviation	8.077	0.231	Quartile 2	0.238
	Minimum	6.800	0.000	Quartile 3	0.447
	Maximum	41.700	1.000	Quartile 4	1.000

Table A-9: Florida Poverty and Indicator Values (2000)
This data table includes the observed and adjusted poverty rates for each county and the calculated indicator value used in building the Economic Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Poverty Level	Adjusted Level	Indicator Values	County	Poverty Level	Adjusted Level	Indicator Values
Alachua	22.8	77.2	0.167	Lee	9.7	90.3	0.849
Baker	14.7	85.3	0.589	Leon	18.2	81.8	0.406
Bay	13.0	87.0	0.677	Levy	18.6	81.4	0.385
Bradford	14.6	85.4	0.594	Liberty	19.9	80.1	0.318
Brevard	9.5	90.5	0.859	Madison	23.1	76.9	0.151
Broward	11.5	88.5	0.755	Manatee	10.1	89.9	0.828
Calhoun	20.0	80.0	0.313	Marion	13.1	86.9	0.672
Charlotte	8.2	91.8	0.927	Martin	8.8	91.2	0.896
Citrus	11.7	88.3	0.745	Miami-Dade	18.0	82.0	0.417
Clay	6.8	93.2	1.000	Monroe	10.2	89.8	0.823
Collier	10.3	89.7	0.818	Nassau	9.1	90.9	0.880
Columbia	15.0	85.0	0.573	Okaloosa	8.8	91.2	0.896
Desoto	23.6	76.4	0.125	Okeechobee	16.0	84.0	0.521
Dixie	19.1	80.9	0.359	Orange	12.1	87.9	0.724
Duval	11.9	88.1	0.734	Osceola	11.5	88.5	0.755
Escambia	15.4	84.6	0.552	Palm Beach	9.9	90.1	0.839
Flagler	8.7	91.3	0.901	Pasco	10.7	89.3	0.797
Franklin	17.7	82.3	0.432	Pinellas	10.0	90.0	0.833
Gadsden	19.9	80.1	0.318	Polk	12.9	87.1	0.682
Gilchrist	14.1	85.9	0.620	Putnam	20.9	79.1	0.266
Glades	15.2	84.8	0.563	Saint Johns	8.0	92.0	0.938
Gulf	16.7	83.3	0.484	Saint Lucie	13.4	86.6	0.656
Hamilton	26.0	74.0	0.000	Santa Rosa	9.8	90.2	0.844
Hardee	24.6	75.4	0.073	Sarasota	7.8	92.2	0.948
Hendry	24.1	75.9	0.099	Seminole	7.4	92.6	0.969
Hernando	10.3	89.7	0.818	Sumter	13.7	86.3	0.641
Highlands	15.2	84.8	0.563	Suwannee	18.5	81.5	0.391
Hillsborough	12.5	87.5	0.703	Taylor	18.0	82.0	0.417
Holmes	19.1	80.9	0.359	Union	14.0	86.0	0.625
Indian River	9.3	90.7	0.870	Volusia	11.6	88.4	0.750
Jackson	17.2	82.8	0.458	Wakulla	11.3	88.7	0.766
Jefferson	17.1	82.9	0.464	Walton	14.4	85.6	0.604
Lafayette	17.5	82.5	0.443	Washington	19.2	80.8	0.354
Lake	9.6	90.4	0.854				
		Raw	FCHDI				
Mean		85.648	0.607	Quartile 1	0.417		
Standard Deviation		4.834	0.252	Quartile 2	0.641		
Minimum		74.000	0.000	Quartile 3	0.826		
Maximum		93.200	1.000	Quartile 4	1.000		

Table A-10: Florida Per Capita Income and Indicator Values (2000)
This data table includes the observed per capita income rates for each county and the calculated indicator value used in building the Economic Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	Census PCI	Indicator Values	County	Census PCI	Indicator Values
Alachua	$18,465	0.383	Lee	$24,542	0.678
Baker	$15,164	0.223	Leon	$21,024	0.507
Bay	$18,700	0.394	Levy	$14,746	0.203
Bradford	$14,226	0.178	Liberty	$17,225	0.323
Brevard	$21,484	0.529	Madison	$12,511	0.094
Broward	$23,170	0.611	Manatee	$22,388	0.573
Calhoun	$12,379	0.088	Marion	$17,848	0.353
Charlotte	$21,806	0.545	Martin	$29,584	0.922
Citrus	$18,585	0.389	Miami-Dade	$18,497	0.385
Clay	$20,868	0.499	Monroe	$26,102	0.753
Collier	$31,195	1.000	Nassau	$22,836	0.595
Columbia	$14,598	0.196	Okaloosa	$20,918	0.502
Desoto	$14,000	0.167	Okeechobee	$14,553	0.193
Dixie	$13,559	0.145	Orange	$20,916	0.502
Duval	$20,753	0.494	Osceola	$17,022	0.313
Escambia	$18,641	0.392	Palm Beach	$28,801	0.884
Flagler	$21,879	0.548	Pasco	$18,439	0.382
Franklin	$16,140	0.270	Pinellas	$23,497	0.627
Gadsden	$14,499	0.191	Polk	$18,302	0.375
Gilchrist	$13,985	0.166	Putnam	$15,603	0.244
Glades	$15,338	0.231	Saint Johns	$28,674	0.878
Gulf	$14,449	0.188	Saint Lucie	$18,790	0.399
Hamilton	$10,562	0.000	Santa Rosa	$20,089	0.462
Hardee	$12,445	0.091	Sarasota	$28,326	0.861
Hendry	$13,663	0.150	Seminole	$24,591	0.680
Hernando	$18,321	0.376	Sumter	$16,830	0.304
Highlands	$17,222	0.323	Suwannee	$14,678	0.199
Hillsborough	$21,812	0.545	Taylor	$15,281	0.229
Holmes	$14,135	0.173	Union	$12,333	0.086
Indian River	$27,227	0.808	Volusia	$19,664	0.441
Jackson	$13,905	0.162	Wakulla	$17,678	0.345
Jefferson	$17,006	0.312	Walton	$18,198	0.370
Lafayette	$13,087	0.122	Washington	$14,980	0.214
Lake	$20,199	0.467			
		Raw Data	FCHDI		
	Mean	$ 18,641	0.392	Quartile 1	0.198
	Standard Deviation	$ 4,773	0.392	Quartile 2	0.375
	Minimum	$ 10,562	0.000	Quartile 3	0.518
	Maximum	$ 31,195	1.000	Quartile 4	1.000

Table A-11: Florida Price Level Index and Indicator Values (2000)

This data table includes the observed and adjusted price level index values for each county and the calculated indicator value used in building the Economic Interim Index. Also included are the descriptive statistics and the quartile break-down for the data set.

County	FPLI 2000	Adjusted FPLI	Indicator Values	County	FPLI 2000	Adjusted FPLI	Indicator Values
Alachua	94.04	5.96	0.812	Lee	98.34	1.66	0.571
Baker	92.54	7.46	0.896	Leon	96.49	3.51	0.675
Bay	93.52	6.48	0.841	Levy	92.03	7.97	0.924
Bradford	93.70	6.30	0.831	Liberty	93.20	6.80	0.859
Brevard	96.92	3.08	0.650	Madison	92.25	7.75	0.912
Broward	106.45	-6.45	0.117	Manatee	96.93	3.07	0.650
Calhoun	91.52	8.48	0.953	Marion	93.25	6.75	0.856
Charlotte	95.94	4.06	0.705	Martin	98.02	1.98	0.589
Citrus	92.75	7.25	0.884	Miami-Dade	106.42	-6.42	0.118
Clay	94.61	5.39	0.780	Monroe	107.60	-7.60	0.052
Collier	101.77	-1.77	0.379	Nassau	92.97	7.03	0.872
Columbia	91.58	8.42	0.950	Okaloosa	94.21	5.79	0.802
Desoto	94.04	5.96	0.812	Okeechobee	94.33	5.67	0.796
Dixie	92.71	7.29	0.886	Orange	98.69	1.31	0.551
Duval	97.04	2.96	0.644	Osceola	95.81	4.19	0.713
Escambia	93.22	6.78	0.858	Palm Beach	108.53	-8.53	0.000
Flagler	96.38	3.62	0.681	Pasco	96.38	3.62	0.681
Franklin	95.02	4.98	0.757	Pinellas	101.41	-1.41	0.399
Gadsden	93.54	6.46	0.840	Polk	95.24	4.76	0.745
Gilchrist	91.22	8.78	0.970	Putnam	93.05	6.95	0.867
Glades	96.03	3.97	0.700	Saint Johns	97.11	2.89	0.640
Gulf	92.15	7.85	0.918	Saint Lucie	96.30	3.70	0.685
Hamilton	91.50	8.50	0.954	Santa Rosa	92.79	7.21	0.882
Hardee	93.78	6.22	0.826	Sarasota	100.20	-0.20	0.467
Hendry	96.79	3.21	0.658	Seminole	97.39	2.61	0.624
Hernando	92.93	7.07	0.874	Sumter	92.58	7.42	0.894
Highlands	94.08	5.92	0.810	Suwannee	90.68	9.32	1.000
Hillsborough	100.32	-0.32	0.460	Taylor	93.52	6.48	0.841
Holmes	93.23	6.77	0.857	Union	90.78	9.22	0.994
Indian River	97.18	2.82	0.636	Volusia	94.50	5.50	0.786
Jackson	90.95	9.05	0.985	Wakulla	94.53	5.47	0.784
Jefferson	95.19	4.81	0.747	Walton	92.82	7.18	0.880
Lafayette	91.22	8.78	0.970	Washington	91.44	8.56	0.957
Lake	95.13	4.87	0.751				
		Raw	FCHDI				
Mean		4.645	0.738	Quartile 1	0.654		
Standard Deviation		3.963	0.222	Quartile 2	0.802		
Minimum		-8.530	0.000	Quartile 3	0.881		
Maximum		9.320	1.000	Quartile 4	1.000		

Table A-12: Mortality Interim Index - Alachua County to Lake County

This data table sums and then averages the calculated mortality rate, child mortality rate, and the combined heart disease and cancer rate to create the Mortality Interim Index value for each county. These interim index values will be used to create the FCHDI.

County	Mortality Rate	Child Mortality	Heart Disease / Cancer		Sum	Mortality Interim Index (Sum / 3)
Alachua	0.941	0.557	0.701		2.200	0.733
Baker	0.824	0.703	0.579		2.106	0.702
Bay	0.716	0.776	0.349		1.841	0.614
Bradford	0.637	0.572	0.657		1.867	0.622
Brevard	0.569	0.794	0.299		1.661	0.554
Broward	0.608	0.775	0.306		1.688	0.563
Calhoun	0.775	0.799	0.560		2.134	0.711
Charlotte	0.118	0.735	0.213		1.066	0.355
Citrus	0.000	0.689	0.311		1.000	0.333
Clay	0.892	0.682	0.456		2.030	0.677
Collier	0.627	0.793	0.354		1.774	0.591
Columbia	0.559	0.532	0.507		1.598	0.533
Desoto	0.559	0.753	0.331		1.642	0.547
Dixie	0.529	0.398	0.522		1.449	0.483
Duval	0.784	0.637	0.520		1.942	0.647
Escambia	0.735	0.534	0.560		1.830	0.610
Flagler	0.431	0.775	0.200		1.406	0.469
Franklin	0.598	0.696	0.680		1.974	0.658
Gadsden	0.765	0.283	0.475		1.523	0.508
Gilchrist	0.500	0.440	0.615		1.554	0.518
Glades	0.608	0.000	0.135		0.742	0.247
Gulf	0.647	0.083	0.391		1.121	0.374
Hamilton	0.804	1.000	0.414		2.218	0.739
Hardee	0.706	0.850	0.695		2.251	0.750
Hendry	0.794	0.727	0.437		1.958	0.653
Hernando	0.176	0.738	0.236		1.150	0.383
Highlands	0.196	0.523	0.314		1.033	0.344
Hillsborough	0.765	0.673	0.421		1.858	0.619
Holmes	0.510	0.699	0.448		1.657	0.552
Indian River	0.353	0.677	0.265		1.295	0.432
Jackson	0.608	0.758	0.407		1.773	0.591
Jefferson	0.529	1.000	0.639		2.168	0.723
Lafayette	0.745	1.000	0.757		2.502	0.834
Lake	0.314	0.859	0.324		1.498	0.499

(Continued)

Table A-12: Mortality Interim Index (Continued) - Lee County to Washington County

County	Mortality Rate	Child Mortality	Heart Disease / Cancer	Sum	Mortality Interim Index (Sum / 3)
Lee	0.480	0.691	0.262	1.433	0.478
Leon	1.000	0.629	0.610	2.239	0.746
Levy	0.392	0.687	0.518	1.597	0.532
Liberty	0.863	0.598	0.361	1.821	0.607
Madison	0.637	0.568	0.411	1.617	0.539
Manatee	0.353	0.710	0.289	1.352	0.451
Marion	0.343	0.748	0.311	1.402	0.467
Martin	0.402	0.614	0.232	1.247	0.416
Miami-Dade	0.784	0.757	0.353	1.894	0.631
Monroe	0.892	0.688	0.474	2.054	0.685
Nassau	0.755	0.653	0.436	1.844	0.615
Okaloosa	0.922	0.715	0.274	1.910	0.637
Okeechobee	0.608	0.383	0.218	1.209	0.403
Orange	0.922	0.723	0.454	2.099	0.700
Osceola	0.882	0.815	0.476	2.174	0.725
Palm Beach	0.451	0.715	0.260	1.427	0.476
Pasco	0.098	0.778	0.396	1.273	0.424
Pinellas	0.275	0.758	0.490	1.522	0.507
Polk	0.559	0.698	0.288	1.545	0.515
Putnam	0.422	0.571	0.401	1.394	0.465
Saint Johns	0.696	0.836	0.500	2.032	0.677
Saint Lucie	0.441	0.684	0.245	1.370	0.457
Santa Rosa	0.873	0.819	0.468	2.160	0.720
Sarasota	0.186	0.674	0.358	1.218	0.406
Seminole	0.922	0.839	0.333	2.094	0.698
Sumter	0.461	0.634	0.190	1.284	0.428
Suwannee	0.441	0.264	0.683	1.388	0.463
Taylor	0.461	0.864	0.417	1.742	0.581
Union	0.588	0.790	0.544	1.923	0.641
Volusia	0.353	0.679	0.374	1.406	0.469
Wakulla	0.775	0.886	0.591	2.252	0.751
Walton	0.608	0.928	0.303	1.839	0.613
Washington	0.520	0.512	0.455	1.487	0.496

Table A-13: Education Interim Index - Alachua County to Lake County

This data table sums and then averages the calculated Non-high school graduate rate, high school graduate and higher rate, and the bachelor's degree and higher rate to create the Education Interim Index value for each county. These interim index values will be used to create the FCHDI.

County	Non-HS Graduate	Education Attainment HS +	Education Attainment BS +	Sum	Education Interim Index (Sum / 3)
Alachua	0.993	0.976	0.914	2.883	0.961
Baker	0.522	0.584	0.040	1.146	0.382
Bay	0.841	0.804	0.312	1.957	0.652
Bradford	0.705	0.639	0.046	1.390	0.463
Brevard	0.827	0.932	0.481	2.240	0.747
Broward	0.859	0.828	0.507	2.195	0.732
Calhoun	0.953	0.516	0.026	1.495	0.498
Charlotte	0.857	0.831	0.309	1.997	0.666
Citrus	0.796	0.738	0.183	1.718	0.573
Clay	0.869	0.935	0.381	2.185	0.728
Collier	0.585	0.823	0.605	2.013	0.671
Columbia	0.728	0.651	0.117	1.497	0.499
Desoto	0.000	0.380	0.046	0.426	0.142
Dixie	0.738	0.438	0.000	1.176	0.392
Duval	0.792	0.845	0.433	2.069	0.690
Escambia	0.878	0.831	0.407	2.116	0.705
Flagler	0.864	0.923	0.413	2.199	0.733
Franklin	0.813	0.496	0.160	1.469	0.490
Gadsden	0.780	0.554	0.175	1.509	0.503
Gilchrist	0.761	0.596	0.074	1.431	0.477
Glades	0.789	0.533	0.086	1.408	0.469
Gulf	0.857	0.600	0.095	1.552	0.517
Hamilton	0.630	0.366	0.014	1.010	0.337
Hardee	0.480	0.247	0.046	0.773	0.258
Hendry	0.487	0.155	0.040	0.682	0.227
Hernando	0.808	0.743	0.169	1.720	0.573
Highlands	0.670	0.646	0.195	1.511	0.504
Hillsborough	0.770	0.799	0.524	2.094	0.698
Holmes	0.874	0.421	0.057	1.352	0.451
Indian River	0.789	0.818	0.467	2.075	0.692
Jackson	0.878	0.516	0.172	1.566	0.522
Jefferson	0.780	0.615	0.289	1.684	0.561
Lafayette	0.466	0.494	0.011	0.971	0.324
Lake	0.749	0.775	0.281	1.805	0.602

(Continued)

Table A-13: Education Interim Index (Continued) - Lee County to Washington County

County	Non-HS Graduate	Education Attainment HS +	Education Attainment BS +	Sum	Education Interim Index (Sum / 3)
Lee	0.724	0.835	0.410	1.969	0.656
Leon	1.000	1.000	1.000	3.000	1.000
Levy	0.698	0.632	0.109	1.439	0.480
Liberty	0.674	0.431	0.017	1.123	0.374
Madison	0.749	0.477	0.097	1.324	0.441
Manatee	0.689	0.814	0.401	1.903	0.634
Marion	0.735	0.736	0.198	1.669	0.556
Martin	0.689	0.908	0.559	2.155	0.718
Miami-Dade	0.843	0.487	0.427	1.757	0.586
Monroe	0.836	0.898	0.536	2.270	0.757
Nassau	0.876	0.804	0.347	2.026	0.675
Okaloosa	0.920	0.973	0.499	2.392	0.797
Okeechobee	0.525	0.419	0.060	1.004	0.335
Orange	0.785	0.823	0.553	2.161	0.720
Osceola	0.789	0.758	0.255	1.802	0.601
Palm Beach	0.761	0.867	0.599	2.227	0.742
Pasco	0.792	0.722	0.181	1.694	0.565
Pinellas	0.787	0.877	0.461	2.125	0.708
Polk	0.672	0.000	0.232	0.904	0.301
Putnam	0.717	0.547	0.074	1.338	0.446
Saint Johns	0.944	0.954	0.754	2.651	0.884
Saint Lucie	0.696	0.724	0.238	1.657	0.552
Santa Rosa	0.911	0.910	0.461	2.283	0.761
Sarasota	0.806	0.952	0.590	2.347	0.782
Seminole	0.890	0.990	0.693	2.574	0.858
Sumter	0.677	0.714	0.155	1.546	0.515
Suwannee	0.696	0.615	0.106	1.417	0.472
Taylor	0.707	0.538	0.060	1.305	0.435
Union	0.616	0.598	0.020	1.234	0.411
Volusia	0.815	0.828	0.309	1.953	0.651
Wakulla	0.747	0.741	0.255	1.743	0.581
Walton	0.838	0.683	0.269	1.791	0.597
Washington	0.829	0.567	0.069	1.464	0.488

Table A-14: Economic Interim Index – Alachua County to Lake County
This data table sums and then averages the calculated poverty rate, per capita income rate, and the Florida Price Level Index values to create the Economic Interim Index value for each county. These interim index values will be used to create the FCHDI.

County	Poverty Level	Census PCI	FPLI - 2000	Sum	Economic Interim Index (Sum / 3)
Alachua	0.167	0.383	0.812	1.361	0.454
Baker	0.589	0.223	0.896	1.707	0.569
Bay	0.677	0.394	0.841	1.912	0.637
Bradford	0.594	0.178	0.831	1.602	0.534
Brevard	0.859	0.529	0.650	2.039	0.680
Broward	0.755	0.611	0.117	1.483	0.494
Calhoun	0.313	0.088	0.953	1.354	0.451
Charlotte	0.927	0.545	0.705	2.177	0.726
Citrus	0.745	0.389	0.884	2.018	0.673
Clay	1.000	0.499	0.780	2.279	0.760
Collier	0.818	1.000	0.379	2.196	0.732
Columbia	0.573	0.196	0.950	1.718	0.573
Desoto	0.125	0.167	0.812	1.103	0.368
Dixie	0.359	0.145	0.886	1.391	0.464
Duval	0.734	0.494	0.644	1.872	0.624
Escambia	0.552	0.392	0.858	1.801	0.600
Flagler	0.901	0.548	0.681	2.130	0.710
Franklin	0.432	0.270	0.757	1.459	0.486
Gadsden	0.318	0.191	0.840	1.348	0.449
Gilchrist	0.620	0.166	0.970	1.755	0.585
Glades	0.563	0.231	0.700	1.494	0.498
Gulf	0.484	0.188	0.918	1.590	0.530
Hamilton	0.000	0.000	0.954	0.954	0.318
Hardee	0.073	0.091	0.826	0.991	0.330
Hendry	0.099	0.150	0.658	0.907	0.302
Hernando	0.818	0.376	0.874	2.068	0.689
Highlands	0.563	0.323	0.810	1.695	0.565
Hillsborough	0.703	0.545	0.460	1.708	0.569
Holmes	0.359	0.173	0.857	1.390	0.463
Indian River	0.870	0.808	0.636	2.313	0.771
Jackson	0.458	0.162	0.985	1.605	0.535
Jefferson	0.464	0.312	0.747	1.523	0.508
Lafayette	0.443	0.122	0.970	1.535	0.512
Lake	0.854	0.467	0.751	2.072	0.691

(Continued)

Table A-14: Economic Interim Index (Continued) – Lee County to Washington County

County	Poverty Level	Census PCI	FPLI - 2000	Sum	Economic Interim Index (Sum / 3)
Lee	0.849	0.678	0.571	2.097	0.699
Leon	0.406	0.507	0.675	1.588	0.529
Levy	0.385	0.203	0.924	1.513	0.504
Liberty	0.318	0.323	0.859	1.499	0.500
Madison	0.151	0.094	0.912	1.158	0.386
Manatee	0.828	0.573	0.650	2.051	0.684
Marion	0.672	0.353	0.856	1.881	0.627
Martin	0.896	0.922	0.589	2.407	0.802
Miami-Dade	0.417	0.385	0.118	0.919	0.306
Monroe	0.823	0.753	0.052	1.628	0.543
Nassau	0.880	0.595	0.872	2.347	0.782
Okaloosa	0.896	0.502	0.802	2.200	0.733
Okeechobee	0.521	0.193	0.796	1.510	0.503
Orange	0.724	0.502	0.551	1.777	0.592
Osceola	0.755	0.313	0.713	1.781	0.594
Palm Beach	0.839	0.884	0.000	1.723	0.574
Pasco	0.797	0.382	0.681	1.859	0.620
Pinellas	0.833	0.627	0.399	1.859	0.620
Polk	0.682	0.375	0.745	1.802	0.601
Putnam	0.266	0.244	0.867	1.377	0.459
Saint Johns	0.938	0.878	0.640	2.455	0.818
Saint Lucie	0.656	0.399	0.685	1.740	0.580
Santa Rosa	0.844	0.462	0.882	2.187	0.729
Sarasota	0.948	0.861	0.467	2.276	0.759
Seminole	0.969	0.680	0.624	2.273	0.758
Sumter	0.641	0.304	0.894	1.838	0.613
Suwannee	0.391	0.199	1.000	1.590	0.530
Taylor	0.417	0.229	0.841	1.486	0.495
Union	0.625	0.086	0.994	1.705	0.568
Volusia	0.750	0.441	0.786	1.977	0.659
Wakulla	0.766	0.345	0.784	1.895	0.632
Walton	0.604	0.370	0.880	1.854	0.618
Washington	0.354	0.214	0.957	1.526	0.509

Table A-15: Florida County Human Development Index - Alachua County to Lake County
This data table sums and then averages the calculated Mortality Interim Index, Education Interim Index, and Economic Interim Index values to create the final FCHDI.

County	Mortality Interim Index	Education Interim Index	Economic Interim Index	Sum	Florida County Human Development Index (Sum / 3)
Alachua	0.733	0.961	0.454	2.148	**0.716**
Baker	0.702	0.382	0.569	1.653	**0.551**
Bay	0.614	0.652	0.637	1.904	**0.635**
Bradford	0.622	0.463	0.534	1.620	**0.540**
Brevard	0.554	0.747	0.680	1.980	**0.660**
Broward	0.563	0.732	0.494	1.789	**0.596**
Calhoun	0.711	0.498	0.451	1.661	**0.554**
Charlotte	0.355	0.666	0.726	1.747	**0.582**
Citrus	0.333	0.573	0.673	1.578	**0.526**
Clay	0.677	0.728	0.760	2.165	**0.722**
Collier	0.591	0.671	0.732	1.995	**0.665**
Columbia	0.533	0.499	0.573	1.604	**0.535**
Desoto	0.547	0.142	0.368	1.057	**0.352**
Dixie	0.483	0.392	0.464	1.339	**0.446**
Duval	0.647	0.690	0.624	1.961	**0.654**
Escambia	0.610	0.705	0.600	1.916	**0.639**
Flagler	0.469	0.733	0.710	1.912	**0.637**
Franklin	0.658	0.490	0.486	1.634	**0.545**
Gadsden	0.508	0.503	0.449	1.460	**0.487**
Gilchrist	0.518	0.477	0.585	1.580	**0.527**
Glades	0.247	0.469	0.498	1.215	**0.405**
Gulf	0.374	0.517	0.530	1.421	**0.474**
Hamilton	0.739	0.337	0.318	1.394	**0.465**
Hardee	0.750	0.258	0.330	1.338	**0.446**
Hendry	0.653	0.227	0.302	1.182	**0.394**
Hernando	0.383	0.573	0.689	1.646	**0.549**
Highlands	0.344	0.504	0.565	1.413	**0.471**
Hillsborough	0.619	0.698	0.569	1.887	**0.629**
Holmes	0.552	0.451	0.463	1.466	**0.489**
Indian River	0.432	0.692	0.771	1.894	**0.631**
Jackson	0.591	0.522	0.535	1.648	**0.549**
Jefferson	0.723	0.561	0.508	1.792	**0.597**
Lafayette	0.834	0.324	0.512	1.670	**0.557**
Lake	0.499	0.602	0.691	1.791	**0.597**

(Continued)

Table A-15: Florida County Human Development Index (Continued)
Lee County to Washington County

County	Mortality Interim Index	Education Interim Index	Economic Interim Index	Sum	Florida County Human Development Index (Sum / 3)
Lee	0.478	0.656	0.699	1.833	**0.611**
Leon	0.746	1.000	0.529	2.276	**0.759**
Levy	0.532	0.480	0.504	1.516	**0.505**
Liberty	0.607	0.374	0.500	1.481	**0.494**
Madison	0.539	0.441	0.386	1.366	**0.455**
Manatee	0.451	0.634	0.684	1.769	**0.590**
Marion	0.467	0.556	0.627	1.651	**0.550**
Martin	0.416	0.718	0.802	1.936	**0.645**
Miami-Dade	0.631	0.586	0.306	1.523	**0.508**
Monroe	0.685	0.757	0.543	1.984	**0.661**
Nassau	0.615	0.675	0.782	2.072	**0.691**
Okaloosa	0.637	0.797	0.733	2.168	**0.723**
Okeechobee	0.403	0.335	0.503	1.241	**0.414**
Orange	0.700	0.720	0.592	2.012	**0.671**
Osceola	0.725	0.601	0.594	1.919	**0.640**
Palm Beach	0.476	0.742	0.574	1.792	**0.597**
Pasco	0.424	0.565	0.620	1.609	**0.536**
Pinellas	0.507	0.708	0.620	1.835	**0.612**
Polk	0.515	0.301	0.601	1.417	**0.472**
Putnam	0.465	0.446	0.459	1.370	**0.457**
Saint Johns	0.677	0.884	0.818	2.380	**0.793**
Saint Lucie	0.457	0.552	0.580	1.589	**0.530**
Santa Rosa	0.720	0.761	0.729	2.210	**0.737**
Sarasota	0.406	0.782	0.759	1.947	**0.649**
Seminole	0.698	0.858	0.758	2.314	**0.771**
Sumter	0.428	0.515	0.613	1.556	**0.519**
Suwannee	0.463	0.472	0.530	1.465	**0.488**
Taylor	0.581	0.435	0.495	1.511	**0.504**
Union	0.641	0.411	0.568	1.621	**0.540**
Volusia	0.469	0.651	0.659	1.778	**0.593**
Wakulla	0.751	0.581	0.632	1.963	**0.654**
Walton	0.613	0.597	0.618	1.828	**0.609**
Washington	0.496	0.488	0.509	1.492	**0.497**

Table A-16: Florida Counties Ranked by FCHDI

This data table lists the Florida counties by rank according to their FCHDI values, the FCHDI values, and the rank value as a percentage of the data set.

	County	FCHDI Value	*Percent*		County	FCHDI Value	*Percent*
1	Saint Johns	0.793	100.00%	**41**	Bradford	0.540	39.30%
2	Seminole	0.771	98.40%	**42**	Pasco	0.536	37.80%
3	Leon	0.759	96.90%	**43**	Columbia	0.535	36.30%
4	Santa Rosa	0.737	95.40%	**44**	Saint Lucie	0.530	34.80%
5	Okaloosa	0.723	93.90%	**45**	Gilchrist	0.527	33.30%
6	Clay	0.722	92.40%	**46**	Citrus	0.526	31.80%
7	Alachua	0.716	90.90%	**47**	Sumter	0.519	30.30%
8	Nassau	0.691	89.30%	**48**	Miami-Dade	0.508	28.70%
9	Orange	0.671	87.80%	**49**	Levy	0.505	27.20%
10	Collier	0.665	86.30%	**50**	Taylor	0.504	25.70%
11	Monroe	0.661	84.80%	**51**	Washington	0.497	24.20%
12	Brevard	0.660	83.30%	**52**	Liberty	0.494	22.70%
13	Wakulla	0.654	81.80%	**53**	Holmes	0.489	21.20%
14	Duval	0.654	80.30%	**54**	Suwannee	0.488	19.60%
15	Sarasota	0.649	78.70%	**55**	Gadsden	0.487	18.10%
16	Martin	0.645	77.20%	**56**	Gulf	0.474	16.60%
17	Osceola	0.640	75.70%	**57**	Polk	0.472	15.10%
18	Escambia	0.639	74.20%	**58**	Highlands	0.471	13.60%
19	Flagler	0.637	72.70%	**59**	Hamilton	0.465	12.10%
20	Bay	0.635	71.20%	**60**	Putnam	0.457	10.60%
21	Indian River	0.631	69.60%	**61**	Madison	0.455	9.00%
22	Hillsborough	0.629	68.10%	**62**	Dixie	0.446	7.50%
23	Pinellas	0.612	66.60%	**63**	Hardee	0.446	6.00%
24	Lee	0.611	65.10%	**64**	Okeechobee	0.414	4.50%
25	Walton	0.609	63.60%	**65**	Glades	0.405	3.00%
26	Jefferson	0.597	62.10%	**66**	Hendry	0.394	1.50%
27	Palm Beach	0.597	60.60%	**67**	Desoto	0.352	.00%
28	Lake	0.597	59.00%				
29	Broward	0.596	57.50%				
30	Volusia	0.593	56.00%				
31	Manatee	0.590	54.50%				
32	Charlotte	0.582	53.00%				
33	Lafayette	0.557	51.50%				
34	Calhoun	0.554	50.00%				
35	Baker	0.551	48.40%				
36	Marion	0.550	46.90%				
37	Jackson	0.549	45.40%				
38	Hernando	0.549	43.90%				
39	Franklin	0.545	42.40%				
40	Union	0.540	40.90%				

Table A-17: Test Variable - Natural Amenities Scale and Indicator Values

County	Natural Amenity Scale	Indicator Values	County	Natural Amenity Scale	Indicator Values
Alachua	2.44	0.366	Lee	5.23	0.856
Baker	0.65	0.051	Leon	1.75	0.244
Bay	2.15	0.315	Levy	2.47	0.371
Bradford	1.34	0.172	Liberty	0.36	0.000
Brevard	3.93	0.627	Madison	1.30	0.165
Broward	4.98	0.812	Manatee	4.66	0.756
Calhoun	1.12	0.134	Marion	2.59	0.392
Charlotte	5.10	0.833	Martin	5.34	0.875
Citrus	3.43	0.540	Miami-Dade	5.48	0.900
Clay	2.01	0.290	Monroe	6.05	1.000
Collier	5.00	0.815	Nassau	2.04	0.295
Columbia	0.59	0.040	Okaloosa	2.01	0.290
Desoto	2.74	0.418	Okeechobee	4.70	0.763
Dixie	2.42	0.362	Orange	2.96	0.457
Duval	2.31	0.343	Osceola	4.50	0.728
Escambia	2.34	0.348	Palm Beach	5.14	0.840
Flagler	2.70	0.411	Pasco	3.37	0.529
Franklin	2.66	0.404	Pinellas	5.05	0.824
Gadsden	1.65	0.227	Polk	3.98	0.636
Gilchrist	1.21	0.149	Putnam	2.35	0.350
Glades	5.15	0.842	Saint Johns	2.98	0.460
Gulf	2.25	0.332	Saint Lucie	5.03	0.821
Hamilton	0.58	0.039	Santa Rosa	1.94	0.278
Hardee	2.25	0.332	Sarasota	4.78	0.777
Hendry	4.22	0.678	Seminole	3.14	0.489
Hernando	3.71	0.589	Sumter	2.84	0.436
Highlands	4.14	0.664	Suwannee	0.70	0.060
Hillsborough	4.32	0.696	Taylor	2.32	0.344
Holmes	0.89	0.093	Union	1.60	0.218
Indian River	4.72	0.766	Volusia	3.45	0.543
Jackson	1.76	0.246	Wakulla	1.95	0.279
Jefferson	2.00	0.288	Walton	2.18	0.320
Lafayette	0.84	0.084	Washington	1.95	0.279
Lake	3.40	0.534			
		Raw	Alt. Indicator		
Mean		2.943	0.454	Quartile 1	0.279
Standard Deviation		1.497	0.263	Quartile 2	0.392
Minimum		0.360	0.000	Quartile 3	0.687
Maximum		6.050	1.000	Quartile 4	1.000

Table A-18: FCHDI + Natural Amenities Indicator

County	9 FCHDI Indicators (summed)	Natural Amenity Indicator	Sum / 10	County	9 FCHDI Indicators (summed)	Natural Amenity Indicator	Sum / 10
Alachua	6.444	0.366	**0.681**	Lee	5.499	0.856	**0.636**
Baker	4.959	0.051	**0.501**	Leon	6.827	0.244	**0.707**
Bay	5.711	0.315	**0.603**	Levy	4.549	0.371	**0.492**
Bradford	4.859	0.172	**0.503**	Liberty	4.443	0.000	**0.444**
Brevard	5.940	0.627	**0.657**	Madison	4.098	0.165	**0.426**
Broward	5.366	0.812	**0.618**	Manatee	5.306	0.756	**0.606**
Calhoun	4.982	0.134	**0.512**	Marion	4.952	0.392	**0.534**
Charlotte	5.241	0.833	**0.607**	Martin	5.809	0.875	**0.668**
Citrus	4.735	0.540	**0.527**	Miami-Dade	4.570	0.900	**0.547**
Clay	6.494	0.290	**0.678**	Monroe	5.952	1.000	**0.695**
Collier	5.984	0.815	**0.680**	Nassau	6.217	0.295	**0.651**
Columbia	4.813	0.040	**0.485**	Okaloosa	6.503	0.290	**0.679**
Desoto	3.171	0.418	**0.359**	Okeechobee	3.722	0.763	**0.448**
Dixie	4.016	0.362	**0.438**	Orange	6.037	0.457	**0.649**
Duval	5.883	0.343	**0.623**	Osceola	5.757	0.728	**0.648**
Escambia	5.747	0.348	**0.609**	Palm Beach	5.376	0.840	**0.622**
Flagler	5.736	0.411	**0.615**	Pasco	4.826	0.529	**0.535**
Franklin	4.903	0.404	**0.531**	Pinellas	5.506	0.824	**0.633**
Gadsden	4.381	0.227	**0.461**	Polk	4.251	0.636	**0.489**
Gilchrist	4.741	0.149	**0.489**	Putnam	4.109	0.350	**0.446**
Glades	3.645	0.842	**0.449**	Saint Johns	7.139	0.460	**0.760**
Gulf	4.264	0.332	**0.460**	Saint Lucie	4.767	0.821	**0.559**
Hamilton	4.182	0.039	**0.422**	Santa Rosa	6.630	0.278	**0.691**
Hardee	4.014	0.332	**0.435**	Sarasota	5.841	0.777	**0.662**
Hendry	3.547	0.678	**0.423**	Seminole	6.941	0.489	**0.743**
Hernando	4.938	0.589	**0.553**	Sumter	4.668	0.436	**0.510**
Highlands	4.239	0.664	**0.490**	Suwannee	4.395	0.060	**0.445**
Hillsborough	5.660	0.696	**0.636**	Taylor	4.533	0.344	**0.488**
Holmes	4.399	0.093	**0.449**	Union	4.862	0.218	**0.508**
Indian River	5.683	0.766	**0.645**	Volusia	5.335	0.543	**0.588**
Jackson	4.944	0.246	**0.519**	Wakulla	5.889	0.279	**0.617**
Jefferson	5.376	0.288	**0.566**	Walton	5.484	0.320	**0.580**
Lafayette	5.009	0.084	**0.509**	Washington	4.477	0.279	**0.476**
Lake	5.374	0.534	**0.591**				

Table A-19: Change in Ranking - FCHDI + Natural Amenity Indicator

	FCHDI		FCHDI + Natural Amenity	Change in Rank		FCHDI		FCHDI + Natural Amenity	Change in Rank
7	Alachua	6	Alachua	**1**	24	Lee	18	Lee	**6**
35	Baker	46	Baker	**-11**	3	Leon	3	Leon	**0**
20	Bay	28	Bay	**-8**	49	Levy	47	Levy	**2**
41	Bradford	45	Bradford	**-4**	52	Liberty	61	Liberty	**-9**
12	Brevard	12	Brevard	**0**	61	Madison	64	Madison	**-3**
29	Broward	22	Broward	**7**	31	Manatee	27	Manatee	**4**
34	Calhoun	41	Calhoun	**-7**	36	Marion	37	Marion	**-1**
32	Charlotte	26	Charlotte	**6**	16	Martin	10	Martin	**6**
46	Citrus	39	Citrus	**7**	48	Miami-Dade	35	Miami-Dade	**13**
6	Clay	9	Clay	**-3**	11	Monroe	4	Monroe	**7**
10	Collier	7	Collier	**3**	8	Nassau	13	Nassau	**-5**
43	Columbia	52	Columbia	**-9**	5	Okaloosa	8	Okaloosa	**-3**
67	Desoto	67	Desoto	**0**	64	Okeechobee	58	Okeechobee	**6**
62	Dixie	62	Dixie	**0**	9	Orange	14	Orange	**-5**
14	Duval	20	Duval	**-6**	17	Osceola	15	Osceola	**2**
18	Escambia	25	Escambia	**-7**	27	Palm Beach	21	Palm Beach	**6**
19	Flagler	24	Flagler	**-5**	42	Pasco	36	Pasco	**6**
39	Franklin	38	Franklin	**1**	23	Pinellas	19	Pinellas	**4**
55	Gadsden	54	Gadsden	**1**	57	Polk	50	Polk	**7**
45	Gilchrist	49	Gilchrist	**-4**	60	Putnam	59	Putnam	**1**
65	Glades	57	Glades	**8**	1	Saint Johns	1	Saint Johns	**0**
56	Gulf	55	Gulf	**1**	44	Saint Lucie	33	Saint Lucie	**11**
59	Hamilton	66	Hamilton	**-7**	4	Santa Rosa	5	Santa Rosa	**-1**
63	Hardee	63	Hardee	**0**	15	Sarasota	11	Sarasota	**4**
66	Hendry	65	Hendry	**1**	2	Seminole	2	Seminole	**0**
38	Hernando	34	Hernando	**4**	47	Sumter	42	Sumter	**5**
58	Highlands	48	Highlands	**10**	54	Suwannee	60	Suwannee	**-6**
22	Hillsborough	17	Hillsborough	**5**	50	Taylor	51	Taylor	**-1**
53	Holmes	56	Holmes	**-3**	40	Union	44	Union	**-4**
21	Indian River	16	Indian River	**5**	30	Volusia	30	Volusia	**0**
37	Jackson	40	Jackson	**-3**	13	Wakulla	23	Wakulla	**-10**
26	Jefferson	32	Jefferson	**-6**	25	Walton	31	Walton	**-6**
33	Lafayette	43	Lafayette	**-10**	51	Washington	53	Washington	**-2**
28	Lake	29	Lake	**-1**					

Standard Deviation	5.562319115
Range	24
Minimum	-11
Maximum	13

1 STDV (+/-) 5.562
2 STDV (+/-) 11.125
3 STDV (+/-) 16.687

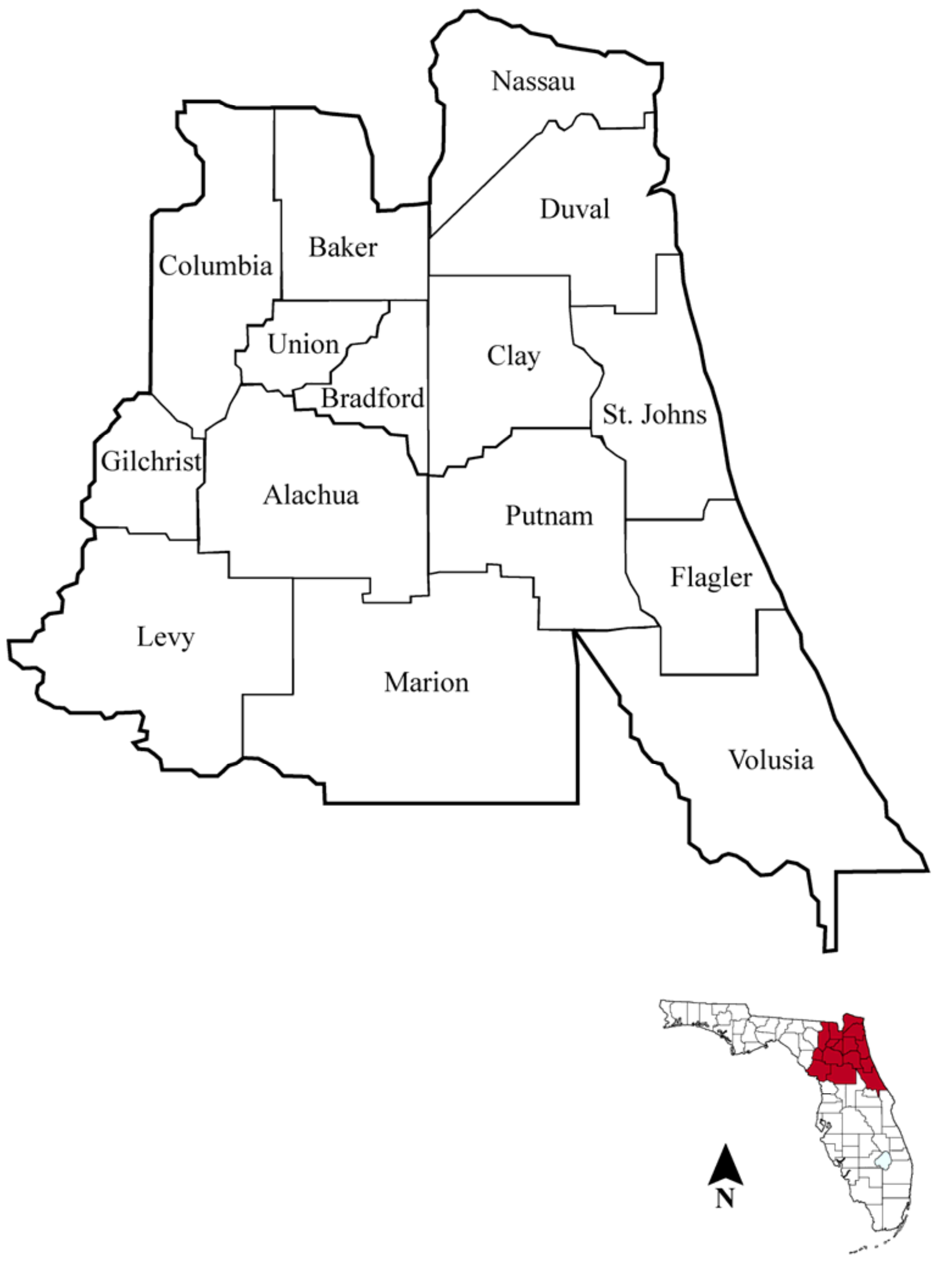
APPENDIX B: Locator Maps of Florida Counties

The following locator maps are for those readers who are unfamiliar with Florida's sixty-seven Counties.

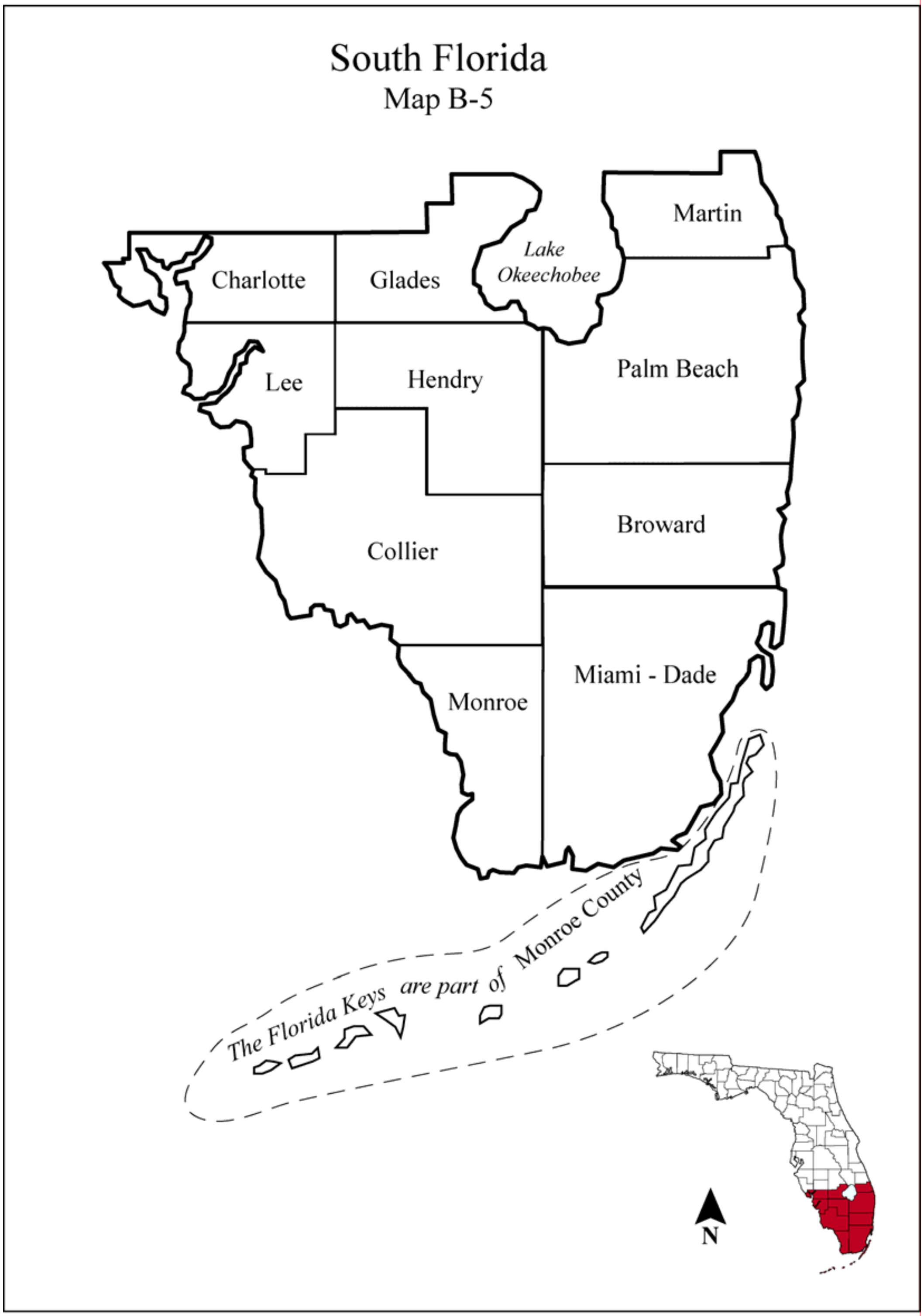

North-west Florida
Map B-1
Escambia
Santa Rosa
Okaloosa
Walton
Holmes
Washington
Jackson
Bay
Calhoun
Gulf
N


North-central Florida
Map B-2
Gadsden
Leon
Jefferson
Madison
Hamilton
Liberty
Wakulla
Taylor
Suwannee
Franklin
Lafayette
Dixie
N

North-east Florida
Map B-3




Central Florida
Map B-4
Citrus
Lake
Sumter
Seminole
Hernando
Orange
Brevard
Pasco
Osceola
Hillsborough
Polk
Indian River
Pinellas
Manatee
Hardee
Okeechobee
St. Lucie
Highlands
DeSoto
Sarasota
N


South Florida
Map B-5
Martin
Lake
Okeechobee
Charlotte
Glades
Lee
Hendry
Palm Beach
Broward
Collier
Miami - Dade
Monroe
The Florida Keys are part of Monroe County
N