

IS "GOOD" GOOD ENOUGH? A SMALL AREA VARIATION
ANALYSIS OF DISPARITY IN EXPRESSED RATES OF
ACCESS TO AND SATISFACTION WITH
CHILD AND ADOLESCENT HEALTHCARE SERVICES
IN EAST CENTRAL FLORIDA

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Public Affairs
in the College of Health and Public Affairs
at the University of Central Florida

Orlando, Florida

Fall Term
2010

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ABSTRACT

The purpose of this dissertation research was to explore indications of disparities within the east Central Florida child and adolescent healthcare services market.

Structured as a follow-up study to work completed in 2005 under the direction of the Health Council of East Central Florida assessing parental perceptions of community child and adolescent healthcare services, this research extended that evaluation by aggregating participant responses at the county and small area zip code group levels, contextually testing the uniformity of responses in understanding parent perceptions of access to, and satisfaction with, community healthcare service offerings available for children and adolescents.

Under a variety of methodologies significance in the responses concerning access to healthcare services were demonstrated between the counties studied. Statistical modeling, however, could not demonstrate the core demographic differences among these data. Data representing perceptions of satisfaction with the services received by children and adolescents were demonstrated at the small area zip code group level within Orange county. Primary effect assessment of the demographic variables representing these respondents yielded findings generally consistent with theoretical expectations of disparity but, notably, the correlation effects between a number of key independent variables demonstrated a mediation of the primary effects on overall perception of satisfaction. Specifically, it was demonstrated that the interaction of white race with possession of private healthcare insurance, and the

interaction of greater levels of educational attainment with black race, caused a proportional reduction in the predicted satisfaction score of these survey respondent cohorts.

Further research specific to these phenomenon encompassing a clearer understanding of the type of care received and the individual's specific experiences with their healthcare providers was recommended, with ensuing research to better identify commonalities of interactions with specific area providers, local restrictions imposed by area insurance carriers, influences caused by language and/or cultural barriers, and the like as drivers in understanding the individual dynamics of satisfaction.

*This work is dedicated to my dad and to my son,
each of whom is a part of this dissertation
through the deep investments of faith and encouragement
which they have uniquely made in me.*

ACKNOWLEDGMENTS

The 16th century English poet John Donne reflectively asserted that “[n]o man is an island entire of itself; every man is a piece of the continent, a part of the main...,” and in the spirit of this thought I gratefully acknowledge that this work has come to fruition due to the guiding and encouraging hands of many to whom I am deeply indebted, both personally and professionally.

Principally among these are the members of my dissertation committee who have provided often quiet, yet sometimes very direct, thoughts and influences guiding both this work and my professional career. I express heartfelt thanks to my chair, Dr. Stephen Holmes, and committee members Dr. Jacquie Byers, Dr. Bob Langworthy, and Dr. Jackie Zhang for their years of patient mentorship and friendship.

Preceding the guidance of my committee were the significant influences of Ms. Shirley Rodziczak who instilled in me a lifelong love of learning, and Mr. Jim Reigles whose deeply rooted ideals of intellectual pursuit and integrity profoundly affect me to this day. Your impacts upon my life are without measure.

Finally, this work is equaled in length each by a “honey-do” and a “Dad-can-we” list. To my amazing wife and son I offer my deepest of appreciation for all of their love, patience, and understanding enabling the completion of this pursuit. You provide the reason and encouragement to strive to make a difference.

Soli Deo Gloria
October, 2010

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LIST OF ACRONYMS AND ABBREVIATIONS

AHRQ	Agency for Healthcare Research and Quality
HCECF	Health Council of East Central Florida
IOM	Institute of Medicine of the National Academies
NHDR	National Healthcare Disparities Report
PRC	Professional Research Consultants, Inc.
PRE	Proportional Reduction in Error
SCHIP	State Children’s Health Insurance Program

DEFINITION OF TERMS

Disparity

“The quantity that separates a group from a specified reference point on a particular measure of health that is expressed in terms of a rate, percentage, mean, or some other quantitative measure.”

Keppel, et al., 2005, p.2

Health status

“Health status was measured by the number of days the child reportedly spent in bed in the past year for illness and by parental rating of the child's overall health in 1 of 5 categories: excellent, very good, good, fair, and poor. An association has been demonstrated previously between parents' perception of their child's health status and their child's actual health status.”

Flores, Bauchner, Feinstein, and Nguyen, p.1067

CHAPTER 1: INTRODUCTION

While a significant body of literature exists on racial and ethnic disparities in the receipt of healthcare services (Beal, Co, Dougherty, Jorsling, Kam, Perrin & Palmer, 2004; Moy, Dayton & Clancy, 2005) only a small percentage of studies have focused on the prevalence and impact of healthcare disparities in and among child populations (Chen, Mathews & Boyce, 2002; Flores, Olson & Tomany-Korman, 2005; Flores & Tomany-Korman, 2008; Goodman, 1999; Newacheck, Hughes, Hung, Wong & Stoddard, 2000), thus the full implications to the individual with regard to short- and long-term health is not well understood (Flores, Bauchner, Feinstein & Nguyen, 1999).

The relationship between childhood health and adult wellness is intuitive, and the potential extent of negative manifestations of disparities in healthcare both upon our children and upon our communities is significant (Flores, Bauchner, Feinstein & Nguyen, 1999) as the level of health established in our community's children provide a foundation for a quality of life which they will enjoy throughout their adult years. Goodman (1999) noted that key health issues such as depression and obesity first identified during the childhood years have been linked to long-term health, and "are predictive of adult disease" (p.1524), and Chen, Martin & Mathews (2006) noted that childhood obesity measures observable among Hispanic children were demonstrable risk factors for cardiovascular disease in later life.

Not only is there a physical wellness linkage between childhood and adult health, but there are financial measures to be considered as well. With regard to the individual, additional healthcare costs may be incurred during adulthood in addressing chronic conditions exacerbated by lack of treatment in earlier years, or in treating newly developing conditions resulting from unhealthy lifestyles or living conditions. With regard to the community, there is an immediate-term cost borne by the increased utilization of healthcare resources in treating otherwise preventable conditions. Further, as indicated by the Institute of Medicine of the National Academies' (the "IOM") Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care there is a long-term economic cost to communities when individuals are not able to contribute to their full potential due to poor and/or compromised health (Smedley, Stith & Nelson, 2003). To the extent that sick kids grow up to be sick adults there is an economic loss incurred through lost productivity. Chen, Martin & Matthews (2006) report that the Children's Defense Fund projects a \$130 billion¹ future economic loss to the U.S. economy due to reduced productivity stemming from the health impact of pediatric poverty.

To the extent, then, that the racial and ethnic disparities in healthcare demonstrated in adult populations also exist among children and adolescents we face a significant societal problem, both now, and into the foreseeable future. Given that healthcare disparities result in physical and economic disadvantages to the individual, thereby yielding avoidable societal costs in additional healthcare

¹ In 1996 dollars

expenditures and an associated loss of productive capacity, we all lose. Further, to the extent that we are fueling the disparity engine through neglect of certain community children and adolescents we are exacerbating our future problem. Finally, as noted by Flores, Olson & Tomany-Korman (2005), the U.S. Census Bureau forecasts that current racial and ethnic minority populations will become the majority population by 2030. The changing demographics of the U.S. population will heighten the impact of healthcare disparities among child and adolescent populations, and will hence continue to increase in significance with regard to the health of our overall population. This is a problem of increasing consequence.

Healthcare Disparity as a Kid's Issue: What Do We Know?

Health status and access to care

Among the studies specific to child and adolescent populations, research has provided evidence of racial and ethnic disparity in health status (Flores, Olson & Tomany-Korman, 2005) and access to healthcare resources (Flores, Bauchner, Feinstein & Nguyen, 1999). As noted above, Goodman (1999) demonstrated that socioeconomic differences had been found to be directly linked to a number of key health factors in adolescents including “self-reported health, depression, and obesity.” (p.1524) Flores & Tomany-Korman (2008) demonstrated that within the national population, children of racial and ethnic minorities populations were significantly less likely to receive primary medical and dental care than were white children, and faced “a ‘triple threat’ of greater

risks of suboptimal medical and oral health status, impaired access to medical and dental care, and lower receipt of prescription medications and essential medical and dental services.” (e294) Newacheck, Hung, Park, Brindis & Irwin (2003) comment that demonstrated socioeconomic differences among adolescent populations is manifested in “a range of health status measures, including mortality, chronic and acute conditions, and self-rated health,” (p.1235) and that lower socioeconomic adolescent populations reflect a higher incidence in the demonstration of adverse health behaviors including suicide attempts, smoking, binge drinking, depression, obesity, and sedentary lifestyles. They further observe that these youths experience lesser access to and continuity — defined as “the presence of a personal doctor or nurse and the length of time the patient has used the source of care” (p.1244) — between regular sources of primary care. The authors contend that these disparate factors impact many adolescents by instilling risky behaviors “linked to the major causes of serious morbidity and mortality for this population,” (p.1236) and comment that the prevalence of disparities in child and adolescent care “were the impetus for the enactment of Medicaid expansions and the State Children’s Health Insurance Program (SCHIP).” (p.1250)

Consistency and coordination of care

In that the receipt of regular and coordinated healthcare services is essential in establishing and maintaining the health of an individual, Zeni, Sappenfield, Thompson & Chen (2007) underscored the importance of a regular healthcare provider to consistently oversee changes in a child’s health to ensure

a “continuity of care” (p.S62) and, as necessary, to provide for, and to monitor the outcome of, specialty referrals. Larson, Schlundt, Patel, McClellan & Hargreaves (2007) comment that the lack of a usual source of care often delays the individual in seeking needed care, thus delaying early treatment of disease thereby exacerbating existing conditions and complicating ensuing treatment requirements. They further comment that regular healthcare service providers are important resources to help patients make their way through the complexities of the healthcare system, assisting them “as advocates to obtain needed preventive and healthcare services to avoid hospital admissions.” (p.143) Against that backdrop, Chen, Martin & Matthews (2006) observed that children of lower-socioeconomic status are less likely to receive physician’s care at early ages.

Zeni, Sappenfield, Thompson & Chen (2007) reiterate that the identification of an individual healthcare professional to provide ongoing primary care has been identified as a key area of focus under *Healthy People 2010* with the goal of ensuring 97% of all children aged 17 and younger receive ongoing care from a regular care provider by the year 2010. However, underscoring the magnitude of potential local issues, the authors report that just 79.9% of Florida children currently receive care from a regular provider.

Enabling resources

Adequate financial resources are generally necessary to secure healthcare services, ideally including some form of private or publicly-funded healthcare insurance. Beal, Co, Dougherty, Jorsling, Kam, Perrin & Palmer,

(2004) further comment on socioeconomic status and the role of publicly funded insurance programs in supporting access to care in pediatric populations. Stressing that “[c]hildren are more likely to live in poverty than any other segment of the population,” (p.200) they note that children comprise the greatest participant cohort of the Medicaid managed care program. Marcell, Ford, Pleck & Sonenstein (2007) address racial and ethnic differences among adolescent populations and posit that “most causes of adolescent male morbidity and mortality are preventable,” (p.e967) and that adolescent males at risk for insufficiency of services received are notably those of lower socioeconomic status lacking healthcare insurance and a regular source for receipt of healthcare services.

While it has been demonstrated that socioeconomic disparities do exist in children’s health status and in the receipt of healthcare services (Flores, Olson & Tomany-Korman, 2005), it is yet unclear whether some of these disparities are due to factors unique to children, or whether children’s disparities are merely a subset of the issues present in adult populations. Given that children are generally affected by limitations in family economic resources, access to health insurance, language barriers and/or cultural attitudes and beliefs toward health care (Flores, Bauchner, Feinstein & Nguyen, 1999), it would be therefore logical to assume that as parents experience the impacts of disparity so, too, would their children be similarly affected. However, significant factors may indeed separate the healthcare experiences of children from that of their parents. Consider first that essential care needs of children differ from services generally sought by

adults. Provision of care to children relies heavily upon primary and preventive care services, whereas adult care services are often more significantly focused on chronic care and specialist care issues. While the scope of these services is significantly different, so, too, are the settings in which they may be provided. The rising prevalence of primary care specifically targeted for children in school-based and/or clinic settings, and the creation and implementation of health insurance programs — such as the State Children’s Health Insurance Program (“SCHIP”) enacted into law in August of 1977 — specifically geared to serving economically disadvantaged children may provide children with the opportunity to receive needed care regardless of family resources or circumstances.

However, the relationship between resources and access are seemingly complex and multifaceted in that the existence of child-focused resource and insurance programs are not in themselves a panacea in ensuring sufficiency in provision of services. Rosenbach, Irvin & Coulam (1999) assessed the relative differences in children’s access to care resources given varying levels of insurance coverage and measured the extent to which various forms of coverage were related to the child’s access to healthcare services and the receipt of care by a regular provider source. Their findings indicate that, in addition to the resourcing of care services, appropriate logistical systems and processes must also exist in support of children’s care.

In addition to possessing the resources necessary to access care services, healthcare resource utilization is also dependent upon the individual’s attitudes and predisposition toward services and providers. Ford, Bearman &

Moody (1999) contend that the ability to access and propensity to use healthcare resources in both children and adults is affected by a mixture of socioeconomic issues and factors. They note that “demographic characteristics, family size, and beliefs” influence the propensity to utilize services, “health insurance, availability of healthcare, and transportation issues” influence the ability to access services, and the “perceived symptoms, general state, and diagnoses” of the individual influence the need to access services. They further offer that, with regard to behaviors among adolescents, studies have demonstrated that “insurance status, income, usual source of care, race/ethnicity, and perceptions of health care settings and professionals influence health care utilization among youth.” (p.2227)

Healthcare Disparity as a Kid’s Issue: Assessing the Local Evidence

Efforts have been made to assess the overall health status of the child and adolescent populations in central Florida. In the fall of 2005 the Health Council of East Central Florida contracted with Professional Research Consultants, Inc., a national market research firm based in Omaha, Nebraska, to survey parents across central Florida and assess their perceptions and attitudes concerning the provision of healthcare services available to and provided for the benefit of their children. PRC administered the survey to 1,807 residents of Brevard, Orange, Osceola, and Seminole counties, targeting the parents of children aged 17 years and younger and adolescents aged 18 to 21 years.

Survey participants were queried on a variety of topics concerning their family's access to, and the relative quality of, available community healthcare services.

The core elements of this assessment were thus to determine whether our community's families enjoyed appropriate access to quality healthcare resources. This assessment was a valuable tool in providing central Florida healthcare planners and practitioners with a comprehensive dataset appropriate to guide and determine the focus of community health care investments and expenditures on behalf of healthcare consumers. The master dataset from the core survey has been made available for use by the Health Council and will serve as the primary data resource for this study.

The study demonstrated that parents are generally pleased with the availability and quality of community healthcare services (Professional Research Corporation, 2005) with satisfaction demonstrable across broad demographic groupings. The focus of this research is to further probe the data and extend the analysis from which their findings were derived (1) to determine if satisfaction is consistently expressed across the entire study population, (2) to assess whether disparate levels of expressed satisfaction may be demonstrated among community groupings of healthcare consumers, and should disparate expressions be demonstrated, (3) to determine whether common demographic factors are present among nonconforming groups. Employing small area analysis techniques, this work will examine whether healthcare resources are expressed to be equally enjoyed by all children of the local community or if

allocative disparities exist within the central Florida market for child and adolescent healthcare.

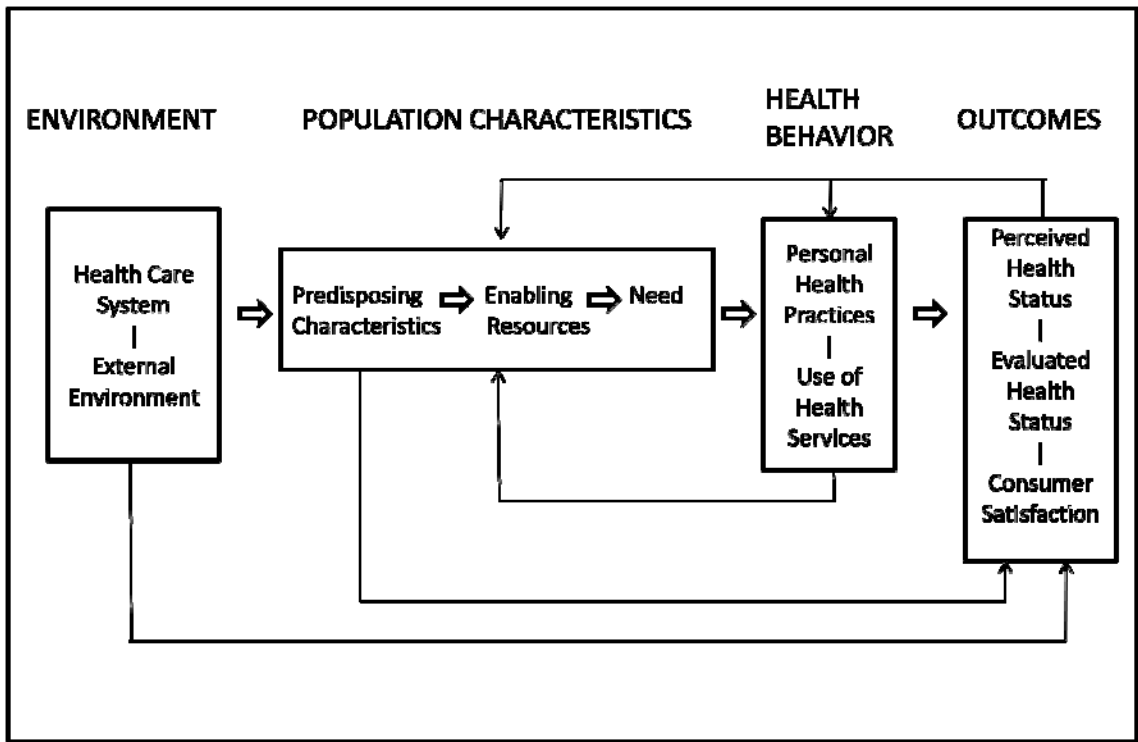
Assessing the Local Evidence: A Theoretical Model for Analysis

Measuring the adequacy of an individual's receipt of healthcare services is an inexact science. Andersen & Aday (1978) offer that while "equity in access to medical care is an appropriate societal goal there is no consensus as to how to measure attainment of the goal," (p.534) noting the various elements that have been employed as measurement factors: provider availability, valuations of comprehensive cost (dollars, time, etc.), per capita utilization, and relative aggregate utilization as measured by diagnoses or observed disability. As noted above, individual attitudes matter, and Field & Briggs (2001) posit that the individual's propensity to utilize healthcare services is relationally linked to their perception of the effort necessarily invested in seeking needed care such that "...the action of seeking health-care must not be more troublesome and disturbing than the illness itself..." (p.295)

This research study is modeled after the work of Andersen and Aday who, throughout the latter half of the twentieth century modeled health services utilization "...to define and measure equitable access to health care; to assist in developing policies to promote equitable access..." (Andersen, 1995, p.1) In conceptualizing the propensity to consume healthcare services, Andersen (1995) presented the use of health services resources as a function of (1) predisposing characteristics influencing the motivation to seek care, (2) possession or control

of the enabling resources for the receipt of care, and (3) need driving receptivity to care. Foundationally, Andersen suggests a recursive interaction between an individual's propensity to consume health services and their perception of previous encounters, and suggests that "effective access" (p.6) is achieved when the consumer's health status and/or satisfaction improves with utilization.

As illustrated in Figure 1, Andersen's final refinement of their model conceptualized the use of health services resources as a function of predisposing characteristics influencing the motivation to seek care, enabling resources for the receipt of care, and need driving receptivity to care.



Andersen, 1995

Figure 1. Andersen's Behavioral Model of Health Resource Utilization

Research Questions

In assessing their survey data, PRC found generally high levels of satisfaction with the quality of and access to child and adolescent health care resources across all the four central Florida counties comprising the study area. Somewhat surprisingly, their analysis did not reveal indicators of disparities in satisfaction with services within the service market. Given the significant body of literature documenting the existence of disparities as a national phenomenon, it is difficult to imagine that the central Florida healthcare market is indeed free of these inequities. To that end, the functional purpose of this dissertation research is to take a more granular view of the data to determine if indicators of disparity have been masked by the large-scale aggregation of population data. This research shall seek to determine if disparity is demonstrable within or among subsets of the general county populations. Applying small area analysis techniques, demographic groupings at the zip code level will be compared and evaluated to determine if disparities are indeed evident within our community.

To provide focus and structure to this analysis the research questions were formulated within two related interrelated groups, with three questions focused on issues related to access to healthcare services, and three questions focused on the satisfaction with the healthcare services received:

Access to healthcare services

Research Question 1: Among all four central Florida counties surveyed, is the rate of access to care services indeed comparable **at the county level** — do we find parents enjoy an equal ability to access needed services for their children across all four counties?

Research Question 2: Within each of the counties surveyed, are the rates of access to care services consistent across all population groups comprising that county, or are disparate levels of access to services demonstrable **among small area zip code groupings** of healthcare consumers?

Research Question 3: Should disparities be demonstrated, what is the *demographic composite* of the small area zip code grouping(s) exhibiting limited access to necessary healthcare services for their children — i.e. are **demographic-based disparities** identifiable?

Satisfaction with healthcare services received

Research Question 4: Among all four central Florida counties surveyed, are expressed rates of satisfaction with care indeed comparable **at the county level** — do we find parents “equally satisfied” with the services available to their children across all four counties?

Research Question 5: Within each of the counties surveyed, are expressed rates of satisfaction with care consistent across all population groups comprising that county, or are disparate levels of expressed satisfaction demonstrable **among small area zip code groupings** of healthcare consumers?

Research Question 6: Should disparities be demonstrated, what is the demographic composite of the zip code grouping(s) reflecting dissatisfaction with healthcare services available to their children — i.e. are **demographic-based disparities** identifiable?

New Contributions

It has been documented above that the study of healthcare disparities has largely neglected to assess specific impacts upon children. This is a significant omission given the significant lifelong health impacts that lack of necessary care during developmental years will have upon an individual, and thus the long-term implications to the health, wellness, and productive capacity of communities within which underserved populations live. This study advances the study of disparities with specific regard to the community care of children. Uniquely, this study applies small area analysis techniques with the intent on identifying community subpopulations to better identify specific populations which might ordinarily be overlooked in aggregate community-based studies.

Structure of the Research

Chapter One identifies disparity as a significant barrier to the equitable distribution of healthcare resources among the nation's population. A significant body of literature demonstrates that racial and ethnic distinctions are noted among individuals' access to necessary healthcare services, and identifiable differences exist among the overall health status of the U.S. population based upon socioeconomic representations. The extent to which disparities exist among child and adolescent populations has not been extensively researched, but it has been demonstrated that the affects of inadequate health services among children are significant in that deficiencies in care experienced early in life may affect an individual's lifelong quality of life. Theory suggests that compromised health reduces an individual's capacity to make productive contributions to the community, thus there is a social cost associated with disparities.

Against this framework this study will assess whether socioeconomic disparities exist in the provision of healthcare services among children in the central Florida community. Small area analysis techniques will be applied to examine parental satisfaction with the access to, and quality of, community child and adolescent care.

Chapter Two presents a review of the literature providing a contextual paradigm of disparity as a community phenomenon and an exploration of the disparities research conducted specific to the factors identified in child and adolescent populations. Representative disparities literature includes

identification of socio-demographic characteristics of at-risk populations, the access and utilization issues identified, and the enabling resources absent in the underserved populations. Next identified are the studies by which parental satisfaction in children's health has been assessed, and the section concludes with an overview of the use of small area analysis techniques in (1) the general healthcare literature, (2) disparities research, and (3) child and adolescent health service provision.

Chapter Three presents a review of the methodology to be employed in this study. Chapter Four presents the results of the study, and the final chapter presents an assessment of the findings with discussion of policy implications, and identification of study limitations and suggestions for further research.

CHAPTER 2: LITERATURE REVIEW

Introduction

For purposes of this study the literature is presented across four broad categories. It is first established that healthcare disparity is a real and prevalent community issue. Placing disparities in an historical context, the current rise of disparate treatment of individuals based on racial and ethnic differences over the past century of American history is presented, followed by a brief review of the current initiatives focused on identifying and serving our vulnerable populations. Against that backdrop disparity issues specific to children and adolescents are next reviewed, noting both the commonalities with and differences unique from adult disparity concerns. Among the issues presented within this set of studies are those which (1) seek to establish causal socio-demographic and behavioral factors producing vulnerability, (2) identify the primary health and service measures affecting vulnerable populations, and (3) assess the factors which contribute to disparate enjoyment of healthcare services. Shifting focus to approaches in disparity assessment, representative studies are presented demonstrating the application of parent satisfaction measures in assessing child and adolescent health issues. Finally, technical application of small area analysis techniques are presented demonstrating practical approaches and uses to assess intra-community issues and disparities.

Healthcare Disparity as a Community Issue

Freeman, Blendon, Aiken, Sudman, Mullinex & Corey (1987) reviewed the history of American healthcare disparities study, a body of research established in the 1930s by the Committee on the Costs of Medical Care. Their seminal study demonstrated that low income individuals enjoyed lesser rates of physician utilization than did high income individuals, a phenomenon of significance due to the observation of greater rates of serious illness among low income groups. The authors reported that over the ensuing four decades disparities in physician use rates among income groups were resolved, such that by the mid-1970s individuals of lower income groups were enjoying a slightly greater utilization of physician services compared to their higher income counterparts. This trend reversal was short-lived, however, as low income groups were again demonstrating lower utilization rates by the mid-1980s. Notably, by 1986 poor individuals enjoyed “27 percent fewer physician visits than did the nonpoor of the same health status” (p.10). They reported that between 1982 and 1986 nonpoor, nonelderly adults experienced no change in their mean number of physician visits, while poor, nonelderly adults realized a 30% decrease in visit frequency during the same time period. This decrease in service use resulted in virtually equal rates of utilization between the poor and nonpoor adults (4.5 – 4.7 mean visits per person, respectively) even though, as a group, financially poor individuals reported themselves as experiencing overall poorer physical health. Thus the expected healthcare needs of the financially poor were seemingly underserved relative to nonpoor comparison groups. Similarly, use rates among

the elderly poor were again found to be roughly equivalent to that of other income groups in spite of poorer reported physical health among the financially poor. Additionally, the authors reported significant race-based differences in physician utilization by 1986, with a 33 percent difference in physician utilization between black and white individuals reporting ill health. The findings were especially significant, they note, given the notably higher mortality rates among black Americans than among their white counterparts. Finally, they note a significant utilization disparity between insured and uninsured individuals. Highlighting that in 1986 uninsured individuals comprised a larger proportion of persons reporting a poorer health status, and yet these individuals enjoyed 27% fewer physician visits and 19% fewer hospital admissions than did the insured populace.

In 1998 President Bill Clinton committed in excess of \$400 million to the challenge of eradicating racial and ethnic disparities in the national provision of healthcare services (Flores, Bauchner, Feinstein & Nguyen, 1999). In 1999 the United States Congress charged the Institute of Medicine of the National Academies (the “IOM”) with the task of assessing the impact of racial and ethnic disparities in the provision of healthcare services in the United States. In response, the IOM appointed a study committee — the Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care — to conduct a large-scale assessment of national health practice. In 2003 the results of their comprehensive work, the National Healthcare Disparities Report (“NHDR”) was published, the body of which assessed the prevalence of healthcare disparities, identified delivery system flaws and limitations, identified

national policy implications, and offered recommendations for ongoing research activity. Employing a working definition of “*disparities* in healthcare as racial or ethnic differences in the quality of healthcare that are not due to access-related factors or clinical needs, preferences, and appropriateness of intervention” (Smedley, Stith & Nelson, 2003, p.32), the Committee asserted the following in their summary findings:

“[r]acial and ethnic minorities tend to receive a lower quality of healthcare than non-minorities, even when access-related factors, such as patients' insurance status and income, are controlled. The sources of these disparities are complex, are rooted in historic and contemporary inequities, and involve many participants at several levels, including health systems, their administrative and bureaucratic processes, utilization managers, healthcare professionals, and patients.”

(Smedley, Stith & Nelson, 2003, p.1)

In their assessment the Committee found “remarkably consistent” evidence of disparities across disease groups and service lines, differences strongly linked to individuals' socioeconomic status. Disparities were evidenced by underuse of appropriate services, higher morbidity and mortality rates, and lower incidence of diagnostic testing among minority populations, with allocative differences in healthcare resources potentially attributed to healthcare practitioner and patient biases, preferences, and attributes, as well as language barriers, healthcare systems structures, and financing mechanisms.

The Committee further commented that, for the individual, healthcare resources are closely tied to elements of “social justice, opportunity, and the quality of life,” and that the health of an individual impacts his or her ability to “advance economically and professionally.” The related economic and social

costs of disparities both to the individual and to the community are therefore highly significant.

From the community perspective, the Committee noted that the health of the individual influences the health of others within their societal group, the prevalence of disparities therefore yielding significant impact beyond the individual. They commented that the U.S. Department of Health and Human Services recognized the significance of the health of the individual within the context of his or her community, stating that “the health of the individual is almost inseparable from the health of the larger community, and... the health of every community in every State and territory determines the overall health status of the Nation,” and thus established within the federal *Healthy People 2010* initiative specific goals to eliminate health disparities. The Committee further delineated the economic burden associated with disparities, manifest in the additional healthcare costs and resource allocations associated with the negligent oversight of long-term conditions and/or inappropriate diagnoses. (Smedley, Stith & Nelson, 2003) Congress has since mandated the publication of an annual NHDR (Keppel, Pamuk, Lynch, Carter-Pokras, Kim, Mays, Percy, Schoenbach & Weissman, 2005) as a means to monitor the nation’s progress toward the elimination of healthcare disparities. In its 2007 report the Agency for Healthcare Research and Quality (AHRQ) noted that not only were healthcare disparities not being reduced, but that the number of individual measures in which disparities were evidenced actually grew (AHRQ, 2008). Considerable work remains in our

national challenge to provide an environment for the health of all citizens to thus maximize the health, wellness, and productivity of our individual communities.

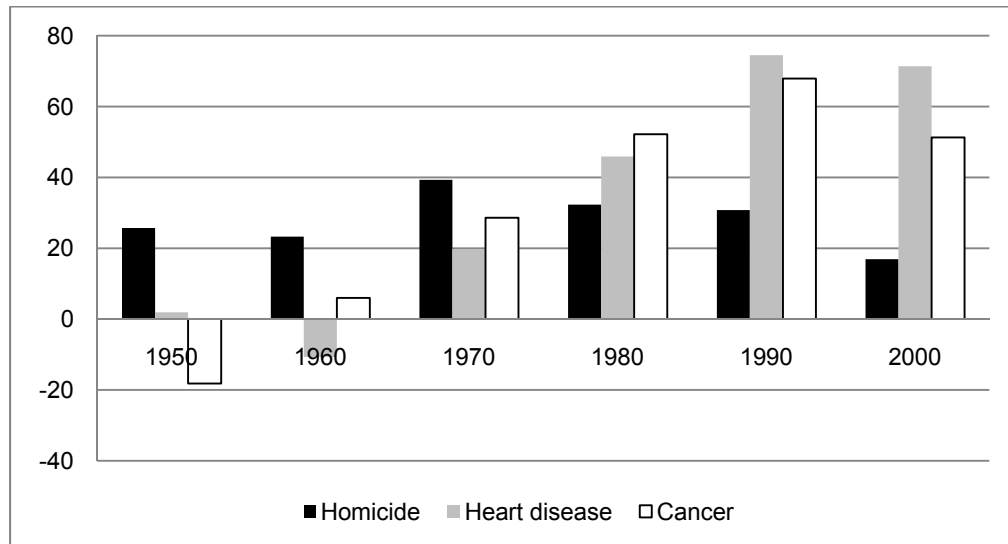
Andrulis (1998) posited that the elimination of financial disparities was central to the elimination of socioeconomic disparities in healthcare. Williams and Jackson (2005) advanced that:

“[w]hether measured by income, education, or occupation, socioeconomic status (SES) is a strong predictor of variations in health. Americans with low SES have levels of illness in their thirties and forties that are not seen in groups with higher SES until three decades of age later. All of the indicators of SES are strongly patterned by race, such that racial differences in SES contribute to racial differences in health. Moreover, the differences in health by SES within each racial group are often larger than the overall racial differences in health.” (p.327)

In their assessment of race-based disparity in healthcare they reviewed comparative historical mortality rate trends within three leading causes of death — homicide, heart disease, and cancer — experienced within black and white populations. Their findings demonstrate that a mounting inequality persists in the provision of healthcare services among the spectrum of American citizens, and that, in the battle against the nation’s leading the causes of death, America’s black population has not benefited over the past half century from advancements in medical science to the same degree as America’s white population.

Figure 2 presents trend information from Williams’ and Jackson’s work, graphically illustrating the mathematical difference in the number of deaths per one hundred thousand people between the Black versus White demographic populations. The bars indicate the raw number difference between the populations per category of death. The increasing mortality rate gap graphically indicates that, since 1970, the rate gap between black and white America is

narrowing in terms of deaths from violent homicide. However, in stark contrast the differential rate of death from representative disease has been consistently rising since the 1950s and 60s.



Williams and Jackson, 2005

Figure 2. Differential Black Versus White Deaths per 100,000 Population

Assessing Disparity in Healthcare for Kids: Foundational Studies

While issues addressed within the disparity literature centered on adult populations provides meaningful background and focus for child and adolescent issues, there are meaningful differences between the populations to be considered. First, the financing, organization, and delivery of children's health services is often separate from that made available to adults. For example, children's care for low income families is sometimes provided through public and community mechanisms such as school wellness / nurse programs, community vaccination programs, and the like. Alternately, public financing mechanisms are

often employed to underwrite the insurance costs of providing primary care to children of eligible, low income families. Second, children's healthcare needs are uniquely different from adult needs, reflective of their stage of physical development. As such, health and treatment programs for the general children's population are fundamentally more reliant on primary care functions — preventative care, wellness checkups, vaccination programs, etc. — and acute hospitalization treatments for children are most often less intensive than are experienced in the general adult population (Stevens & Shi, 2002). Further, given that the relative health of children and adolescents maintained in their formative years establishes a foundation for their health throughout adulthood, the extent to which children forego necessary care during their developmental years can have both near- and long-term consequences to their health and well-being (Newacheck, Hughes, Hung, Wong & Stoddard, 2000). Likewise, the quality of the care by which children's conditions are managed by healthcare professionals equally have short- and long-term consequences to their health and well-being (Perrin & Homer, 2007). To that end, the following literature was reviewed to better understand the contextual issues in healthcare disparities among child and adolescent populations.

Assessing causal relationships in child and adolescent disparity

Vingilis, Wade & Seeley (2007) emphasize that adolescence is the time of life during which individuals form critical behavioral choices and habits — including lifestyle choices and care utilization practices — which may influence their health status throughout adulthood. Given that these choices and habits

are made by the individual, it would be of great value to policy makers and care professionals to understand the factors which influence health-related behaviors, thus providing opportunity for interventions “before psychological problems and lifestyle choices become largely established by the end of the teenage years.” (p.774) The authors further note, however, that while predictor studies are useful in identifying factors in expected utilization patterns, they do not necessarily explain the determinants, or root causes, of these drivers. From that perspective the literature is further presented to first consider causal factors in care utilization, and then to review potential determinants of disparity in access to care among children and adolescents.

Sociodemographic factors

Significant among the efforts to derive causal factors in access and utilization disparity is the work of Andersen & Aday (1978) who employed path analysis techniques to assess the foundational components driving physician services utilization. Their approach employed the theoretical construct that predisposing variables (age, race, and education level) influence enabling factors (i.e. income, insurance status, and lack of regular care provider), and that the enabling factors in turn influence utilization, both directly, and through the incidence of illness or need/perceived self-reported health. The result of their work indicated age and illness to be the main determinants to service provision, and thus not suggestive of disparity. However, they noted that lack of a regular

medical provider was found to be the “enabling variable which has the greatest impact on physician utilization.” (p.544)

Within the construct of Andersen’s (1995) Behavioral Model of Health Resource Utilization illustrated in Chapter 1, Vingilis, Wade & Seeley (2007) tested predisposing factors, enabling resources, and need components of the model to determine causal relationships to patterns of care utilization. Measuring utilization as total use of any physical or mental healthcare practitioner’s services (including physicians, ophthalmologists, nurses, chiropractors, physiotherapists, social workers/counselors, psychologists, speech, audiology or occupational therapists, dentists, and orthodontists), while they found association between utilization and the predisposing factors, their findings supported Andersen and Aday’s work that each “component makes independent contributions to predicting use” (p.790) without mediating effects.

Approaching causal relationships from a macro perspective, Benjamins, Kirby & Bond Huie (2004) sought to determine whether community factors contributed to the propensity to consume healthcare services. Grounding their research was a theoretical conceptualization of care utilization determined by the individual’s predisposing factors including their (i) awareness of service availability and individual demographic risk, (ii) perceptions of disease and treatment risk, (iii) attitudes toward and confidence in the value of healthcare treatments and providers, and (iv) social capital — factors of civic trust and reciprocity in influencing social norms and transmission of information. Against this framework they derived a research model assessing community enabling

factors and the availability of resources, the “values, preferences, and attitudes toward health care,” (p.705) and the influence of social capital in the dissemination of healthcare information. They found that community factors were “significant predictors” (p.710) of services consumed.

Discerning the critical role of regular care providers in evaluating health status and in ensuring appropriate specialty referrals and continuity of care, Zeni, Sappenfield, Thompson & Chen (2007) applied Aday and Andersen’s Access to Medical Care model to review Florida patient data (n=2,116) from the 2003 National Survey of Children’s Health to assess factors correlated to lack of a regular healthcare provider. Constructing a correlations analysis between (1) predisposing factors, defined as age, gender, ethnicity, race, family structure, and education level; (2) need factors, identified as existence of chronic conditions or special health need; and (3) enabling factors, defined as poverty, and insurance status, and lack of regular care provider, they found greater incidence of lacking a regular provider among children who were (i) older, (ii) had less educated parents, (iii) experienced gaps in their insurance coverage, (iv) were closer to the poverty level, and (v) claimed Hispanic ethnicity. Flores, Bauchner, Feinstein & Nguyen (1999) analyzed data from the National Health Interview Survey to assess relationships between socioeconomic factors and income and parental education, finding significant, but not causal, relationships between the variables.

Observing the relationship between continuous insurance coverage and having a regular care provider, Rosenbach, Irvin & Coulam (1999) assessed the

results of the Medicaid Extension Demonstration project and determined that provision of insurance coverage alone did not guarantee consistency of regular care, but that additional enabling factors encompassing delivery system structures including fostering relationships with care providers, educating consumers on the need for preventive care services, provision of transportation systems and translation services also play significant roles in facilitating provision of regular care services.

Foregoing care

Ford, Bearman & Moody (1999) assessed the health behaviors of Canadian adolescents (n=20,746) in grades 7-12, studying the factors influencing their foregoing healthcare services. They reported that 18.7% of the adolescents surveyed indicated that they had foregone necessary care within the past year, and found that among demographic groupings, adolescents of uninsured status, lower SES, older age group, African American or Hispanic racial minority group, single parented home, participation in high risk behaviors — daily smoking, frequent alcohol consumption and/or sexually active — physical disability, and mental health problems were comparatively more likely to forego needed health care services than their peers. Among the reasons cited by study participants for foregone care, a majority [63.3%] said they “thought the problem would go away,” with additional responses provided including “fear of what the physician would say or do [15.5%], inability to pay [14.0%], concerns about confidentiality [11.5%], parent/guardian would not go with participant for care [11.7%], and

difficulty making an appointment [8.9%].” (p.2232) Of note, the researchers mention that these findings must be interpreted within the complex developmental context of the adolescent and that multiple interrelated expressed and non-expressed issues may be involved. They comment that while insurance status is generally a significant issue in accessing services, while Canadian youth enjoy the benefit of universal care 40-60% of youths with specific health concerns do not seek services. They further note that among their study participants, 15% reported that they did not seek services because a parent/guardian could/would not take them to a healthcare provider, and that 12% contend that they did not want their parents to know about their health issue.

Marcell, Ford, Pleck & Sonenstein (2007) employed data from wave 1 (1988) and wave 2 (1990-91) of the National Survey of Adolescent Males, segregating “modifiable (beliefs about masculinity, parental communication, sex education, and health insurance) and nonmodifiable (age, race/ethnicity, and region of residence) factors” (p.e966) to assess the reasons that male adolescents forego care. Reviewing response data of study participants aged 15-19 years (n=1,677), the authors sought to determine predictors of respondents having received a physical examination within the year prior to survey participation. They found the highest rates of receipt of physical examinations among participants that had previously had discussions about reproductive health issues with both parents, as well as with those whose mothers possessed higher levels of education. Lower rates of examinations

were associated with individuals having predisposing factors including Hispanic ethnicity, living in South or West, older in age, and those holding “more traditional masculine beliefs.” (p.e970)

Ginsburg, Menapace & Slap (1997) employed adolescent focus groups to investigate the reasons that adolescents use or forego care, forming twenty-one discussion groups to review the respondent data concerning fifteen health services questions obtained from the ninth grader community of the School District of Philadelphia. Their goal in the qualitative analysis was to elicit information directly from adolescents about adolescent perceptions and issues. Among the chief observed concerns of adolescents with regard to receiving care was the possibility of provider-to-patient transmission of disease (notably fear of HIV), and lowest among their expressed concerns were patient respect and confidentiality. Panelist explanations noted that while they could withhold (control) sensitive information, transmission issues were generally outside of their control.

Physician trust

Doescher, Saver, Franks & Fiscella (2000) sought to assess the underlying causes in disparity as correlates to perception of, and trust in, the physician care provider, and specifically whether low levels of trust were demonstrable by patient race and/or ethnicity. Reviewing data (n=32,929) from the Satisfaction With Physician Style component questions of the 1996-97 Community Tracking Study Household Survey the authors found that non-white

patients held lower levels of satisfaction and trust in physicians than did white respondents. They further found that lower satisfaction and trust scores predominated among patients in the following classifications:

“younger, male, less educated, poorer, in poorer health, uninsured, enrolled in Medicaid or other public health insurance coverage or an HMO, a current smoker, receiving regular care in a setting outside of a physician’s office, lacking physician continuity for repeat visits, making fewer visits to physicians, making more visits to emergency departments, and not having been hospitalized in the previous year.” (p.1158)

Health, access and utilization

Disparities in the receipt of healthcare services have been demonstrated among child and adolescent populations. Newacheck, Hughes, Hung, Wong & Stoddard (2000) reported that 7.3% of American children — or 4.7 million — experienced at least one unmet healthcare need, with two-thirds of those children coming from low-income and/or uninsured families. Surveying the parents of children aged 5 to 12 years residing in San Bernadino County, California, Stevens & Shi (2002) demonstrated that, consistent with findings found among adult populations, children of racial minorities (Asian, Black and Hispanic) reported enjoying a lower quality of primary services than did non-minority children, with children of Asian American heritage experiencing the lowest quality of care. The authors further offered that the findings were especially significant given the high population growth rate among the Asian American population, and that, despite generally higher family incomes, Asian American individuals have been found to only be in fair or poor health, under-immunized, and exhibit a greater contract risk for preventable illnesses, including hepatitis B.

Newacheck, Hughes & Stoddard (1996) studied patterns of primary care utilization among children, with focus on three categories of at-risk groups: racial minority, poor, and uninsured children. Utilizing the National Medical Expenditure Survey, they examined health services payment data (n=7,578) for children's care during the 1987 calendar year and compared at-risk populations with a control group possessing none of the at-risk characteristics. They found children in the at-risk groups to be two to three times more likely to not have a usual source of primary care, were twice as likely to not have after hours care available from their care providers, were nearly twice as likely to need to travel in excess of 30 minutes to receive care, and were nearly three times as likely to need to wait an hour or more to see their provider. Their findings indicated that children in these at-risk groups "encounter both financial and non-financial barriers to care." (p.30)

Flores, Olson & Tomany-Korman (2005) analyzed the data from the National Survey of Early Childhood Health conducted in 2000 (n=2,608) and demonstrated significantly poorer health status and lower rates of specialist referrals in Hispanic and black children as compared to white children. Notably, they found that black children were "twice as likely not to be in excellent or very good health," (p.e186) and that "Hispanic children had almost double the odds of not being referred to a specialist by their provider." (p.e188)

Controlling for health insurance and socioeconomic status, Weinick & Krauss (2000) demonstrated socioeconomic disparities among the healthcare services received by children, demonstrating significant differences in lack of

regular providers among Black, Hispanic, uninsured, and older children aged 13 to 17 years.

Newacheck (1989) demonstrated that poorer and sicker adolescents received less access to care than did their wealthier and/or healthier peers. Reviewing the adolescent (aged 10-18 years) subject components of the 1983 and the 1984 National Health Interview Survey, he assessed the differences between poor and nonpoor subjects (n=22,792) self-reported health status (reported as Excellent, Very Good, Good, Fair or Poor) and the use of ambulatory care and inpatient hospital resources. Subject data reflected household response information as provided by adult (age ≥ 17) family members, with actual survey respondents frequently being the adolescent's mother. Use of ambulatory care measures reflected the average number of annual contacts with a physician, including face-to-face encounters and/or telephone conversations to receive examination, treatment, consultation, and/or advice provided by a physician or a medical professional acting under a physician's direction. Inpatient hospital utilization was defined as having received hospital services wherein the subject was admitted for observation or treatment requiring an overnight stay. Respondent family data were stratified based upon income in relation to the 1984 U.S. poverty index. Newacheck found significant health status differences between subjects above and below the poverty level, with poorer health generally being reported among sub-poverty level subjects. He noted that, across all health status levels, lower income adolescents were 35% more likely to have experienced gaps of two or more years between receipt of

ambulatory care services, and that they received 13% fewer annual contacts with physicians. He further noted that, within each designated self-reported health status category, poorer adolescents consistently received fewer physician services than their more affluent peers, and that the service differential increased as health status decreased. Less difference was observed between adolescents of Excellent health than was noted between groups in Fair/Poor health. Finally, while use of hospital services was found to correlate to reported health status, differences between income groups were found to be “much less pronounced than those reported for ambulatory care.” (p.1060)

Extending these findings, Lieu, Newacheck & McManus (1993) employed data from the 1988 National Health interview Study assessing differences in utilization of healthcare services among adolescents (n=7,465) of varied socioeconomic groups, measuring service utilization as the amount of elapsed time between routine care visits and the total number of physician contacts in the past year. While indicating lower self-reported health status than their non-minority peers, they found that Black and Hispanic adolescents aged 10-17 years enjoyed 30.8% and 34.6% fewer caregiver contacts respectively than their White counterparts, and that 15% of Black and 19% of Hispanic adolescents had no regular source of routine preventative care as compared to 7% of White adolescents.

Similarly, Newacheck, Hung, Park, Brindis & Irwin (2003) reviewed data from the 1999 and 2000 National Health Interview Survey to test for socioeconomic-based differences in the access to, and satisfaction with, care

services received among adolescents aged 10-18 years (n=12,434). The authors stratified the survey population by income groupings derived as a ratio of family income, adjusted for family size, to the federal poverty level (“FPL”), casting four study groups: (1) below poverty, with income less than 100% of the FPL, representing 17.4% of the study population, (2) near poor, designated as 100-199% of FPL, encompassing 21.2%% of the study population, (3) moderate income, defined as 200-299% of the FPL, embodying 18.2% of the population, and (4) middle/high income, identified as possessing total family income greater than or equal to 300% of the FPL, comprising 43.1% of all respondents. An association between income and health status was indicated, with self-reported health status being lower among adolescents of families of lower income groupings. They also found strong associations between family income and access to care, noting that adolescents designated as poor were “four times as likely” (p.1242) as their middle/high income counterparts “to be without a usual source of care,” (p.1243) and “poor adolescents being seven times more likely than adolescents in middle- and higher-income families to have unmet medical care needs.” (p.1244)

Assessing intra-ethnic disparities, Sarmiento, Miller, Ford, Schoenbach, Viadro, Adimora & Suchindran (2004) analyzed differences in rates of routine physical examinations among Latino adolescents in grades 7 through 12. They found that while the majority of Latino students were proportionately less likely to receive an annual physical than were non-Latino Whites and non-Latino Blacks, prevalence rates varied among ethnicity with students of Mexican heritage

demonstrably less likely to have had a physical examination in the past year than were students of Cuban, Puerto Rican, Central/South American or Dominican descent.

Enabling resources

Larson, Schlundt, Patel, McClellan & Hargreaves (2007) assessed the prevalence of enabling factors as barriers to care, probing relative difficulties in accessing care presented by (i) transportation to/from the care facility, (ii) the availability of the needed type of care, (iii) ability to secure time off from work, (iv) ability to make time within personal schedule, (v) cost of care, (vi) location of care facility, (vii) securing child/elder care for other family members, and (viii) the hours of the care facility. From this information they derived four dimensions of barriers to care — “(1) time and competing priorities, (2) convenience and availability, (3) healthcare utilization, and (4) healthcare affordability.” (p.142) Through their analysis they statistically demonstrated that women experienced greater difficulties in having available time or ability to manage their personal schedules so as to access care, that African Americans experienced greater difficulties in securing transportation and/or accessing care due to facility locations and/or hours of operation, and that lower income respondents experienced greater difficulties with utilization and affordability. To the extent that the adult primarily responsible for the coordinating the child(ren)’s care is affected by disparity in along race/ethnicity and/or gender characteristics with regard to accessing care, so too may the child be similarly affected with regard to their ability to access care.

Hargraves & Hadley (2003) hypothesized that disparities in healthcare access may be related to influencers in the individual's propensity to seek care, chiefly their (1) "measured characteristics" comprised of income, insurance coverage and/or need for care, or their (2) unobserved factors, including culture, attitudes, and/or discrimination, and assessed the role of (3) "insurance coverage, income, and community medical care resources related to the safety net play in reducing disparities in access to medical care." (p.810) They examined the capacity of African Americans, Hispanics, and Whites to access care within the context of the following measures: (1) unmet medical needs, (2) use of a regular healthcare provider, and (3) having received the services of a physician in the past year. They found that the lack of insurance was the most important factor in explaining all but unmet medical needs measures in the differences between African Americans and Whites, and was the single most important factor in differences between Hispanics and Whites across all three measures. Income differences were found to be the second most important factor with the same impact demonstration — the second most important factor in all but unmet medical needs measures in the differences between African Americans and Whites, and was the second most important factor in differences between Hispanics and Whites across all three measures.

Shi (2001) explored predisposing, enabling and need factors to elucidate the vulnerability of populations based on disparities in insurance coverage, demonstrating significance of race and income on insurance coverage, with income as the predominating predictor of lack of coverage. Citing the

demonstrated role of insurance in enabling access and continuity of care, Shi makes the argument to ensure coverage for vulnerable populations, defined as individuals with “higher relative risk of poor physical, psychological, and/or social health than the population as a whole.” (p.520) For research purposes the author notes that vulnerable populations typically include (i) “racial or ethnic minorities, (ii) the uninsured, (iii) children, (iv) the poor, (v) the chronically ill and disabled, (vi) the mentally ill, (vii) persons with acquired immunodeficiency syndrome (AIDS), (viii) alcohol or substance abusers, and (ix) homeless individuals.” (p.519)

Assessing the data from a 1986 national random telephone survey underwritten by the Robert Wood Johnson Foundation, Wood, Hayward, Corey, Freeman & Shapiro (1990) demonstrated that “being uninsured, poor, or nonwhite were independent predictors of children having less access to preventive or general medical care.” (p.670) Guendelman & Pearl (2004) tested the relationships between child (only) versus full family insurance coverage and access to care, finding that provision of insurance to children (only) provided for a notable increase in their access to care. Conversely, full family coverage provided only modest increases in access to services over and above the child-only programs.

Similarly, Newacheck, Brindis, Cart, Marchi & Irwin (1999) demonstrated the importance of insurance coverage as a determinant in accessing care services among adolescents, with uninsured cohort populations reporting notably

greater difficulties in obtaining medical or dental care, as well as reporting lower rates of access to regular care providers and/or health centers and clinics.

Flores and Tomany-Korman (2008) analyzed data from the National Survey of Children's Health, a random sample telephone survey (n=102,353) conducted in 2003-04 assessing parent impressions of the health status and access to health services of their children (aged 0-17 years). The authors demonstrated socioeconomic-based differences in medical and dental health status, prevalence of insurance coverage, transportation difficulties in accessing care services, access to specialty care services, and enjoyment of a usual source of care services. Noted disparities were especially prevalent among Latino, African American, Native American and Asian/Pacific Islander populations, as well as among multiracial children.

Assessing Parent Satisfaction in the Propensity to Consume Healthcare Services

Seid, Stevens & Varni (2003) surveyed parents of California children enrolled in kindergarten through 6th grade (n=3,406) to assess parental satisfaction with pediatric primary care services. Employing the Parent's Perceptions of Primary Care assessment tool, the authors sought to assess respondent differences based on race/ethnicity, language, and/or access measures. They noted that while race/ethnicity-based differentials were distinguishable, language and access measures predominated in their influence upon satisfaction measures.

Noting that the U.S. Census Bureau forecasts that current racial and ethnic minority populations will become the majority populations by 2030, Flores, Olson & Tomany-Korman (2005) comment that the changing demographics of the U.S. population will heighten the impact of healthcare disparities among pediatric populations and will hence continue to increase their significance with regard to the health of our overall population. Employing a nationally representative sample, the authors queried parents on the utilization of care services for their child(ren), as well as the parent's perception of the care provider and the care received, demonstrating notable race-based differences in health status, insurance coverage, access to care, and overall satisfaction with healthcare providers. In their assessment, the authors explored parental satisfaction with preventive healthcare services provided for their children, surveying the likelihood of recommending care providers to other parents, perceptions of provider attentiveness, and perceptions of provider respect. Specifically, they measured satisfaction in four key component areas: (1) global satisfaction with health of the services received, (2) satisfaction with necessary health care information received, (3) satisfaction with the amount of time dedicated by healthcare providers on behalf of their child, and (4) the resultant likelihood of parents to recommend the healthcare provider to other parents. In review of the data from 2,068 parent telephone interviews the authors found high degrees of provider satisfaction expressed by study participants. However, they noted slightly lower rates of global satisfaction among black mothers, and lower

satisfaction rates among parents of uninsured children and among Spanish-speaking Hispanic mothers.

Noting that patient satisfaction is strongly correlated to compliance with medical directives, Lewis, Scott, Pantell & Wolf (1986) measured parent satisfaction with medical services provided to their children. Developing and implementing their Parent Medical Interview Satisfaction Scale (P-MISS), they focused assessment on (1) physician communication with parents, (2) physician communication with children, (3) “distress relief,” and (4) “adherence intent.” (p.209) In devising their survey instrument that researchers found strong correlations between satisfaction and objective measures of physician’s interpersonal skills, communication with the parent(s), communication with the child, distress relief and adherence intent. Among a number of potential applications, the authors contend that satisfaction assessment — and specifically their survey instrument — may provide specific value in identifying and assisting dissatisfied medical consumers.

Application of Small Area Analysis in Healthcare Research

The analysis presented by PRC reflected a generally satisfied populace. However, from a disparities perspective, aggregation of the respondent data at the county- and region-level potentially masks the prevalence of contrasting opinions. While PRC’s task was to assess the market as a whole, the focus of this dissertation was to identify the populations not represented by the aggregate

analysis. A focused analysis toolset was therefore required to re-aggregate the data and assess the specifics of the subpopulations.

Small area analysis is a research approach in which datasets are viewed at geographically relevant units for policy analysis. A variety of aggregation levels may thus be applied to satisfy the research need to provide pertinent groupings of individuals or communities based upon their physical location. Small area analysis is therefore employed to explore research questions to determine the prevalence, or lack, of a recognizable phenomenon, condition, or trait among or between identifiable population groupings. Dataset aggregation may include clustering of population data based upon reporting by state, county, school district, zip code clusters, and the like. Where spatial considerations are integral to the assessment, small area analysis approaches may include coordinate and/or GIS mapping.

The healthcare literature reflects a body of research employing the use of small area analysis in a variety of clinical practice, resource utilization analysis, and policy development applications. In its application, small area analysis has enabled healthcare researchers to identify disparate populations not otherwise evident or observed in larger-scale or aggregate data. By enabling a finer granularity in analysis the technique has been extremely valuable in assessing trends and phenomenon present at a community level, as well as for understanding disparity within and among the members comprising a community. (Whitman, Silva, Shah & Ansell, 2004) For example, implementation of analysis techniques have proven beneficial in clinical practice identifying “geo-

demographic characteristics” (p.1) for populations at-risk for contraction of hepatitis C (Zhang, Alcorn, Garavaglia, Doig & Yang, 2001), employing census tract aggregation to target screening programs for populations at high risk for incidence of breast, colorectal, and/or cervical cancer (Andrews, Kemer, Zauber, Mandelblatt, Pittman & Struening, 1994), identifying at-risk populations for childhood lead poisoning by targeting high risk neighborhoods by zip code areas (Brown, Shenassa & Tips, 2001) or populations at risk due to geographic adjacency to waste deposits (Trepka, Heinrich, Krause, Schulz, Lippold, Meyer & Wichmann, 1997), assessing socioeconomic indicators and incidence of hospitalization for asthma (Ray, Thamer, Fadillioglu & Gergen, 1998; Gottlieb, Beiser & O'Connor, 1995), and reductions in asthma morbidity and mortality outcomes disparities (Naureckas & Thomas, 2007). Illustrating the value of small area analysis techniques in healthcare utilization analysis, key studies have assessed practice variations in performing dental procedures (Diehr & Grembowski, 1990), practice variations in surgical procedures (Diehr, Cain, Kreuter & Rosenkrantz, 1992), and community variations in hospital admissions (McMahon, Wolfe & Tedeschi, 1989; Hofer, Wolfe, Tedeschi, McMahon & Griffith, 1998). Finally, in support of policy analysis, small area analysis tools have been employed to derive maternal health policy formulation for sub-Saharan Africa through estimation, by region, of the number of medically unassisted home deliveries (Johnson, Brown & Padmadas, *undated whitepaper*), stratifying county-level uninsured rates by demographic indicators among zip-code population groups of State of Wisconsin residents (Wisconsin Department

of Health and Family Services, 2006), to “develop estimates of uninsurance at policy relevant levels” within the state of Florida (Lazarus, Foust & Hitt, 2000), analyzing differences in community health experience rates in small area motor vehicle deaths, prevalence of prenatal care, health insurance coverage, and cigarette smoking in selected Utah communities (Haggard, Shah & Rolfs, 1998), to derive neighborhood-specific pediatric injury prevention programs in Northern Manhattan (Durkin, Davidson, Kuhn, O'Connor & Barlow, 1994), and to develop a distribution methodology for allocation of hospital and community health services resources for use by health planning officials in England (Smith, Sheldon, Carr-Hill, Martin, Peacock & Hardman, 1994).

Small area analysis in disparity assessment

Bindman, Grumbach, Osmond, Komaromy, Vranizan, Lurie, Billings & Stewart (1995) employed the use of small area analysis techniques to assess the frequency of hospitalization for treatment of chronic conditions, specifically those conditions generally more effectively treated in an outpatient setting. Seeking to determine whether socioeconomic factors could be identified as determinants in the propensity to treat patient conditions within an acute care setting, the authors constructed homogenous socioeconomic study groupings, selecting zip code clusters from within their sample of 6,674 California residents and comparing the resident’s self-reported access to healthcare services with community access rates for specified chronic disease conditions. As published hospital discharge records would not reflect the incidence of patients not treated, the authors underscored the importance of employing self-reported access to care data.

Upon analysis, the researchers found significant variation in the rates of hospitalization for treatment of chronic conditions, noting positive correlations between reported accessibility and actual hospital admission rates. They further noted that while self-reported access to care was generally indicated as favorable, respondents reported lesser accessibility in geographic areas wherein the rates of uninsured populations is higher. However, they also noted that rates of hospital admission for treatment of chronic conditions were greater in geographic areas with higher proportions of individuals reported as uninsured, as beneficiaries of Medicaid, or as reported as having no regular place for medical care.

The State of Wisconsin employed small area analysis techniques to develop a multivariate logistic regression model to study trends and characteristics of uninsured residents. Their researchers applied zip-code level small area analysis techniques to a regional database to infer and estimate representative county populations, stratifying rates of uninsurance by demographic indicators to aid in estimating predictors of uninsurance within the target population. The empirical model which was developed employed self-reported “perceived need” for service as influenced by “predisposing” individual demographic factors — age, gender, education, race/ethnicity, poverty status, employment status, and marital status — and measures of community demographics — unemployment rates and income variability (Wisconsin Department of Health and Family Services, 2006).

Haggard, Shah & Rolfs (1998) assessed population data, predefined local health district, county, and political boundaries, and income-based comparable socio-economic zip codes to derive small area study populations to analyze differences in community health experience rates in small area motor vehicle deaths, prevalence of prenatal care, health insurance coverage, and cigarette smoking in selected Utah communities. The authors employed small area techniques, noting that, from a community health perspective, county-level definitions alone lack sufficient detail in assessing densely-populated urban communities. Further, they offered that while Census block group definitions are helpful in deriving relatively homogeneous population groups, they cannot be directly tied to health data. Small areas were thus derived from “health event incidence rates.”

Zhang, Alcorn, Garavaglia, Doig & Yang (2001) reported that hepatitis C has disproportionately affected minority and inner city populations, and they identified the challenge in effectively identifying asymptomatic individuals within the community. Observing a relatively constant 10% diagnosis rate across all zip codes of individuals tested, they further noted that more than one half of the positive diagnoses were derived from just 10% of the local clinics. The authors thus employed small area analysis techniques to derive geo-demographic characteristics of at-risk individuals. They found that greatest incidence of behavioral risk factors (transmission through blood products and/or transfusions, drug use, shared needles, and/or multiple sex partners) could be reasonably associated with characteristic neighborhood compositions, thus small area

techniques could be employed as proxy identifiers to these geographic areas. In the same vein, Andrews, Kemer, Zauber, Mandelblatt, Pittman & Struening (1994) employed small area techniques in the attempt to model geographic incidence of cancer and to refine strategies to maximize screening program activities. Their modeling yielded significant identification breast, colorectal and cervical cancers.

Application of small area analysis in child and adolescent health issues

Noting substantial intra-city rates of childhood lead poisoning Brown, Shenassa & Tips (2001) employed small area analysis to further assess relative incidence rates within individual communities. The authors compared the reported poisonings of selected zip code group subpopulations to community averages of children aged 0-5 years across seven large U.S. cities (n=625,880), selecting zip code groupings as the unit of study "...because of its properties as a relatively small, homogenous, and easily recognized geographic unit." (p.3) Through their analysis they successfully demonstrated significant variations between communities in the proportion of child populations being tested for lead exposure — ranging from 6.2% to 28.0% — as well as in the rates of testing within individual communities, noting five-fold variations in the incidence of community testing rates. More importantly, they found that 90% of children demonstrating high levels of exposure resided in just 38% of the sample zip code areas, and that 50% of those children lived in just 11% of the sample zip code areas. From their study the authors concluded that small area analysis was an

important tool for use in indentifying at-risk populations among and within communities, enabling effective utilization of education and prevention resources.

Summary

In this chapter research was reviewed demonstrating that disparities in healthcare persist, negatively impacting the lives and well-being of racial and ethnic minorities as well as those among the lower economic strata of American society. Further, literature was highlighted indicating that disparity issues affecting children and adolescents differ from that of adults, primarily due to the differences in the basic types of care received, availability of provider sources, and through the availability of governmental insurance programs targeting youth populations.

Specific to this study, it was noted that parent survey responses are employed to measure healthcare disparity issues concerning children and adolescents, and that utilization of routine physicals is employed as a proxy measure for access to care. The following chapter outlines the process by which this study shall examine the prevalence of disparity in access to and satisfaction with child and adolescent healthcare services within the east Central Florida community.

CHAPTER 3: METHODOLOGY

Overview

In the fall of 2005 the Health Council of East Central Florida engaged Professional Research Consultants, Inc. (“PRC”) of Omaha, Nebraska to conduct a four county assessment of the health and healthcare needs of community children and adolescents. Employing a sampling and replacement methodology the researchers utilized a 180 question survey instrument to directly gather information from parents and/or other adult household members responsible for the health and healthcare needs of their children aged 19 years and younger, as well as to gather supplemental information directly from adolescents between the ages of 12 and 19.

In the spring of 2006 the results of the PRC research was presented to the Health Council of East Central Florida, the Winter Park Health Foundation, and Florida Hospital. Among their findings the researchers reported that 90% of the adults surveyed rated their child’s or adolescent’s health as “excellent,” or “very good.” Conversely, 4.9% of children and adolescents were described as having either “fair” or “poor” health; demographically, significant components of this respondent cohort were lower income and/or Black families. The researchers noted that 93.2% of respondents reported having a regular source for their medical care, with positive responses most often reported among those with children under the age of 12, for children / adolescents of families with higher income levels, and/or respondents of White race. Further, they noted that 80%

of respondents held a favorable impression of their primary source of care, assessing their care providers as either “excellent” or “very good.” Among respondents, 83.2% offered that their child / adolescent received a routine physical within the past year, with greatest likelihood of care receipt reported among children less than 12 years of age, children of families with lower income levels, and/or Black or Hispanic race. Finally, the researchers noted that children and adolescents of east Central Florida enjoy physician use rates which are greater than the US population as a whole, and reported significant levels of insurance — including government sources — held by survey participants. Among survey responses, 11.7% of the participants reported an inability to receive health care services when needed with 10.1% of respondents noted “inconvenient office hours” as a barrier to receiving care. The highest rates for both inability to receive care and inconvenient office hours were reported in Osceola County, and the lowest rates were reported in Seminole County.

A summary of the dataset demographics is provided in Table 1.

Table 1. Study Data Demographic Composite

	BREVARD		ORANGE		OSCEOLA		SEMINOLE		TOTAL	
	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>
<u>Race</u>		*		*				*		
American Indian	7	1.9%	27	3.0%	6	3.2%	1	0.3%	41	2.3%
Alaska Native, Asian, Pacific Islander	5	1.3%	25	2.7%	7	3.7%	9	2.9%	46	2.6%
African American, Black	26	6.9%	150	16.4%	16	8.5%	18	5.8%	210	11.7%
White	301	79.8%	538	58.9%	109	57.7%	235	76.3%	1,183	66.2%
Other	<u>38</u>	10.1%	<u>174</u>	19.0%	<u>51</u>	27.0%	<u>45</u>	14.6%	<u>308</u>	17.2%
TOTAL:	377	100%	914	100%	189	100%	308	100%	1,788	100%

	BREVARD		ORANGE		OSCEOLA		SEMINOLE		TOTAL	
	N	Pct	N	Pct	N	Pct	N	Pct	N	Pct
<u>Child's Gender</u>										
Male	196	51.7%	437	47.2%	93	48.4%	161	51.8%	887	49.1%
Female	<u>183</u>	48.3%	<u>488</u>	52.8%	<u>99</u>	51.6%	<u>150</u>	48.2%	<u>920</u>	50.9%
TOTAL:	379	100%	925	100%	192	100%	311	100%	1,807	100%
<u>Income</u>										
		*		*		*		*		
Below poverty	27	8.3%	92	11.3%	21	12.7%	14	5.2%	154	9.8%
Above poverty	<u>300</u>	91.7%	<u>721</u>	88.7%	<u>145</u>	87.3%	<u>257</u>	94.8%	<u>1,423</u>	90.2%
TOTAL:	327	100%	813	100%	166	100%	271	100%	1,577	100%
<u>Child has private health care insurance</u>										
		*		*		*		*		
Yes	244	89.1%	614	84.3%	113	83.7%	233	88.9%	1,204	86.1%
No	<u>30</u>	10.9%	<u>114</u>	15.7%	<u>22</u>	16.3%	<u>29</u>	11.1%	<u>195</u>	13.9%
TOTAL:	274	100%	728	100%	135	100%	262	100%	1,399	100%
<u>How would you rate this child's health</u>										
Excellent	191	50.7%	499	54.0%	91	47.6%	171	55.2%	952	52.8%
Very Good	127	33.7%	228	24.7%	60	31.4%	85	27.4%	500	27.7%
Good	41	10.9%	148	16.0%	31	16.2%	43	13.9%	263	14.6%
Fair	16	4.2%	38	4.1%	8	4.2%	9	2.9%	71	3.9%
Poor	<u>2</u>	0.5%	<u>11</u>	1.2%	<u>1</u>	0.5%	<u>2</u>	0.6%	<u>16</u>	0.9%
TOTAL:	377	100%	924	100%	191	100%	310	100%	1,802	100%
<u>Do you have a usual source for care</u>										
Yes	359	94.7%	853	92.2%	175	91.1%	298	95.8%	1,685	93.2%
No	<u>20</u>	5.3%	<u>72</u>	7.8%	<u>17</u>	8.9%	<u>13</u>	4.2%	<u>122</u>	6.8%
TOTAL:	379	100%	925	100%	192	100%	311	100%	1,807	100%
<u>How would you rate the services of your usual source for care</u>										
Excellent	183	51.1%	430	50.6%	69	39.9%	144	48.3%	826	49.2%
Very Good	107	29.9%	231	27.2%	51	29.5%	99	33.2%	488	29.1%
Good	46	12.8%	144	16.9%	40	23.1%	41	13.8%	271	16.1%
Fair	16	4.5%	33	3.9%	10	5.8%	9	3.0%	68	4.1%
Poor	<u>6</u>	1.7%	<u>12</u>	1.4%	<u>3</u>	1.7%	<u>5</u>	1.7%	<u>26</u>	1.5%
TOTAL:	358	100%	850	100%	173	100%	298	100%	1,679	100%

	BREVARD		ORANGE		OSCEOLA		SEMINOLE		TOTAL	
	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>	<u>N</u>	<u>Pct</u>
How long since last visit for routine checkup										
0-12 months	309	82.6%	773	84.0%	153	81.0%	252	82.4%	1,487	83.1%
13-24 months	40	10.7%	94	10.2%	23	12.2%	34	11.1%	191	10.7%
25-60 months	12	3.2%	33	3.6%	8	4.2%	11	3.6%	64	3.6%
61+ months	9	2.4%	12	1.3%	2	1.1%	8	2.6%	31	1.7%
Never	<u>4</u>	1.1%	<u>8</u>	0.9%	<u>3</u>	1.6%	<u>1</u>	0.3%	<u>16</u>	0.9%
TOTAL:	374	100%	920	100%	189	100%	306	100%	1,789	100%

* - Comparative county data statistically significant at the 0.05 level

Comparison of data to U.S. Census Bureau county estimates
<http://www.census.gov/did/www/saipe/index.html>

As noted in Table 1, with one exception — the racial composition of Osceola county — the race, income, and the child’s possession of private health insurance represented by the dataset is consistent with Census Bureau estimates of the respective counties demographic composition. Upon further examination it was noted that approximately 58% of the Osceola study participants indicated White race. The Census Bureau, however, estimates that White individuals comprise approximately 75% of the Osceola county population, thus the White race population is underrepresented and racial minority populations are overrepresented in the study data. Given that the literature supports that racial minorities are more likely than White populations to experience disparities in healthcare, the oversampling of racial minorities in this county should prove less problematic to this study than had minority populations been underrepresented in the data. Mindful that the data may indicate a greater than actual prevalence of race-based disparities in Osceola county than may

actually exist, and provided due care is assumed in making broad race-based generalizations of Osceola county, as a whole, the dataset is held as generally representative of the county populations and therefore appropriate for use in this analysis.

The purpose of the PRC study was to assess the east Central Florida market as whole to determine the sufficiency and suitability of services provided to the resident population and, as noted, the PRC assessment of the data indicated relatively high degrees of positive perceptions of access and satisfaction. This study will assess the consistency of these overall findings within respondent subpopulations with the goal of identifying disparate populations. The research design, statistical methodologies to be employed, and descriptive detailing of the data capture strategy are further detailed below.

This dissertation study will then extend the PRC research to evaluate the consistency of these perceptions, testing for disparity by identifiable market segments. Utilizing an exploratory research design, small area analysis techniques will be employed to isolate subpopulations to determine if specific communities or residential groupings of individuals provide identifiable indications of being underserved. Small area analysis will facilitate statistical evaluation of the access and satisfaction indicators in the determination of community disparities. To the extent that these small area populations may be identified specific policies and/or programs may be developed to target the at-risk children and adolescents throughout the east Central Florida community.

Research Design

The initial task in the research will be to comparatively assess the resident populations and determine whether the measures of access and satisfaction are consistent across all respondents at the county level. Once comparative measures are established the respondent data will be aggregated by zip code enabling small area assessment of the respective subpopulations within each county. Employment of Proportional Reduction in Error (“PRE”), *t*-test, and analysis of variance (“ANOVA”) will facilitate analysis of the respondent access and satisfaction data respectively at the small area level, enabling isolation of population clusters for which responses regarding access and satisfaction differ from the aggregate responses of their respective counties. Descriptive analysis and multivariate regression techniques will then be applied to derive demographic inference of the composition of the sub-populations demonstrating statistically significant differences in respondent indications of access to, and satisfaction with, care services received.

This study therefore employs application of small area analysis procedures as well as a number of statistical techniques in the analysis of the data — PRE, *t*-test, one-way ANOVA, and multivariate regression analysis — each of which are defined below.

Small area analysis

As noted, this study uniquely employs small area analysis in the assessment of access to, and satisfaction with, child and adolescent healthcare

services within the four counties comprising the east Central Florida healthcare market. The purpose for employing small area analysis is to segregate the study population by an identifiable, homogeneous factor so as to compare the responses of each identified group with its sample peers and identify key differentiators. The organizing element for this study is residential grouping — facilitating understanding of geographic pockets of respondents indicating healthcare needs that may be poorly represented or underserved.

While the theoretical underpinnings of this work are established in Andersen’s Behavioral Model of Health Resource Utilization, the application of statistical modeling techniques are principally guided by the work of Diehr & Grembowski (1990) and Whitman, Silva, Shah & Ensell (2004) in the methodological constructs of this analysis. Diehr & Grembowski (1990) note that “[s]mall area analysis is a popular methodology in health services research,” (p.1343) typically applied by researchers in assessing high rates of variability in service utilization and in seeking to explain variations in terms of availability of services, physician practice patterns, and the like. Implementing practical application of the technique, the authors performed an analysis of variance on small area procedure groupings among their methodologies to assess variability in dental procedure rates among Pennsylvania Blue Cross members. Whitman, Silva, Shah & Ensell (2004) asserted that “[s]mall areas analysis in health is essential in uncovering local-level disparities often masked by health estimates for large areas (e.g. cities, counties, states),” (p.397) and probed the neighborhood effect in healthcare utilization, employing small area analysis

techniques to construct neighborhood-level analysis groups to compare key health status indicators across six socioeconomically diverse Chicago neighborhoods. As highlighted in Chapter Two, the literature well documents the use of zip code clusters as the basis of the small area analysis groups. Brown, Shenassa & Tips (2001) support the use of zip codes in constructing small area clusters in that they are a “relatively small, homogeneous, and easily recognized geographic unit” (p.3) for analysis. This study shall likewise utilize the respondent zip code as the basis for small area formation.

Proportional Reduction in Error (PRE)

Whereas the variable representing access is comprised of nominal data appropriate statistical techniques must be applied to enable interpretation of the relationships between the non-ordered variables. Proportional Reduction in Error (PRE) techniques are employed when it is desirable to make relational inferences within nominal-level data. In assessing relationships between nominal-level data elements these statistical techniques compare the prediction errors between the use of the independent variable to predict a dependent variable as well as modeling without benefit of independent variables. Comparison of the amount of error between the two approaches thus provides a relative measure of the predictive strength provided by the independent variable. (Norušis, 2000) Simply stated, the “PRE statistic reflects how well knowledge of one variable improves prediction of the second variable.” (Bohrnstedt & Knoke, 1988, p.307)

Symmetric PRE measures

Symmetric PRE measures are those indicators which assess relationships between variables free of dependent / independent categorization. Symmetric measures are based on chi-square assessments, providing evidence of a correlative relationship between two variables regardless of assumed influence. (Bohrnstedt & Knoke, 1988) Three such measures will be considered in this analysis: Cramer's V, the contingency coefficient (C), and Phi.

Cramer's V extends the chi square analysis of nominal-level variables (Champion & Hartley, 2010) wherein the measure "adjusts chi-square for sample size," (Bohrnstedt & Knoke, 1988, p.310) represented by the formula:

(Equation 1. Cramers V)

$$V = \sqrt{X^2 / ((N)(\text{Min}(r - 1, c - 1)))}$$

where:

N = number of observations

r = number of rows

c = number of columns

(Bohrnstedt & Knoke, 1988, p.310)

the calculation of which takes on a value of zero when two variables are independent of one another, and a value of 1.00 in the case of a perfect correlation between variables.

Similarly, the contingency coefficient (C) is also a derivative of the chi-square estimation, represented by the formula:

(Equation 2. Contingency Coefficient)

$$C = \sqrt{\chi^2 / (\chi^2 + N)}$$

where:

N = number of observations

(Bohrnstedt & Knoke, 1988, p.310)

wherein a value of zero represents an independent relationship between two variables, and increasingly dependent relationships indicated as the statistic approaches its upper limit value approaching 1.00.

Finally, the PRE measure Phi is a “measure of association between two nominal-level variables” (Champion & Hartley, 2010, p.499) which is identical to the sample correlation coefficient statistic *r*. (Bohrnstedt & Knoke, 1988)

Depending on the use of positive and negative integers in variable coding, Phi measurement values range from –1.00 to +1.00, with +/-1.00 indicating perfect association between variables, and 0 reflecting complete independence. The Phi statistic is represented by the formula:

(Equation 3. Phi)

$$\phi = (bc - ad) / \sqrt{(a + b)(c + d)(a + c)(b + d)}$$

where:

a, b, c, d = quadrants of a 2 x 2 table

(Bohrnstedt & Knoke, 1988, p.333)

Employment of these statistical indicators will facilitate the assessment of data relationships among the non-ordered data elements representing access. Use of symmetric PRE measures will enable identification of associations between demographic variables to be considered as elements which differentiate the experience and perceptions between and among small area groups.

t-Test

To enhance confidence in the PRE findings the nominal data will also be transformed and represented as interval-level variables enabling application of more robust Ordinary Least Squares (OLS) techniques. However, in exchange for this ability to employ more robust statistical tools, transformation of the data will result in a significant decrease in the data sample size, thus diminishing the explanatory power of the analysis.

This supplemental analysis will provide a point of comparative assessment between the nominal- and interval-based modeling approaches. Assessing the data under PRE measures and transforming and evaluating the data under OLS techniques will thus provide two distinctly different approaches, each with significant inherent limitations. While utilization of the raw nominal data provides for the most desirable sample sizes for evaluation, the underlying data type limits the available approaches in data evaluation to derivative models of generally non-robust chi-square techniques. Under PRE analysis weak statistical approaches will be applied to the best source of the data. Data transformations enable robust analysis methodologies, but diminish sample size and

generalizability. Thereunder, the OLS-based analyses apply strong statistical approaches to a compromised data source. Neither approach is singularly desirable, and analytical care would need be applied to the findings derived under each. There is, however, an additional measure of confidence provided by employing the techniques in parallel. If the results of the two distinct approaches are in consort with one another there is additional justification to accept the findings of significance within the context of this study. To that end, this analysis will employ both methodologies in assessing the hypotheses related to access to care, and will rely on the consistency between the findings under each approach to validate the final results and provide for acceptance of statistical significance.

Data conversions and *t*-testing procedures will be more fully discussed within the context of each hypothesis under Chapter 4.

One-Way Analysis of Variance (ANOVA)

In defining the analysis of variance (ANOVA) technique, Norušis (2000) offers that while *t*-test techniques are effective tools for use in comparing the relationships between two population means, ANOVA techniques are applied when more than two population means are to be compared. Specifically, in the application of ANOVA methods, several population means are simultaneously compared under the null hypothesis of equal means. Appropriate rejection of the null hypothesis is made when it can be demonstrated that one or more of the population means is/are statistically different than the others based on the variability of the samples and the variance of the group means.

In the assessment of variability the sample is partitioned and analyzed based on variations in the observations within a group about its mean, and in the variations in the observations between group means. Consistent with its name, the “within-groups estimate of variability” provides assessment of the observations within the group, and reflects an average of the variances. The “between-groups estimate of variability” reflects the standard deviation of the sample means, or an estimate of the standard error of the mean. If the null hypothesis is true that the means of the populations are equal, then the between-groups estimate of variability provides a correct estimate of the variance. Alternately, if the null hypothesis is false, then the between-groups estimate will be too large. The within-groups estimate of variability is reliably valid, however, regardless of whether the null hypothesis is true or false. Upon calculation of the between-groups and the within-groups estimates of variability, the F statistic is calculated as the ratio of the between-groups mean square over the within-groups mean square. This ratio is compared to the mathematically defined F distribution to test against critical values and determination of statistical significance.

ANOVA methodology requires that the samples taken from each population are random and independent, that the populations are normally distributed, and that the populations have equal variances. The assumption of independence requires that no associations exist among the observations either within or between groups. The assumption of normal distributions is somewhat flexible, however, in that the analysis is valid provided that the data “are not

extremely non-normal.” (Norušis, 2000, p.263) Finally, Norušis (2000) offers that the assumption of equal variances among the populations is similarly of marginal importance provided that each group contains a similar number of observations.

Bonferroni *post-hoc* procedure

The functional purpose of ANOVA testing, then, is to identify whether significant differences are observable “between” the groups being analyzed, with variability evidenced by a significant *F*-test. However, significant between-groups findings measures only the likelihood of a common population mean among the samples. Once variability has been detected additional analysis is required to determine which data pairs are demonstrably different. Additional “*post hoc*,” or “after the fact” testing procedures are required to further compare all pairs of means within the sample to determine which of the individual sample means are significantly different from one another. *Post hoc* tests enable the performance of pairwise comparisons, as well as provide for mathematical corrections to ensure computational integrity of calculations encompassing multiple groups of comparative assessments. (Spatz, 2001; Champion & Hartley, 2010) Norušis (2000) cautions that pairwise analysis of the data does present an additional level of statistical complexity in that the possibility of committing a Type I error increases as the number of comparisons increases, an issue termed the “multiple comparison problem.” *Post hoc* procedures correct for the problem by adjusting the significance the significance level of the analysis.

This analysis will employ the Bonferroni *post hoc* procedure to examine between group variability, enabling discernment of the specific small area groups differing one from another. The Bonferroni method provides for computational integrity, adjusting for the multiple comparison problem and maintaining the integrity of the analysis as a whole, by simply dividing the significance level by the number of comparisons to be made. (Norušis, 2000)

Multivariate regression analysis

Regression analysis techniques will be employed to support determination of interaction effects among the satisfaction responses, a technique which enables the statistician to model the changes in a dependent variable as a function of the change(s) in one or more independent variables. Through systematic development of a structured linear equation a methodical approach is undertaken to evaluate the relative strength of a quantitative relationship between data variables. Taking the generalized linear form:

(Equation 4. Generalized Linear Regression Equation)

$$\hat{Y}_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \dots + \varepsilon_i$$

the dependent variable \hat{Y} is estimated by a constant value (β_0) plus the aggregate sum of the independent variables ($X_1, X_2, X_3 \dots$), plus the stochastic error term (ε_i), defined below. The estimated influence of the individual independent variables is represented by their coefficients ($\beta_1, \beta_2, \beta_3 \dots$). (Studenmund, 1992)

The aggregate collection of independent variables comprises the deterministic, or expected, component of the regression model as it encompasses the value of the dependent variable “determined by” the independent variables. Virtually all models contain elements of variability that cannot be otherwise explained by the collection of independent variables specifying the model. The stochastic, or random, error term, symbolized as epsilon (ϵ) in the regression equation, represents all other variation in the dependent variable not otherwise captured in the regression data model. These may include some or all of “...sources such as omitted influences, measurement error, incorrect functional form, or purely random and totally unpredictable occurrences...” including the statistician’s “...ignorance or inability to model all the movements of the dependent variable...” (Studenmund, 1992, p.10)

Regression models most often employ OLS techniques to estimate the coefficients of the independent variables contained within the model. The relative ease of implementation and the theoretical validity of OLS techniques are well-suited to the task of regression analysis. Further, the OLS statistics provide invaluable evaluative support in assessing the overall efficacy, or fit, of the model to the data. Of essential importance is the relative measurement of the amount of variability explained by the independent variables. The Coefficient of Determination (R^2) represents the ratio of variability of the deterministic components to the aggregate variability, dividing the explained sum of squares (ESS) by the total sum of squares (TSS). The Coefficient of Determination (R^2) equation is thus given:

(Equation 5. Coefficient of Determination)

$$R^2 = \frac{ESS}{TSS}$$

The R^2 statistic thus presents the ratio, or reflects the percentage, of variability explained by the model. The greater the R^2 statistic value, the greater the variability explained by the model and its determinants. (Studenmund, 1992)

Data Source

Data acquisition

Employing a standardized health assessment questionnaire customized for this engagement, PRC captured data from households located within Brevard, Orange, Osceola, and Seminole counties having children aged 19 years and younger. Noting “timeliness, efficiency and random selection capabilities” (p.1) as key drivers to methodology selection, a randomized telephone survey was employed for data gathering. Telephone calls were placed to random households within the four counties and, as noted above, the survey instrument was utilized to gather information directly from adult members of the household, with supplemental information gathered directly from adolescents. So as to randomly select a target child from within the household, the adults were asked to respond to the survey questions considering the child/adolescent within the household who most recently had his/her birthday. Telephone calls were terminated and another number dialed in the case that no child or adolescent resided within the household. Due to the peculiar nature of the screening out

process for ineligible households, an overall response rate was not calculated given that traditional response rate calculations would present a skewed perspective on respondents and invited participation.

A total of 400 randomized telephone surveys were conducted within each county and, at the direction of sponsoring agencies within that county, an additional 200 interviews were performed in Brevard county. Based upon the sampling of these 1,800 respondents, the expected maximum error rate was $\pm 2.3\%$ at a 95% level of confidence. Upon completion of all interviews a representative regional sample was constructed by applying relative weights to the sample reflective of the actual population distribution within the four counties.

Where appropriate, additional information concerning the sample population was included from a similar study conducted by PRC in 2004, as well as data obtained by the researchers from various secondary sources including the Florida Department of Health and the national Centers for Disease Control & Prevention (CDC). Among the sources guiding the development of the survey instrument were the health promotion and disease prevention targets outlined by the U.S. Department of Health and Human Services in the Healthy People 2010 initiative.

Variable selection

Of the 180 data elements collected from participant surveys Table 2 below highlights the data elements representing the aggregating, independent, and dependent variables to be employed in this research. The study variables COUNTY and ZIPCODE of residence will be employed to re-aggregate the data for

analysis. Consistent with the literature, respondent access to care services is represented by the dependent variable PROVIDER, reflecting utilization of a usual source primary care services, and expressed satisfaction with care received is represented by the QUALITY variable. As further discussed below, demonstrated differences in the data will be analyzed to identify whether localized socioeconomic-based disparities are evidenced by the survey data.

Table 2. Selected Study Variables

AGGREGATING ELEMENTS

<u>Variable</u>	<u>Question</u>	<u>Valid Responses</u>
COUNTY	Q001: Would you please tell me in which County you live?	1 = Brevard 2 = Orange 3 = Osceola 4 = Seminole
ZIPCODE	Q002: And would you please tell me which zip Code you live in?	Respondent zip code

DEPENDENT VARIABLES

ACCESS	Q019: Is there a particular place that you usually take this child if he/she is sick or you need advice regarding this child's health?	0 = No 1 = Yes
SATISFACTION	Q020: How would you rate the overall health care services received at this particular place? Would you say	1 = Excellent 2 = Very Good 3 = Good 4 = Fair 5 = Poor



INDEPENDENT VARIABLES

GENDER	Q011: Is this child male or female?	0 = Female 1 = Male
INSURED	Q071: Does this child have any PRIVATE HEALTH insurance that pays for medical bills? Or, do you have NO health insurance coverage and pay for this child's healthcare on your own?	0 = No, self-pay/none 1 = Yes, private health
HISPANIC	Q089: Is (he/she) of Hispanic or Latino origin, or is your family originally from a Spanish-speaking country?	0 = No 1 =Yes
RACE	Q091: And, is (he/she)	1=Am Indian/Alaskan 2=Asian/Pacific Island 3=African Am/Black 4=White 5=Other
EDUCATION	Q095: What is the highest grade or year of school YOU have completed?	1=Never attended 2=Grade 1-8 3=Grade 9-11 4=Grade 12 or GED 5=College 1-3 years 6=Bachelors 7=Postgraduate

Research Hypotheses

Based on the research questions indentified in Chapter 1 the analysis will incorporate varying aggregations of the data to assess the focal points of study: access to healthcare services, and rates of satisfaction with services received. Table 3 illustrates the analysis approach.

Table 3. Access to Services and Satisfaction Rate Assessment Matrix

	ACCESS	SATISFACTION
COUNTY	H ₁ : Assess whether rates of access to healthcare services are equivalent across all four counties	H ₂ : Assess whether rates of satisfaction with healthcare services received are equivalent across all four counties
SMALL AREA	H ₃ : Assess whether rates of access to healthcare services are equivalent across all zip code groups within each county 	H ₄ : Assess whether rates of satisfaction with healthcare services received are equivalent across all zip code groups within each county 
DEMOGRAPHIC COMPONENTS	H ₅ : Assess whether socioeconomic differences exist among respondents providing differing expressions of access to healthcare services across all zip code groups within each county	H ₆ : Assess whether socioeconomic differences exist among respondents providing differing expressions of satisfaction with healthcare services received across all zip code groups within each county. Such differences may be represented by individual demographic components, or by interaction effects among the indicators taken in aggregate groups.

The research hypotheses are thus formally stated:

Research questions: Access to healthcare services

Data Analysis (H₁)

Research Question 1: Among all four central Florida counties surveyed, is the rate of access to care services indeed comparable **at the county level** — do we find parents enjoy an equal ability to access needed services for their children across all four counties?

H₀: expressed rates of access to healthcare services are equivalent
across all four counties

H_A: expressed rates of access to healthcare services differ across the
counties

To test this hypothesis, responses from the variable PROVIDER [Q019: Is there a particular place that you usually take this child if he/she is sick or you need advice regarding this child's health?] will be extracted and will be aggregated by responses from the variable COUNTY [Q001: Would you please tell me in which County you live?]. As noted above, the initial task in the research will be to determine whether the respondent expressions of access to care services are consistently indicated across all respondents at the county level or if indications of disparate access to services exists among the resident populations. PRE and *t*-test methodologies will be employed to test the consistency of responses across the respondent population.

Data Analysis (H₂)

Research Question 2: Within each of the counties surveyed, are the rates of access to care services consistent across all population groups comprising that county, or are disparate levels of access to services demonstrable **among small area zip code groupings** of healthcare consumers?

H₀: expressed rates of access to healthcare services are equivalent across all small area groups within each county

H_A: expressed rates of access to healthcare services differ across small area groups within each county

In this step of the analysis the respondent data will be aggregated utilizing the data variable ZIPCODE [Q002: And would you please tell me which ZIP Code you live in?] so as to facilitate the small area assessment of the respective subpopulations. Further employment of PRE and *t*-test techniques will provide for analysis of the respondent data at the sub-population level, enabling isolation of population clusters for which responses regarding access differ from the findings for the respective county as whole. As discussed above, the consistency of findings between the PRE and OLS techniques will guide the evaluation of the significance of the findings and validation of resultant findings.

Access: Data Analysis (H₃)

Research Question 3: Should disparities be demonstrated, what is the *demographic composite* of the small area zip code grouping(s) exhibiting limited

access to necessary healthcare services for their children — i.e. *are demographic-based disparities* identifiable?

H₀: no socioeconomic differences exist among respondents expressing limited access to service rates across all small area groups within each respective county

H_A: socioeconomic differences exist among respondents expressing limited access to service rates across all small area groups within each respective county

Provided statistical differences are demonstrated among the small area zip code groupings, PRE and *t*-test tools will again be applied to assess which demographic factors demonstrate statistical significance. As presented in Research Question 2, the consistency of findings between the PRE and OLS techniques will again guide the evaluation of the significance of the findings and validation of resultant findings.

Satisfaction with healthcare services received

Data Analysis (H₄)

Research Question 4: Among all four central Florida counties surveyed, are expressed rates of satisfaction with care indeed comparable ***at the county level*** — do we find parents “equally satisfied” with the services available to their children across all four counties?

H₀: expressed rates of satisfaction with healthcare services received are equivalent across all four counties

H_A: expressed rates of satisfaction with healthcare services received differ across the counties

Similar to the procedure followed to test the first research hypothesis, the responses from the variable QUALITY will be extracted and aggregated by responses from the COUNTY variable. Again, the aggregated data will serve as a comparative measure both across and within the four-county data, and one-way ANOVA and Bonferroni *post hoc* testing will be applied to comparatively assess whether expressed satisfaction rates are consistent across east Central Florida, or if identifiable indications of disparity emerge.

Data Analysis (H₅)

Research Question 5: Within each of the counties surveyed, are expressed rates of satisfaction with care consistent across all population groups comprising that county, or are disparate levels of expressed satisfaction demonstrable ***among small area zip code groupings*** of healthcare consumers?

H₀: expressed rates of satisfaction with care services are equivalent across all small area groups within each county

H_A: expressed rates of satisfaction with care services differ across small area groups within each county

Employing the small area aggregations constructed utilizing variable ZIPCODE of the respondent data, one-way ANOVA and Bonferroni *post hoc* techniques are again employed for isolation of population clusters for which responses regarding rates of satisfaction differ from the findings for the respective county as whole.

Data Analysis (H₆)

Research Question 6: Should disparities be demonstrated, what is the demographic composite of the zip code grouping(s) reflecting dissatisfaction with healthcare services available to their children — i.e. are ***demographic-based disparities*** identifiable?

H₀: no socioeconomic differences exist among respondents providing differing expressions of rates of satisfaction with care services received across all small area groups within each county

H_A: socioeconomic differences exist among respondents providing differing expressions of rates of satisfaction with care services across all small area groups within each county

For those subpopulations demonstrating a statistically significant difference in respondent indications of satisfaction multivariate regression analysis will be applied to derive demographic inference of the composition of the dissimilar sub-populations. The regression model will serve to identify those data elements which are uniquely correlated to small area populations expressing

satisfaction rates different from the county population as a whole, and will further support discovery of interaction effects among data variables which may demonstrated in the resultant findings.

Summary

Representative data from the PRC east Central Florida assessment have been selected to define geographic and sociodemographic components of the study population. Aggregations of the data by logical subpopulation groupings will facilitate analysis of key variables representing access to and satisfaction with community healthcare services.

Four statistical techniques will be employed within this research — Proportional Reduction in Error, one-way ANOVA, *t*-test, and multivariate regression analysis — employed so as to successively probe more deeply into the socioeconomic data associated with the respondent subpopulations which comprise the aggregate data. In each modeling scenario the respondent data will be assessed to determine whether evidence of disparity exists within the east Central Florida community.

The following chapters present the procedural application of the research and the associated findings of the analysis.

CHAPTER 4: RESULTS

Hypothesis Testing Results

The previous chapter highlighted elements of the dataset to be employed, as well as detailed the research approach and statistical tools and techniques to be applied in testing the research questions previously posited. In this chapter a comprehensive specification of the research process and statistical findings for each research hypothesis is provided. Where statistical significance is determined summary assessment and implications are offered, findings which are more fully explored in the final chapter of this work.

Successively deeper levels of analysis are undertaken for each of the access and satisfaction indicators, assessing the data for each at the county and then small area levels to vet indications of disparity within the respondent data.

Research Questions: Access to Healthcare Services

Focus and process

The purpose of the first three research questions was to test the uniformity of respondent's access to care across and within the four counties represented in the study. Responses to the survey variable PROVIDER [Q019: Is there a particular place that you usually take this child if he/she is sick or you need advice regarding this child's health?], provide the primary data source. The focus of the research questions was to probe the responses at successively greater levels of detail to identify indications of disparate expressions of access to care

services and, if present, to examine the underlying factors associated with disparity.

Research Question 1 proposes querying the extent to which respondent experiences were found to be similar ***between the four counties*** surveyed;

Research Question 2 proposes assessing the variability of responses ***within each of the counties***, employing small area analysis to compare responses based upon the participant's residence zip code; and

Research Question 3 proposes probing the composite demographics between small areas within each county demonstrating statistically significant ***differences in respondent experiences***.

Because the PROVIDER variable is comprised of nominal data there were recognized limits in the types of statistical techniques which might be employed, as well as limitations in assessing the causal nature of the relationship between the variables. Measures of proportional reduction in error (PRE) were first employed to measure relationships between the dependent and independent variables in the analysis of the access to care research questions, and OLS procedures were applied to further validate statistical relationships and findings.

Data Analysis (H₁)

Research Question 1: Among all four central Florida counties surveyed, is the rate of access to care services indeed comparable **at the county level** — do we find parents enjoy an equal ability to access needed services for their children across all four counties? To reiterate, the associated hypotheses for this research question:

H₀: expressed rates of access to healthcare services are equivalent across all four counties

H_A: expressed rates of access to healthcare services differ across the counties

The symmetric PRE statistics for nominal data were evaluated to test non-dependent relationships with the (i) contingency coefficient, (ii) Phi, and (iii) Cramer's V generated for the data. Key findings are reflected in Table 4.

Table 4. PRE Statistics: Access by County

<u>Statistic</u>	<u>Value</u>	<u>Approx. Sig</u>
Phi	0.064	0.058
Cramer's V	0.064	0.058
Contingency Coefficient	0.064	0.058

* - indicates significance at the 0.05 level

Analysis of the data under PRE methodologies provides marginal supporting evidence to reject the null hypothesis of equivalent expressions of access to care across the four counties surveyed. The findings, just slightly

below the 95% significance level, marginally support rejection of the null, possibly suggesting that differences do exist between the counties and that reported access may not be consistent among the populations thus represented.

However, these findings are tempered by interpreting the strength of the actual correlation reflected under this hypothesis. Assessing these results we can say with some confidence that the ability to ascertain a respondent's satisfaction with their access to care is enhanced by approximately 6.4% by knowing the county in which they live. This is admittedly a helpful, but not compelling, finding.

To further test this hypothesis, interval-level transformation of the PROVIDER variable and OLS assessment under *t*-testing was performed. Mean scores of the responses to the access scores were calculated for each county and compared to the grand mean of the east Central Florida region. As provided in Table 5, assessment of the interval-level representations of the data strongly represents statistical significance in differences among the county-level data.

Table 5. *t*-Test Results for Differences in Access by County and Region

County	East Central Florida Region Mean = .9325			
	Mean	N	t	Sig. Value
Brevard	.9464	379	5.884	.000*
Orange	.9219	925	-4.723	.000*
Osceola	.9122	192	-6.293	.000*
Seminole	.9593	311	8.868	.000*

* - indicates significance at the 0.05 level

These data reflect that, overall, respondents from the four county community indicate favorable access to services, with residents of Seminole county expressing the greatest enjoyment of access and residents of Osceola

county expressing the least. Evaluation of the county mean scores relative to the region as a whole reflects that differences in access rates are indeed statistically different, and there is consistency, therefore, between both the PRE and OLS methodologies providing statistical evidence to reject the null hypothesis. The data thus suggest that access is not consistently enjoyed across the four county service region, and the null hypothesis of equivalent access to care across all counties is rejected. Further analysis under the second hypothesis is therefore warranted to assess indicators of small area differentials.

Data Analysis (H₂)

Research Question 2: Within each of the counties surveyed, are the rates of access to care services consistent across all population groups comprising that county, or are disparate levels of access to services demonstrable **among small area zip code groupings** of healthcare consumers?

H₀: expressed rates of access to care services are equivalent across all small area groups within each county

H_A: expressed rates of access to care services differ across small area groups within each county

At this step in the analysis the respondent data was aggregated by the ZIPCODE variable [Q002: And would you please tell me which ZIP Code you live in?] so as to employ small area assessment of the respective subpopulations. The data was again assessed under PRE techniques to facilitate analysis of the respondent data at a sub-county level, enabling isolation of small area population

clusters for which responses regarding access differ from the findings for the respective county as whole. Once aggregated, the contingency coefficient, Phi, and Cramer's V statistics were again generated and assessed. Key findings are reflected in Table 6.

Table 6. PRE Statistics: Access by Small Area

<u>County</u>	<u>Statistic</u>	<u>Value</u>	<u>Approx. Sig.</u>
Brevard	Phi	0.212	0.909
	Cramer's V	0.212	0.909
	Contingency Coefficient	0.212	0.909
Orange	Phi	0.248	0.015*
	Cramer's V	0.248	0.015*
	Contingency Coefficient	0.248	0.015*
Osceola	Phi	0.165	0.920
	Cramer's V	0.165	0.920
	Contingency Coefficient	0.165	0.920
Seminole	Phi	0.291	0.010*
	Cramer's V	0.291	0.010*
	Contingency Coefficient	0.291	0.010*

* - indicates significance at the 0.05 level

Statistical differences are demonstrated within the small areas comprising Orange and Seminole counties. As outlined above, OLS techniques were employed utilizing transformed data to validate the findings. For this analysis, mean scores were generated at the zip code level to produce a measurement indicator for each small area. A *t*-test procedure was performed to compare the individual small area means with the composite group mean score for the county from which they were derived. The results of this analysis are presented in Table 7.

Table 7. *t*-test Results for Differences in Small Area Composite Mean and County Mean

<u>County</u>	<u>County Mean</u>	<u>Small Area Mean</u>	<u>N</u>	<u>T</u>	<u>Sig .Value</u>
Brevard	.9464	.9517	27	.406	.688
Orange	.9219	.9291	37	.554	.583
Osceola	.9122	.9145	13	.128	.900
Seminole	.9593	.9175	13	-1.318	.212

* - indicates significance at the 0.05 level

In this analysis no statistically significant differences were observed among the small areas, and congruence with the PRE indicators is therefore not demonstrated. As delineated in the research design discussion in Chapter 3, the limitations in evaluating nominal-level data consistency were to be addressed through the employment of parallel techniques with results to be validated by consistent findings between approaches. The findings with regard to this hypothesis are herein indeterminate, with insufficient support to reject the null hypothesis without concern for committing a Type I error.

The null hypothesis thereby fails to be rejected, and analysis of access to care under Research Question 3 is not undertaken.

Research Questions: Satisfaction with Healthcare Services Received

Focus and process

The purpose of the three research questions related to satisfaction was to test the uniformity of respondent's satisfaction with the care services received across and within the four counties represented in the study. Responses to the

survey variable QUALITY [Q020: How would you rate the overall health care services received at this particular place?] provide the primary data source in assessing these questions. Consistent with the process employed above to assess respondent perceptions of access to care, the research questions probing satisfaction measures were structured so as to explore the response data at successively greater levels of detail.

Research Question 4 probed the extent to which respondent experiences were found to be similar ***between the four counties*** surveyed;

Research Question 5 assessed the variability of responses ***within each of the counties***, employing small area analysis to compare responses based upon the participant's residence zip code; and

Research Question 6 probed the demographic composite between small areas within each county demonstrating statistically significant ***differences in respondent experiences***.

Analysis of variance testing was principally employed to evaluate the consistency of responses at the county and small area levels, and multivariate regression analysis was employed to elucidate the geographic and socio-demographic differences between disparate small area groups. As noted above, ANOVA methodology requires random and independent selection of samples

taken from a normally distributed population. Graphical review of the data revealed a positive skew in the SATISFACTION variable data. A base-10 logarithmic transformation of the data was performed to normalize the QUALITY variable. Further, because ANOVA procedures require a minimum of three cases per sub-grouping for analysis, the dataset was refined to exclude from analysis any small area zip code groups with fewer than three cases. Seven zip code areas were thus identified for exclusion as detailed in Table 8.

Table 8. PRE Statistics: Access by Small Area

<u>County</u>	<u>N</u>	<u>Zip Code</u>	<u>SPSS Variable Code</u>
Brevard	1	32920	64
	2	32931	69
	1	32949	74
	1	32950	75
	1	32976	80
Orange	None		
Osceola	2	34773	95
Seminole	2	32730	08

Where statistical significance was demonstrated under ANOVA testing the Bonferroni *post hoc* correction method was applied to statistically differentiate the group findings so as to identify the specific counties demonstrating respondent differences in their comparative levels of satisfaction. The process thus guided the analysis to focus review on populations and small areas with demonstrable differences in experience and response.

Data Analysis (H₄)

Research Question 4: Among all four central Florida counties surveyed, are expressed rates of satisfaction with care indeed comparable **at the county level** — do we find parents “equally satisfied” with the services available to their children across all four counties?

H₀: expressed satisfaction with healthcare rates are equivalent across all four counties

H_A: expressed satisfaction with healthcare rates differ across the counties

Logarithmically-adjusted responses from the variable QUALITY [Q020: How would you rate the overall health care services received at this particular place?] were selected and aggregated by responses from the COUNTY variable [Q001: County of residence]. These county-level responses were tested using one-way ANOVA to determine whether one or more of the county sample means of the selected SATISFACTION variables were statistically different than the other counties in the study population.

The summary results of these analyses are provided reflected in Tables 9, 10, and 11.

Table 9. Case Summaries of Satisfaction Measured by County

<u>Would you please tell me in which County you live?</u>	<u>Mean</u>	<u>N</u>	<u>Std. Deviation</u>
Brevard County	1.7560	352	.95626
Orange County	1.7864	850	.95834
Osceola County	1.9928	171	1.00999
Seminole County	1.7716	296	.92238
Total	1.7985	1670	.95853

Table 10. ANOVA Assessment of Satisfaction Measured by County

	<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Between Groups	.388	3	.129	2.841	.037
Within Groups	75.703	1665	.045		
Total	76.091	1668			

Table 11. Bonferroni *Post hoc* Assessment of Satisfaction Measured by County

(I) Would you please tell me in which County you live?	(J) Would you please tell me in which County you live?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Brevard County	Orange County	-.00685	.01351	1.000	-.0425	.0288
	Osceola County	-.05472*	.01987	.036	-.1072	-.0022
	Seminole County	-.00735	.01681	1.000	-.0518	.0371
Orange County	Brevard County	.00685	.01351	1.000	-.0288	.0425
	Osceola County	-.04788*	.01787	.045	-.0951	-.0007
	Seminole County	-.00050	.01439	1.000	-.0385	.0375
Osceola County	Brevard County	.05472*	.01987	.036	.0022	.1072
	Orange County	.04788*	.01787	.045	.0007	.0951
	Seminole County	.04738	.02048	.125	-.0067	.1015
Seminole County	Brevard County	.00735	.01681	1.000	-.0371	.0518
	Orange County	.00050	.01439	1.000	-.0375	.0385
	Osceola County	-.04738	.02048	.125	-.1015	.0067

* The mean difference is significant at the 0.05 level

The ANOVA between-groups statistic indicates statistical significance in the inter-county responses supporting the assumption of differences in the expressed rates of satisfaction among the counties surveyed. The case summaries data presented in Table 9 are of particular interest in that the mean satisfaction scores for Brevard, Orange and Seminole counties are closely clustered at 1.7560, 1.7864, and 1.7716 respectively, thus supporting interpretation of a generally consistent expression of satisfaction among respondents from those three counties. However, assessment of responses from the residents of Osceola county present a noticeably different experience, with a satisfaction mean score of 1.9928 approximating a 13% less favorable

rating than that reported by the other three counties. Further, variability within the Osceola county scores is also slightly greater than that comparably evidenced within the other counties. The data thus appear to reflect the fact that, in aggregate, residents of Osceola county appear generally less satisfied with the care services provided to children and adolescents than are the residents of the other counties surveyed. Table 10 reflects that the ANOVA between-groups statistic is significant providing evidence that, at the county level of assessment, the rates of satisfaction with care services received do indeed differ within the survey population. The null hypothesis that satisfaction rates are equivalent across all four counties is therefore rejected.

The Bonferroni *post hoc* testing indicates that the significance in response differences is found between Osceola and Orange and Brevard counties. Research Question 5 will further probe these differences among survey respondents to further identify any subpopulations which do not share the majority view of satisfaction with healthcare services received. Should disparate groups be identified, characteristics of these varying population groupings will be examined under Research Question 6.

Data Analysis (H₅)

Research Question 5: Within each of the counties surveyed, are expressed rates of satisfaction with care consistent across all population groups comprising that county, or are disparate levels of expressed satisfaction demonstrable ***among small area zip code groupings*** of healthcare consumers?

H₀: expressed rates of satisfaction with healthcare services received are equivalent across all small area groups within each county

H_A: expressed rates of satisfaction with healthcare services received differ across small area groups within each county

The following data variables were represented in this phase of analysis:

- 1) the logarithmically-adjusted responses from QUALITY (Q020: How would you rate the overall health care services received at this particular place?) were utilized to represent a measure of satisfaction;
- 2) ZIPCODE (Q002: And would you please tell me which ZIP Code you live in?) provided data necessary for small area determination; and
- 3) the dataset was split in SPSS by COUNTY (Q001: Would you please tell me in which County you live?) to enable separate analyses by individual counties.

The data was again assessed under one-way ANOVA techniques to facilitate analysis of the respondent data at a sub-county level, enabling isolation of small area population clusters for which responses regarding access differ from the findings for the respective county as whole. The dataset was split by county in SPSS, and the responses inherent to the small areas within each county were run against each other to assess observable differences in responses. The key focus of the ANOVA modeling in this portion of the analysis

is the identification of counties exhibiting significant between-groups variance, and the review of the small area groupings therein indicating statistically significant differences one from another.

Table 12 provides the composite results of the statistical analysis for the between-groups analysis.

Table 12. Composite ANOVA Between-Groups Analysis

		<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
Brevard	Between Groups	0.820	21	0.039	0.862	0.641
	Within Groups	14.945	330	0.045		
	Total	15.765	351			
Orange	Between Groups	5.517	36	0.153	3.713	.000*
	Within Groups	33.561	813	0.041		
	Total	39.078	849			
Osceola	Between Groups	0.319	10	0.032	0.638	0.780
	Within Groups	7.946	159	0.050		
	Total	8.265	169			
Seminole	Between Groups	0.317	11	0.029	0.664	0.772
	Within Groups	12.279	283	0.043		
	Total	12.596	294			

* Indicates significance at the 0.05 level

The between-groups data did not reflect statistical significance of response differences among the Brevard, Osceola, and Seminole county respondents, therefore indicating general agreement of satisfaction with regard to the healthcare services received by the child and adolescent populations within

their respective communities. *Post hoc* analysis were thus not indicated within Brevard, Osceola, and Seminole counties.

In contrast, the between-groups statistic for Orange county indicated significant differences in the responses regarding satisfaction with care among the representative small area groups. The Bonferroni *post hoc* testing was conducted to examine the intra-group, small area differences within the county data. A composite of the statistically significant findings between small areas is reflected Table 13.

Table 13. Small Area Satisfaction Differentials; Composite Significant Bonferroni Values by Small Area

	32703	32789	32792	32806	32808	32809	32810	32811	32812	32817	32824	32829	32839	34761
32703														
32789	--													
32792	--	--												
32806	--	--	--											
32808	--	--	--	--										
32809	0.006	--	0.040	0.004	--									
32810	--	--	--	--	--	0.002								
32811	--	--	--	--	--	--	0.023							
32812	--	--	--	--	--	--	0.038	--						
32817	--	--	--	--	--	0.049	--	--	--					
32824	0.008	--	--	0.005	--	--	0.002	--	--	--				
32829	--	--	--	--	--	--	0.042	--	--	--	--			
32839	0.019	--	--	0.012	--	--	0.005	--	--	--	--	--		
34761	--	--	--	--	--	0.041	--	--	--	--	--	--	--	

As indicated, significance is indicated between a number of small areas, most notably among zip code group 32810 and five other small areas. Table 14 presents a demographic composite of the small areas identified. Evidenced by the demographic snapshot, the counties in question demonstrate considerable differences in their socioeconomic makeup. Of interest, zip code area 32810

represents a dividing point between the upper and lower economic stratifications, but is somewhat less racially diverse than some of the more relatively affluent small areas. However, with regard to relative measures of satisfaction, the calculated differential satisfaction does not seem to indicate that satisfaction is based on race and/or income alone. These results are indeed intriguing, and the relative size and diverse makeup of Orange county provide opportunity to further probe dimensions of disparity within these data.

Table 14. Selected Small Area Group Demographics

	<u>32811</u>	<u>32839</u>	<u>32810</u>	<u>32824</u>	<u>32829</u>	<u>32812</u>
Average Housing Value	68,700	86,800	88,600	108,300	102,500	122,400
Average Income Per Household	32,984	31,200	39,185	45,787	53,719	44,566
Median Age	28.7	29.8	31.7	32.6	35.6	35.3
White	11,266	18,184	20,215	12,982	2,783	29,532
Black	18,023	14,367	8,697	2,276	231	2,349
Hispanic	4,333	10,767	4,665	8,496	1,084	7,578
Asian	1,013	1,674	912	811	109	809
Indian	93	129	136	104	21	108
Hawaiian	30	61	19	23	0	16
Other	<u>1,555</u>	<u>3,657</u>	<u>1,578</u>	<u>2,287</u>	<u>301</u>	<u>2,053</u>
TOTAL:	36,313	48,839	36,222	26,979	4,529	42,445
Males	16,166	21,784	16,129	9,494	1,705	17,414
Females	<u>17,225</u>	<u>18,673</u>	<u>16,494</u>	<u>9,833</u>	<u>1,860</u>	<u>18,538</u>
TOTAL:	33,391	40,457	32,623	19,327	3,565	35,952
Percent White	31%	37%	56%	48%	61%	70%
Percent Black	50%	29%	24%	8%	5%	6%
Percent Hispanic	12%	22%	13%	31%	24%	18%
Percent Male	48%	54%	49%	49%	48%	48%
Percent Female	52%	46%	51%	51%	52%	52%
Differential Satisfaction	-0.237	-0.259		-0.2708	-0.1523	-0.2142

SOURCE: <http://www.zip-codes.com> ; extracted 08.28.10

Based upon the intra-county results, the null hypothesis of equivalency of expressed rates of satisfaction across the small area groups within Orange

county was therefore rejected, and Research Question 6 was undertaken to employing analysis of key demographic variables identified in the extant literature underlying community disparities in healthcare services.

Data Analysis (H₆)

Research Question 6: Should disparities be demonstrated, what is the demographic composite of the zip code grouping(s) reflecting dissatisfaction with healthcare services available to their children — i.e. are **demographic-based disparities** identifiable?

H₀: no socioeconomic differences exist among respondents providing differing expressions of rates of satisfaction with healthcare services received across all small area groups within each county

H_A: socioeconomic differences exist among respondents providing differing expressions of rates of satisfaction with healthcare services received across all small area groups within each county

A regression equation was conceptualized to probe the differences among the significant small area groups, testing the relative influence which the demographic variables may exert upon ratings of satisfaction with care services. Data analysis was restricted to just those Orange county small areas demonstrating significant differences in the responses regarding satisfaction with care. Where necessary, data were transformed to provide for discrete independent variables and were regressed on the dependent QUALITY variable.

An initial model was specified as:

(Equation 6. Conceptual Small Area Multivariate Regression Model)

$$\hat{Y}_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_j (X_1 * X_2) + \beta_j (X_1 * X_3) + \beta_j (X_2 * X_3) + \dots + \beta_k (X_1 * X_2 * X_3) + \beta_k (X_1 * X_2 * X_4) + \beta_k (X_1 * X_2 * X_5) + \dots + \beta_l (X_1 * X_2 * X_3 * X_4 * X_5 * X_6 * X_7) + \epsilon_i$$

where:

\hat{Y}_i :	ln QUALITY
MALE:	0 = no, 1 = yes
BLACK:	0 = no, 1 = yes
WHITE:	0 = no, 1 = yes
HISPANIC:	0 = no, 1 = yes
EDUCATION:	highest grade level achieved by respondent
PRIVATE_INSURANCE:	0 = no, 1 = yes
SELF_INSURE:	0 = no, 1 = yes
ϵ_i :	stochastic error term

such that all possible combinations of variables were tested, allowing for evaluation of individual variables, as well as the interaction effects possible via all multiple combinations of the demographic variables. Non-significant variables and combinations were eliminated from the model, and the regression was re-conceptualized and run employing only statistically significant elements. Tables 15 and 16 present the results of final model runs.

Table 15. Final Multiple Regression Model ANOVA on Key Demographic Factors

<u>Model</u>	<u>R</u>	<u>R Square</u>	<u>Adjusted R Square</u>	<u>Std. Error of the Estimate</u>
- 1	.299 ^a	.090	.080	.20029

<u>Model</u>		<u>Sum of Squares</u>	<u>df</u>	<u>Mean Square</u>	<u>F</u>	<u>Sig.</u>
1	Regression	2.603	7	.372	9.271	.000 ^a
	Residual	26.442	659	.040		
	Total	29.045	666			

a. Predictors:

- o *Constant*
- o *HISPANIC*: Is (he/she) of Hispanic or Latino origin, or is your family originally from a Spanish-speaking country?
- o *PRIVATE_INSURANCE*: Does this child have any PRIVATE HEALTH insurance that pays for medical bills?
- o *SELF_INSURE*: Or, do you have NO health insurance coverage and pay for this child's healthcare on your own?
- o *EDUCATION*: What is the highest grade or year of school YOU have completed?
- o *BLACK*: Black [Y/N]
- o *WHITE*: White [Y/N]
- o *BLACK*EDUCATION*
- o *WHITE*PRIVATE_INSURANCE*

b. Dependent Variable: SAT2

Table 16. Final Multiple Regression Model Coefficients^a

<u>Model</u>	<u>Unstandardized Coefficients</u>		<u>Standardized Coefficients</u>		<u>Sig.</u>
	<u>B</u>	<u>Std. Error</u>	<u>Beta</u>	<u>t</u>	
1 (Constant)	.594	.075		7.896	.000
WHITE	-.298	.095	-.669	-3.137	.002
PRIVATE_INSURANCE	-.124	.024	-.201	-5.238	.000
BLACK	-.482	.170	-.642	-2.831	.005
EDUCATION	-.054	.014	-.258	-3.899	.000
WHITE* PRIVATE_INSURANCE	.050	.017	.650	2.872	.004
BLACK*EDUCATION	.088	.034	.583	2.598	.010
HISPANIC	.037	.022	.065	1.659	.098

a. Dependent Variable: SAT2

Based upon these results, the model in final form yields the following:

(Equation 7. Final Small Area Multivariate Regression Model)

$$\ln \text{QUALITY} = \beta_0 - 0.669(\text{WHITE}) - 0.201(\text{PRIVATE_INSURANCE}) - 0.642(\text{BLACK}) - 0.258(\text{EDUCATION}) + 0.650(\text{WHITE} * \text{PRIVATE_INSURANCE}) + 0.583(\text{BLACK} * \text{EDUCATION}) + 0.065(\text{HISPANIC}) + \varepsilon_1$$

where:

BLACK:	0 = no, 1 = yes
WHITE:	0 = no, 1 = yes
HISPANIC:	0 = no, 1 = yes
EDUCATION:	highest grade level achieved by respondent
PRIVATE_INSURANCE:	0 = no, 1 = yes
BLACK * EDUCATION:	interaction term
WHITE * PRIVATE_INSURANCE:	interaction term
ε_i :	stochastic error term

To reiterate, satisfaction was measured on a Likert scale with the value of “1” indicating greatest satisfaction, and the value “5” designating least satisfaction. The data model was constructed evaluating the impact of the variables on the base-10 log transformation of the SATISFACTION variable, yielding variables which were individually statistically significant (the “primary effect” variables), as well as variables which, when combined, yielded statistically significant impact on the predicted value of the dependent SATISFACTION variable (the “correlation effects”).

Evidenced by Table 15, the final model yields an R^2 value of 0.09, indicating that the model has explained approximately 9% of the variability around the mean through inclusion of the demographic variables as input factors. While the significant amount of remaining variability may be due to additional

factors external to the model, of specific interest within the explained variation is the interpretation of the independent demographic variables, highlighted below.

Primary effects

Review of the significant variables provides support that the findings are indeed consistent with theoretical underpinnings of disparity. Specifically, the final model illustrates statistical differences in perceived satisfaction with healthcare services received based on the respondent's race and ethnicity, with race-based variables negatively correlated and ethnicity indicators positively correlated to the dependent variable indicator of satisfaction. Interpretation of the model's race and ethnicity variable coefficients demonstrates that, among the small areas studied, White race exerts an incrementally greater relative influence upon greater ratings of satisfaction, followed by Black race. The model further demonstrates that Hispanic ethnicity is an indicator of lower rates of satisfaction. With regard to demographic composition, we can thus assert that non-Hispanic White and Black respondents are respectively most satisfied with their care.

Two other variables, Private Insurance and Educational Attainment, were significant in their primary effects in relation to the dependent variable. Both of these variables reflected negative correlations to the satisfaction score, indicating that respondent possession of private healthcare insurance and/or achievement of greater levels of education independently asserted influence on greater levels of respondent satisfaction. These indicators are similarly consistent with the disparities literature and provide findings which are consistent with the theoretical

formulation of the model. Interestingly, both of these variables are also important in their compound influence with other variables, further explored in the correlation effects discussion below.

Correlation effects

Further demonstrated in the final regression model is the existence of notable interactions among some of the significant data variables. These interactions, or correlation effects, are found between a number of the variables demonstrating primary significance. Specifically, the model reflects a mitigation of the impact of primary effect factors when multiple conditions are present.

In the model, the combination of Black race with Education positively correlates to the dependent variable, as does the interaction of White race with Private Insurance. Within the context of the model, as positively correlated variables the effect of the interactions is to raise the predicted value of the dependent variable measuring satisfaction thereby indicating a lower satisfaction rating. The practical implications of this interaction suggest that while the presence of multiple indicators is indeed important, there is a mediating of the effect in the presence of multiple indicators.

Consider the cohort of white individuals possessing private healthcare insurance. By application and interpretation of the regression equation coefficients, it would be expected that the predicted satisfaction rating would be positively impacted by each of White race, a -0.669 effect on \ln QUALITY, as well as by possessing Private Insurance, a - 0.201 effect. In a similar vein, the

instance of black individuals possessing advanced levels of education it would support predicted satisfaction rates to be positively impacted by each of Black race and Educational Attainment, with effects of -0.642 and -0.258 respectively on the SATISFACTION variable score. In each of these instances, the individual primary effects of the variables are predictors of increased satisfaction.

Interestingly, however, the data model reveals a uniquely different effect realized through the interaction of these significant primary independent variables.

When multiple conditions exist wherein respondents of White race possessing private healthcare insurance, or respondents of Black race possessing increasingly greater levels of educational achievement, a negative effect on the satisfaction rating is observed. The interaction of these indicators one with another in effect reduces the overall indication of satisfaction. The coefficients of the interaction variables actually reverse the direction of the predicted satisfaction score such that there is a mediating impact of the primary effect of the variables. While it would have been expected that white respondents with private healthcare insurance, or black respondents possessing higher levels of education, would be very satisfied with the care services received, the model instead demonstrates that predicted satisfaction among these respondent groups is instead significantly lower than initially assumed. These interaction effects exerted by Private Insurance and Educational Attainment on the SATISFACTION variable present interesting implications for further analysis, research, and public policy formulation, all of which are discussed in greater detail in the final chapter.

Summary

This research has identified indications of disparity among the study population and, specifically, among small area population groups within the geographic counties surveyed. Notably, it was demonstrated at the county level that perceived experiences both in access to, and satisfaction with, healthcare services differed among the participants by county of residence. Further exploration of the data at the small area level failed to provide additional differentiation of experiences in access to care, but significance in assessments of satisfaction with services received was demonstrated in the small area assessment of Orange county. Primary effect assessment of the demographic variables representing the respondents of these small areas yielded findings generally consistent with theoretical expectations of disparity, but the correlation effects of Private Insurance and Educational Attainment on the SATISFACTION variable provided unique mediation of the positive influences of the demographic factors provided on an independent basis. These findings offer opportunity for further analysis, research, and public policy formulation, all of which are discussed in greater detail in the final chapter.

CHAPTER 5: SUMMARY AND CONCLUSIONS

The purpose of this dissertation research was initially described as an exploration of disparities within the east Central Florida child and adolescent healthcare services market, and was conducted as a follow-up study to work completed in 2005 under the direction of the Health Council of East Central Florida assessing parental perceptions of community child and adolescent healthcare services. This research further extended the PRC evaluation by assessing indications of disparity within the survey data by examining parental indicators of access to, and satisfaction with, community child and adolescent healthcare services.

Within the context of the PRC study data respondent findings were assessed at the county, small area zip code group, and respondent demographic levels to identify and understand the extent to which service disparities are perceived to be experienced within the local community. These indications and findings are herein examined with regard to interpretation and potential implication to local healthcare providers and health policy makers.

Table 17 presents the summary findings of the research.

Table 17. Summary Research Findings

RESEARCH QUESTION	RESEARCH CATEGORY	RESEARCH TYPE	RESEARCH FINDING
01	Access	Proportional Reduction in Error / <i>t</i> -test	REJECT the null that expressed access to service rates are equivalent across all four counties
02	Access	Proportional Reduction in Error / <i>t</i> -test	FAIL TO REJECT the null that access to service rates are equivalent across all small areas within the counties surveyed
03	Access	N/A	NOT ASSESSED as differences in access to care not established at the small area level
04	Satisfaction	One-Way ANOVA / Bonferroni <i>post hoc</i> testing	REJECT the null that expressed satisfaction rates are equivalent across all four counties
05	Satisfaction	One-Way ANOVA / Bonferroni <i>post hoc</i> testing	REJECT the null expressed satisfaction rates are equivalent across all zip code groups within Orange county; and FAIL TO REJECT the null expressed satisfaction rates are equivalent across all zip code groups within Brevard, Osceola, and Seminole counties
06	Satisfaction	Multiple Regression Analysis	REJECT the null that no socioeconomic differences exist among respondents providing differing expressions of satisfaction rates across all zip code groups within each county; identified significant variables and interaction effects correlated with satisfaction scores

Discussion of Findings

Analysis of the data provided the following insights and findings with regard to the perceptions of the provision of community child and adolescent healthcare services.

Research focus: Access to care

The data variable PROVIDER [Q019: Is there a particular place that you usually take this child if he/she is sick or you need advice regarding this child's health?] served as the primary variable of focus. These data were aggregated by the COUNTY variable [Q001: County of residence] and the ZIPCODE variable [Q002: And would you please tell me which ZIP Code you live in?] so as to employ small area assessment of the respective subpopulations and to quantitatively address the following research questions:

Research Question 1: Among all four central Florida counties surveyed, is the rate of access to care services indeed comparable **at the county level** — do we find parents enjoy an equal ability to access needed services for their children across all four counties?

Research Question 2: Within each of the counties surveyed, are the rates of access to care services consistent across all population groups comprising that county, or are disparate levels of access to services

demonstrable ***among small area zip code groupings*** of healthcare consumers?

Research Question 3: Should disparities be demonstrated, what is the *demographic composite* of the small area zip code grouping(s) exhibiting limited access to necessary healthcare services for their children — i.e. ***are demographic-based disparities*** identifiable?

The data reflected that survey respondents provided generally favorable indications of access to services, but that statistical differences in their aggregate responses were noted at the county level. It was specifically noted that residents of Seminole county provided the most favorable expressions of access to services and that responses of Osceola county residents were least favorable. However, in further evaluation of the individual county responses the data did not support differentiation at the small group level, and therefore no analytical support was given to pursue demographics-level evaluation. At the county level it can only thus be surmised that differences in access may be due to macro-level issues such as (1) geography, (2) infrastructure, and/or (3) the healthcare asset base.

The physical geography of the county may be a crucial determinant considering that the spectrum of expressed access runs from most favorable in Seminole county, a highly suburban population center, to least favorable in Osceola county, a significantly rural locale. The unique dynamics of the physical

composition of these communities supports a different understanding of the availability of care services or, alternately, the challenges and barriers encountered in accessing care. The physical proximities inherent to accessing care in a medium density population center differ substantially from that of a community wherein significant physical distances may exist between residents and centers of healthcare services.

Underlying the differences in geography is the transportation infrastructure of the county — the road systems, travel times to care providers, access to public transportation, etc. As highlighted, transportation and transportation systems are demonstrated in the literature as key in support of healthcare consumer access to provider resources (Rosenbach, Irvin & Coulam, 1999; Larson, Schlundt, Patel, McClellan & Hargreaves, 2007; Flores & Tomany-Korman, 2008).

Finally, these issues are critical to access only to the extent that a sufficient stock of care providers exists within the community to adequately service the community healthcare services need. To the extent that the right mix of providers exists within the right physical locations, community demand may be well served. However, should a community lack specific services, or should geography cause undue difficulties in accessing service providers due to physical separations — conditions which are both often experienced in rural locales — then low expressed rates of access would most certainly be expected.

Research focus: Satisfaction with healthcare services received

Data from the logarithmically-adjusted responses from the QUALITY [Q020: How would you rate the overall health care services received at this particular

place?] variable served as the primary variable of focus. These data were further aggregated by the COUNTY [Q001: County of residence] variable and the ZIPCODE [Q002: And would you please tell me which ZIP Code you live in?] variable so as to employ small area assessment of the respective subpopulations, enabling quantitative assessment of the following research questions:

Research Question 4: Among all four central Florida counties surveyed, are expressed rates of satisfaction with care indeed comparable **at the county level** — do we find parents “equally satisfied” with the services available to their children across all four counties?

Research Question 5: Within each of the counties surveyed, are expressed rates of satisfaction with care consistent across all population groups comprising that county, or are disparate levels of expressed satisfaction demonstrable **among small area zip code groupings** of healthcare consumers?

Research Question 6: Should disparities be demonstrated, what is the demographic composite of the zip code grouping(s) reflecting dissatisfaction with healthcare services available to their children — i.e. are **demographic-based disparities** identifiable?

The data reflected that survey respondents were generally favorable in their indications of satisfaction with healthcare services received by their child / adolescent and that, at the county level, statistical differences were noted between Brevard, Orange, and Osceola counties. Within the county evaluation it was further noted that residents of Osceola county indicated the lowest expressions of satisfaction in comparison to all other counties in the region.

More granular analysis of the data revealed statistical variations in the SATISFACTION variable among the small areas comprising Orange county. Nine of the small area zip code groups within the county demonstrated differences from one another, the results of which were explored further to determine the significant unique demographic factors as drivers of differentiation in the comparative small area satisfaction data. Analysis of these data indicated only one independent variable, Hispanic ethnicity ($\beta = 0.065$), to uniquely be positively correlated with the $\log_{(10)}$ value of the SATISFACTION variable. As Hispanic ethnicity is represented in the data as a dichotomous variable the interpretation of the primary effect of this relationship is straightforward. A positive response increases the numerical score of the dependent satisfaction measure of the SATISFACTION variable, thus indicating a lower expression of satisfaction with services received. Conversely, as unique factors, the independent variables White race, Black race, possession of Private Insurance and Educational Attainment all exhibited negative correlations with the SATISFACTION variable score reflecting healthcare services received, with beta values relative to the $\log_{(10)}$ value of satisfaction of -0.669, -0.642, - 0.201, -0.258 respectively .

Logically, the negative primary effect of these independent factors serves to decrease the numerical score of the dependent satisfaction measure of the SATISFACTION variable, thus indicating a higher expression of satisfaction with services received.

In that racial and ethnic disparities have been demonstrated in the literature (Beal, Co, Dougherty, Jorsling, Kam, Perrin & Palmer, 2004; Moy, Dayton & Clancy, 2005) the positive correlation between satisfaction and Hispanic ethnicity and the negative correlation between satisfaction and White race is consistent with the theoretical expectations of the model. While the negative relationship between Black race and satisfaction is initially somewhat surprising — suggesting Black race is a contributing factor in the increasing satisfaction — assessment of the race and ethnicity factors of the model as a whole provides consistency within the theoretical framework. The model evidences that, of the individuals studied, White respondents were relatively most satisfied with care services received ($\beta = -0.669$), followed closely by respondents of Black race ($\beta = -0.642$), and finally respondents of Hispanic ethnicity ($\beta = 0.065$). The model suggests that, in aggregate, non-White individuals are indeed relatively less satisfied with care services received. Further, the data suggests that, while slightly less satisfied with services than White respondents, Black respondents do provide indications of satisfaction with services received. Only Hispanic ethnicity exerts a diminution of the satisfaction rating.

Beyond the findings of racial and ethnic congruence to theoretical expectations the negative correlations between satisfaction and possession of Private Insurance and between satisfaction and Educational Attainment is similarly consistent with the disparities literature. Generally speaking, factors related to higher levels of education and possession of health insurance benefits would be hypothesized to correspond with greater satisfaction (Williams & Jackson, 2005; Rosenbach, Irvin & Coulam, 1999; Flores, Bauchner, Feinstein & Nguyen, 1999).

Against the consistency of these primary effects, it is the mitigating impact of the interaction effects that provide the most intriguing findings from this study. Relative to the $\log_{(10)}$ value of the SATISFACTION indicator, the SATISFACTION variable is positively correlated to the combination of Black race with higher levels of Educational Attainment ($\beta = 0.583$) as well as positively correlated with the combination of White race with Private Insurance ($\beta = 0.650$). As noted, while the primary effects of the Black and White race variables and the Private Insurance and Educational Attainment variables reflect directionally expected modeling, the correlation effects of these compound factors effectively reduce the impact of the variables primary effects and thereby decrease the overall prediction of the dependent indicator of satisfaction. The interaction effects thereby functionally reverse the direction of the impact of the factors on the calculation of the SATISFACTION variable score and thus reflect a mitigation of the positive influence of these factors on the overall ratings of satisfaction.

The mitigating effects of Private Insurance and Educational Attainment with their respective associated race variables seemingly underscores the rise of consumerism in healthcare and the enhanced expectations of consumers. Due to their restraining impact on the otherwise positive effects of selective race variables on perceived satisfaction, the possession of private insurance and advanced educational attainment serve to further aggregating cohort results within otherwise apparently satisfied populations. To the researcher, healthcare provider, and policy-maker alike, these mitigating effects provide notable indications that varied levels expectations within demographic subpopulations are also powerful determinants in the overall expression of satisfaction with care services.

Contributions of the Study

Healthcare disparities in child and adolescent services

This study adds to the healthcare disparities literature with regard to children and adolescents. As noted in the review of the literature, healthcare disparity issues may present differently in child and adolescent populations than that experienced by adults. As detailed, differences in the basic healthcare needs unique to each population, as well as the funding and resource availability specific to children's services may significantly alter the service experiences and, therefore, the disparities experience encountered by each group.

The findings of this study specifically support the general theoretical indications of racial- and ethnic-based disparity, but contribute the locally-

significant findings underscoring the importance of Private Insurance and increased Educational Attainment as further determinants in enhancing satisfaction with healthcare services received.

Focused community analysis

This study is unique in its (1) focus on healthcare disparity among the child and adolescent populations in east Central Florida, and (2) application of small areas analysis techniques in assessing disparity issues specific to our local community. This targeted approach and focus on community disparity issues provides for further understanding of local healthcare dynamics. Further, it provides an important benchmark for evaluation of ongoing service provision. Identification of underserved sub-populations and communities establishes targets for the improvement of existing services and development goals for new community offerings.

Policy Implications

This study has demonstrated indicators of disparities in the provision of healthcare for children and adolescents. In demonstrating differences at the county and small group levels this research has shown that residents do not express equivalent indications of access to, or satisfaction with, child and adolescent healthcare services across the four county study area.

With regard to access, this study has demonstrated the need for policy makers and providers to consider the volume and breadth of services needed across the service market. The finding of significant differences among Brevard,

Orange, and Osceola counties underscores the diversity of populations comprising the east Central Florida market. Again, considering the specific healthcare needs of children and adolescents, a focus on the availability of primary care facilities and providers is essential, the adequacy of which, as guided by the extant literature, is to be measured in terms of the number of available providers, the geographic coverage provided for by the healthcare entities, and the days and hours during which healthcare services are provided.

With regard to satisfaction this study has demonstrated differences in favorability by small area population groups. Clearly, the satisfaction with services received is not equally enjoyed by all, and providers and policy-makers are notably affected by their constituent's unique racial and ethnic composition, educational attainment, and access to private health insurance.

Limitations and Future Research

This study greatly expanded the functional purpose of the data beyond its initial intent, therefore a number of limitations and shortcomings were encountered while conducting this research. As the dataset was being stretched beyond its initial purpose, the data lacked the depth of resource desired in drilling down into granular levels of information. Whereas the data were initially collected for purposes of developing county level analyses, application of small area techniques, and regression analysis on individual demographic components within the small area zip code groups, resulted in small sample sizes and limited capabilities for generalizability.

Specific to the dataset, this study was primarily limited by the use of secondary data for an expanded scope of study. In this regard the composition of the data was problematic, specifically the need to utilize nominal-level data elements for core components of the analysis proved challenging, as well as limited the scope of disparity analysis which otherwise might have been performed. At a minimum, ordinal-level data would have proved useful in vetting the respondent's true ability to access care. Finally, the dataset was based upon respondent interviews, and was therefore subject to the distortions and biases naturally inherent to self-reported data. The dataset contains consumer's perceptions of reasonable access and satisfaction, both of which are highly subjective in interpretation. Economist Mark Pauly cautions that "the plural of anecdote is not data." While important, consumer expressions of preferences and attitudes are only one part of assessing the reality of a community phenomenon.

Specific to measurement of satisfaction, the mediating impact of the correlation effects needs to be more deeply explored. To more fully understand the nature of these discrepancies additional information needs to be gathered relative to the individual's specific experiences with their healthcare providers beyond Likert scale measurement. Delineating whether experiences were reflective of common interactions with a specific area provider, subject to restrictions imposed by a common insurance carrier, influenced by language and/or cultural barriers, etc. are necessary factors in fully understanding the individual dynamics of satisfaction.

With regard then to future research, the findings from this study are indeed interesting and merit further investigation to test the reasonableness of the analysis and the extent to which the findings of disparity are real. Additional study is warranted to further probe the communities and demographics identified within the Orange county small areas focus communities. Gathering a larger sample size and correcting for the data composition issues noted above, retesting the area for generalizable findings would be a crucial first step toward more deeply identifying the disparity factors in this community. Should a more robust analysis of the identified populations reflect demonstrable differences in these targeted areas, a small area approach throughout the full study area may prove an invaluable tool in understanding community needs and enhancing the provision of care services to this community's child and adolescent populations.

Summary

This work has provided a construct for the evaluation of disparities in the provision of child and adolescent healthcare services throughout the east Central Florida healthcare services market. Building on an assessment previously conducted within the market under the direction of the Health Council of East Central Florida, statistical evaluation at the county and small area zip code group level enabled aggregation of parent responses concerning the healthcare services being provided for their children.

Parent's perceptions of the ability to access necessary healthcare services, and their associated satisfaction with the quality of the care received by

their child, were evaluated across and within Brevard, Orange, Osceola, and Seminole counties to assess the consistency of, and divergence among, participant responses. Differences in parental perceptions of access were demonstrated at the county level, and distinctions in satisfaction with services received were demonstrated among unique demographic groups residing in Orange county. Finally, within the demographic analyses the mitigation of satisfaction was noted through the interaction of variables, indicating gradients of satisfaction within specific demographic groups. Considerations for providers of care and for policy-makers were provided, as were factors for future research in support of improving the equity of healthcare services provided for the benefit of children and adolescents within east Central Florida.

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