A MULTILEVEL APPROACH TO UNDERSTANDING HEALTHCARE DISPARITIES IN THE NURSING HOME SETTING

By

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To my family for supporting me in every way during this intellectual journey.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Abstract of Dissertation Presented to the Graduate School
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Prior research indicates pervasive racial/ethnic disparities in quality of care among nursing home residents. The objective of this study was to understand factors that contribute to nursing home segregation, and understand how resident, nursing home, and county/MSA characteristics were associated with quality of care. This study 1) identified nursing home and county/MSA factors that may contribute to nursing home segregation, 2) examined how nursing home residents' race, nursing home segregation, and residential segregation independently influenced quality of care, and 3) identified the manner and degree to which each (resident, nursing home, or market) level accounted for differences observed in quality of care. The goal of this study was to move from documenting racial/ethnic disparities to understanding causal pathways that lead to racial/ethnic disparities.

The sample for the first part of this study consisted of Medicare and Medicaid certified nursing homes across the United States during 2005, which consisted of approximately 7,000 nursing homes. The sample of the second half of the study consisted of Medicare and Medicaid certified nursing homes across the United States

and nursing home residents (N=2,568,865) in these homes during 2005. Four data sources were used in this study: On-Line Survey Certification of Automated Records (OSCAR), Minimum Data Set (MDS), Area Resource File (ARF) and residential segregation data. Generalized linear models (GLM) were used to examine the association between nursing home segregation (dissimilarity index) and county/MSA characteristics. 3-level generalized hierarchical linear models were conducted to examine how nursing home residents' race, nursing home segregation, and residential segregation were associated with quality of care in nursing homes.

Results from this study suggest that nursing home segregation persist because minority residents are overrepresented in resource-constrained nursing homes. Residential segregation was also a contributing factor that created an environment where minority residents were disproportionately served in certain nursing homes. Nursing home segregation is evident in the nursing home industry; however, lack of resources available to segregated homes can exacerbate racial/ethnic disparities in nursing homes. This study also indicated residents' race/ethnicity, residents' racial composition, and segregation were associated with the quality of care residents received in nursing homes.

CHAPTER 1
INTRODCTION

Racial/Ethnic Healthcare Disparities

The 2003 Institute of Medicine (IOM) report, *Unequal Treatment: Confronting Racial and Ethnic Disparities of Health Care*, documented widespread evidence of racial/ethnic healthcare disparities, after controlling for sociodemographic factors and insurance status. The IOM report (2003), defined racial/ethnic healthcare disparities as "racial or ethnic differences in the quality of healthcare that are not due to access related factors or clinical needs, patient preferences, or appropriateness of the intervention". The definition above encompasses the goal of the IOM report to provide evidence of disparities after access was considered equivalent in healthcare settings. In 2005, LaVeist expanded on the IOM (2003) model by including access as a potential factor that may widen healthcare disparities among minorities and non-minorities. Healthcare disparities were defined as "differences in quality of care that are not due to clinically appropriate treatment decisions or patient preferences" (p.109). As such, healthcare racial/ethnic disparities can arise due to inequities in the healthcare system or due to the behavior of healthcare providers. This study incorporates access when explaining nursing home racial/ethnic healthcare disparities because access to quality nursing homes can have a pivotal role in widening racial/ethnic disparities.

The elimination of racial/ethnic disparities has become a nationwide goal; with initiatives such as, *Health People 2010,* developed by the U.S. Department of Health and Human Service (HHS) being implemented to mitigate/eliminate racial/ethnic disparities. In addition to disparities in access to care, evidence indicates that racial/ethnic disparities persist in quality of care, and some quality differences have

widen from 2000-2001 to 2005-2006 for minorities (National Healthcare Disparities Report, 2009). Disparities in access to care can be one possible explanation for the widening of racial/ethnic disparities in quality of care (National Healthcare Disparities Report, 2009). Consequently, access to high quality services can influence the quality of care received by an individual. Similar issues with access and quality of care have been found in the long-term care setting, as minorities are overrepresented in nursing homes that have been associated with lower quality of care (Smith et al., 2007; Smith et al. 2008; Mor et al. 2004; Miller et al. 2006; Fennell et al. 2010). Therefore, there is a need to document and understand factors that contribute to racial/ethnic disparities in nursing homes.

Disparities hamper efforts to improve the nation's health; they raise concern about the overall quality of healthcare in the United States; and they may lead to costs associated with inadequate care that may have implications for overall healthcare expenditures (IOM, 2001). Higher costs may be accrued due to the inadequate care received by minorities that could result in expensive and avoidable complications. As explained in the 2003 IOM report, "the extent that minority beneficiaries of publicly funded programs are less likely to receive high quality care- these beneficiaries as well as taxpayers- may face higher future healthcare costs."(p.37). Therefore, working to mitigate/eliminate racial/ethnic disparities in the healthcare system will be beneficial not only for minorities, but for the society as a whole.

Statement of the Problem

As the nation becomes more diverse and older over time (U.S. Census Bureau, 2008), it is essential to understand how differences in quality of care arise in nursing homes. It is estimated that between 2010 and 2050 the older population (65 and older)

will increase from 40.2 million to 88.5 million, and they will represent 20% of the total population. The oldest-old (those 85 and older) will grow at the fastest rate, as the Baby Boomers begin to move into this age group (U.S. Census Bureau, 2008). One reason for the increase in the older population is that individuals in the United States are living longer and healthier lives (He, Sengutpa, Velkoff, & DaBarros, 2005). Although the elderly are living longer it is well documented that the prevalence of chronic conditions, defined as an illness that last longer than three months and are marked by frequent recurrence, increases with age (Rice and Fineman, 2004, Weinstock, 2004). As such, it is expected that there will be an increasing demand for nursing homes use as the older population ages.

Along with living longer, the racial composition of the older population is also becoming more diverse. The minority population growth as a whole has been growing faster than that of the White population (IOM, 1996). Between 2010 and 2050, the minority population age 65 and older is expected to increase from 20% to 42% of the total population (U.S. Census Report, 2008). Minorities will also account for a large percent of the oldest-old (Wolf, 2001). Consequently, growth in the racial/ethnic elderly populations suggests the racial composition of nursing home residents will become more diverse over time. Sahyoun et al. (2001) demonstrated that the residential composition of nursing home residents was becoming more diverse from 1985-1997. Fennell et al. (2010) found a decline in the percentage of White residents who used nursing homes, but a slight increase in the percentage of Black and Hispanic residents who used nursing homes from 2000-2005. As the racial/ethnic composition of nursing home residents becomes more diverse, concerns have begun to arise about inequities

in quality of care received among racial/ethnic residents in nursing homes. With a population that is aging and becoming more diverse there is a growing need to understand how inequities may arise in the nursing home setting.

Significance

While overt segregation, such as the Jim Crow laws, has been abolished in the United States for more than 40 years, de facto segregation continues to exist in the U.S. healthcare system. Seminal work has provided evidence of nursing home segregation (Smith, 1990; Smith et al., 2007; Fennell et al., 2000), which may partially explain racial/ethnic healthcare disparities that occur in nursing homes. Nursing homes with high proportions of minorities have been associated with having worse quality, lower staff, and fewer resources (Smith et al, 2007 & 2008; Mor et al., 2004 Fennell et al., 2010); which can affect the quality of care provided to all residents in nursing homes with high proportion of minority residents. Therefore, there is need to understand the determinants of inequalities in the quality of care in nursing homes with high proportion of minority residents.

Smith et al., (2007 & 2008) conducted a descriptive study using the dissimilarity index to provide evidence of an association between nursing home segregation and quality of care. Findings of this study indicated that nursing homes remain relatively segregated and mirror residential segregation. Segregation has been associated with created an environment where Black nursing home residents are more likely to reside in poor performing nursing homes relative to White nursing home residents. Previous studies have used residents' racial composition as a facility level measure of nursing home segregation, which has been associated with racial/ethnic disparities in quality of care in nursing homes (Gerardo et al., 2009; Cai, Mukamel, Temkin-Greener, 2010;

Miller et al., 2006; Fennell, Miller, and Mor, 2000). However, no nursing home studies to date have examined the role segregation may have on quality of care and outcomes in nursing homes, measured by segregation indices, while adjusting for additional important predictors of quality.

Since the 80's, growth of the minority population has outpaced that of the White population. This is expected to continue, especially for the Hispanic population which is projected to increase from 46.7 million (14% of the total population) in 2008 to 132.8 million (30% of the total population) in 2050 (U.S. Census Bureau, 2008). It is expected that the Hispanic population will account for an increasing proportion of older adults as the number of immigrants begin to age (IOM, 1996), while having higher rates of disabilities compared to Whites (Reed and Andes, 2001; Buchanan et al., 2008). Reed and Andes, (2001) identified that Latino communities had the fewest number of nursing home beds, which can have severe implications for an aging and rapidly growing population.

Previous nursing home literature has focused predominately on racial/ethnic disparities between Black and White residents in nursing homes (Smith, 2007; Angelelli, Grabowski, and Mor, 2006; Mor et al., 2004; Miller et al., 2006; and Fennell, Miller, and Mor, 2000), with limited literature on racial/ethnic disparities among other racial/ethnic groups. Fennell et al., (2010) demonstrated Hispanic nursing home residents are more likely to reside in nursing homes with severe deficiencies and poor quality of care. Nursing homes with higher proportion of Hispanic residents have been associated with having higher prevalence of pressure ulcers among residents (Gerardo, Teno, & Mor, 2009). Growth among an aging Hispanic population and studies indicating disparities in

quality of care provided to Hispanic residents, demonstrate the need to examine factors that may contribute to racial/ethnic disparities for Hispanic residents. This study purposes to examine the relationship between facility and county/MSA factors in relation to Hispanic nursing home segregation and examine how residents' race/ethnicity and segregation are associated with quality after adjusting for resident, facility and county/MSA level characteristics.

Racial/ethnic disparities are complex and multifaceted in nature; as such, a multilevel approach is needed to better understand the causes and consequences of these disparities. While there is ample evidence that examines how resident, facility, and/or county factors may contribute to disparities in quality of care in nursing homes, there is limited evidence to explain how each level independently contributes to disparities in quality of care. The use of multilevel modeling will allow investigators to examine how resident, facility, and county/MSA factors contribute to differences in quality, while accounting for the hierarchical structure of the data. To our knowledge, only one study in the nursing home literature has attempted to examine how resident, facility, and county characteristics account for racial/ethnic differences. Troyer and McAuley (2006) found that county factors (24%) accounted for a larger portion of the differences in having an advance directive among Black and White nursing home residents; while, resident factors accounted for 12% of the difference and facility factors accounted for 8% of the difference. This current study will contribute to the literature by examining how resident, nursing home, and county/MSA characteristics independently influence quality of care in nursing homes, while attempting to understand how each level accounts for the difference in quality using the intraclass coefficient (ICC). At a

time when federal and state governments are facing budget shortfalls due to the current economic recession, the ability to implement initiatives where they are needed most will help to ensure that scarce resources are appropriately targeting the source that will help to mitigate/eliminate racial/ethnic disparities.

The nursing home industry consists of a two-tier system, which is composed of nursing homes that are highly reliant on Medicaid and those that have a more diverse payer mix (Mor et al., 2004). Minority residents are overrepresented in Medicaid-reliant nursing homes that are associated with lower quality, lower staffing, and worse financial performance (Mor et al., 2004). The differences in socioeconomic status among minority and White residents and financing of nursing home care may help to maintain these disparities, which may be exacerbated by segregation. While Medicaid is the primary financer of nursing home care, a higher proportion of Black nursing home residents rely on Medicaid compared to White nursing homes residents (Ness, Ahmed, and Aronow, 2004). As such, it is important to understand how factors, such as segregation and payer status, contribute to quality of care among residents.

Specific Aims

While prior research suggests that several factors may contribute to racial/ethnic disparities in quality of care in nursing homes, the causal pathways remain unclear. With an aging and diverse population increasing over time (National Center for Health Statistics, 2007); it is essential to understand factors that contribute to racial/ethnic disparities in quality of care, for successful interventions and policies to be designed to reduce these disparities. The specific aims of the proposed study are:

I. To examine how county/MSA and nursing home characteristics are associated with nursing home segregation

II. To examine if nursing home residents' factors, specifically residents' race/ethnicity, are independently associated with quality of nursing homes (after controlling for county/MSA and organizational factors)

III. To examine if nursing home factors, specifically racial composition, are independently associated with quality of care in nursing homes (after controlling for resident and county/MSA factors)

IV. To examine if county/MSA factors, specifically residential and nursing home segregation, are independently associated with quality of care in nursing homes (after controlling for resident and organizational factors)

V. Examine the proportion of variance from each level (resident, nursing home, and county/MSA factors) that is associated with quality of care in nursing home

Generalized linear models (GLM's) and generalized hierarchical linear models (GHLM's) were used for this study. GLM's were used to examine the relationship between nursing home segregation (dissimilarity index) and county/MSA factors. GLM's were used due to the proportional nature of the dissimilarity index and lack of clustering occurring at this level. The dissimilarity index represents the "evenness" between two groups that are distributed across units. This study measured Black-White nursing home segregation and Hispanic-White nursing home segregation. Nursing home segregation using the dissimilarity index represented the Black and Hispanic nursing home residents that would need to move across nursing homes to achieve an even distribution in a given metropolitan statistical area (MSA) relative to White nursing home residents. Black-White residential segregation and Hispanic-White residential segregation were also measured in this study. Residents' racial composition was used to measure nursing home segregation at the facility level. 2-level GHLM's were used to examine the relationship between residents' racial composition and nursing home and county/MSA characteristics. GHLM's appropriately account for the hierarchical nature of the data and proportional level of the dependent variable. 3-level GHLM's were used

to examine how residents' race, nursing home segregation, and residential segregation were associated with quality of nursing homes.

Chapter 2 will consists of a literature review that provides a brief overview of nursing home segregation, nursing home use, and nursing home racial/ethnic disparities. Chapter 2 also presents the conceptual framework for this study. Chapter 3 describes the methodological approaches and provides descriptions of dependent and independent variables used in this study. Chapter 4 provides a description of the results obtained from the analyses conducted for this study. Chapter 5 provides discussion of the results and strengths and limitations of the study.

Definition of Terms

- Racial composition of nursing home residents: accounts for the racial diversity within nursing homes. Racial composition represents the percent of nursing home residents who are Hispanic, and the percent of nursing home residents who are non-Hispanic Black relative to total population of residents in nursing homes. This measure of segregation was measured at the facility level.

- Dissimilarity index: used to measure nursing home and residential segregation. The dissimilarity index is the most widely use measure of segregation. This index ranges from 0-1, with an index of 0 indicating no segregation and an index of 1 indicating complete segregation. The index measures the "evenness" with which two mutually exclusive groups are distributed across the geographic units that make up a larger geographic entity.

    - Nursing home segregation (dissimilarity index): Nursing home segregation measures the distribution of Black nursing home residents divided by the total number of Black nursing home residents in a metropolitan statistical area (MSA) relative to White nursing home residents divided by the total number of White nursing home residents in a MSA. Hispanic-White nursing home segregation was measured in a similar manner, but Hispanic and White nursing home residents are the populations of interest. This measure of segregation was measured at the MSA level

    - Residential segregation (dissimilarity index): Black-White residential segregation measured the distribution of Blacks in a census tract divided by Blacks in a MSA relative Whites in a census divided by Whites in a MSA. Hispanic-White residential segregation was measured in a similar manner to Black-White residential segregation.

CHAPTER 2
LITERATURE REVIEW

Nursing Homes and Segregation

History of Nursing Home Segregation

The concept of nursing homes emerged with the immigration of Europeans to the New World, as almshouses became a place for people who were sick or had disabilities or elder adults without sufficient family or financial support. Almshouses were organized by community charities that purchased private homes and turned them into communal residence (Slutz and Young, 2001). The privatization of this sector allowed owners of homes to select who would have access to care, which usually excluded Blacks and the poor. Consequently, municipal and county governments created homes and “infirmaries” to care for improvised older adults. These types of models were the basis of care for the elderly that existed until the Great Depression and the social restructuring during World War II (Slutz and Young, 2001).

In 1946, the government passed the Hospital Survey and Construction Act of 1946 also known as the “Hill-Burton” Act. This legislation was in response to the shortage and maldistribution of hospitals and other health facilities recognized by Congress following the Great Depression and World War II (Rice and Jones, 1994). The purpose of the Act was to provide federal funds to states for hospital construction, with the intent of building an improved hospital system nationwide (Rice and Jones, 1994). Nursing homes were not included in the initial “Hill-Burton” Act; however, in 1954 amendments were added to the bill that incorporated financial support for construction and renovation of government and not-for-profit nursing homes. The bill only extended support to nursing homes affiliated with a hospital. Nursing homes were also required

to maintain certain standards for areas that may affect “quality of care”. For-profit nursing homes continued to be excluded from the “Hill-Burton” Act and sought resources from other sources (Giacalone and Duetsch, 2000).

For some the Hill-Burton Act was considered a great step forward in civil rights because the legislation required that facilities of equal quality be built for minorities and included a “separate but equal” clause to specify this intention (Renyolds, 1997), while others viewed this legislation with disdain and distrust (Rice and Jones, 1994). There were two aspects of the legislation: the survey phase and the construction phase (Rice and Jones, 1994). Through the federal-state partnership, state agencies were given grants to assess how best to appropriate funds based on population distribution and existing bed size (Reynolds, 2004). Although the federal government provided monies to the states to construct facilities, the government allowed the states to determine racial decisions that pertained to the facilities, which allowed both segregation and the “separate but equal” clause to go unchallenged (Vihlen, S., 1994). Some members of Congress called for nondiscrimination in the use of federal money, or no money to facilities that practiced segregation (Reynolds, 2004). However, other members of Congress argued for the right of the state and local hospital authorities to set policy. This allowed facilities to maintain separate facilities for separate populations, if the facilities plan made equitable provisions on the basis of need for facilities and services of likely quality for each group (Reynolds, 2004).

In response to continuing problems of segregation, several initiatives and lawsuits ensued, with the intentions of deleting the “separate but equal” clause of the Hill-Burton Act. The first Imhotep National Conference on Hospital Integration was held

March 8-9, 1957 in Washington D.C. (Rice and Jones, 1994). During this time, a group of southern physicians and attorneys began to file lawsuits that the “separate but equal” clause of Hill-Burton was unconstitutional. On February 12, 1962, NAACP Legal Defense Fund state attorney, Pearson Conard, and a Black dentist, George Simkins, from Greensboro, NC filed suit against Moses H. Cones Hospital and Wesley Long Community Hospital (Rice and Jones, 1994, and Reynolds, 2004). The 1962 Simkins vs. The Moses H. Cones Hospital would be the medical equivalent of the Brown vs. Board of Education. The defense did not attempt to argue the inequality of the segregated system, but the basis of the case was whether or not hospitals that received Hill-Burton funding were sufficiently infused with “state action” to bring them within the Fifth (due-process) and Fourteenth (equal protection) Amendment prohibitions against racial discrimination (Vihlen, S, 1994 and Reynolds, R, 2004). As a result of the court case, hospitals that were proposed or under construction in the jurisdiction of the Fourth District Court (Maryland, Virginia, West Virginia, North Carolina, and South Carolina) were legally obligated to integrate (Reynolds, 2004). The new Hill-Burton regulations did not apply to hospitals that already used federal funds (Reynolds, 2004). In 1964, the Civil Rights Act amended the Hill-Burton legislation and the separate but equal clause was omitted from the bill (Vihlen, S., 1994).

The Department of Health, Education, and Welfare (HEW) was the first federal agency to draft regulations for Title VI of the Civil Rights Act prohibiting the provision of federal funds to organizations or programs that engage in racial segregation or other forms of discrimination (Smith, 2005, Reynolds, 1997 and Reynolds, 2004). Title VI stipulated that “ no person in the United States shall, on the ground of race, color, or

national origin be excluded from participation in, be denied the benefits of, or subjected to discrimination under any program or activity receiving Federal financial assistance" (Vihlen, S., 1994). The first significant test of Title VI enforcement was introduced with the implementation of Medicare in 1966 (Smith, 2005). However, hospitals and nursing homes responded differently to the new law. According to Smith (1990) ecologic niches, "an organizations tolerance for changing levels of resources" (cited in Scott and Davis, 2007), will have a role in determining how organizations respond to change. Consequently, it would be expected that the pressure from civic groups, lawsuits, and policies would produce changes in the healthcare setting to integrate. Smith (1990) suggests that these ecological niches had different effects in determining how hospitals and nursing homes responded to pressures to integrate.

The Medicare and Medicaid legislation in 1965 raised the cost of resistance for hospitals. Hospitals that opposed integration would face the threat of losing federal funds- due to losing access to individuals age 65 years and older and losing funds from Medicare and Medicaid- that would make financial survival difficult among these hospitals. By the late 1960s, Medicare combined with Medicaid, accounted for more than 60 percent of a general hospitals income (Smith, 1995 and 2005). The requirement of Title VI certification for all participating hospitals and the reimbursement from Medicare gave hospitals a strong financial incentive to integrate their facilities and ensure equal access (Smith, 1995). While Medicare created a strong incentive for hospital to integrate, reimbursement from Medicaid had a less significant impact on nursing homes.

Nursing homes had fewer incentives and less pressure to integrate than hospitals. Medicare and Medicaid reimbursement accounted for only a small portion of nursing homes' income, as such each lacked the financial leverage to create change in nursing homes. Medicare provided limited coverage for nursing home services, while Medicaid only ensured that impoverished individuals were able to gain access to nursing homes. Consequently, during this time nursing home preferred all other types of payment sources to Medicaid. Nursing homes were heavily dependent on private pay, predominantly White residents; as such, nursing homes in many communities faced the fear of "white flight". States also did not have an interest in enforcing integration in nursing homes, since increased access to Black patients meant increased cost to the Medicaid programs (Smith, 1990). Therefore, progression of integration for nursing home facilities was at a slower pace than hospitals.

Nursing Home Segregation

Studies have indicated Black and Hispanic nursing home residents follow residential housing patterns, by residing in nursing home facilities that are located in their own communities (Reed and Andes,2001; Smith et al., 2007; and Fennell et al., 2000). According to the 2003 Institute of Medicine, *Unequal treatment: Confronting racial and ethnic disparities in health care*, differences that occur due to patient's preferences do not account for disparities. However, when operation of the healthcare system and regulatory system contribute to differences then disparities arise. While, consumers preferences may be related to minorities selecting to stay in nursing homes located in their own communities, the differences in care that have been associated with nursing homes that have higher proportion of minorities are not likely to be explained by preferences' of the resident. Prior literature suggests nursing homes that serve higher

proportion of minority residents are associated with lower quality of care and higher deficiencies (Mor et al., 2004, Smith et al., 2007; Fennell et al., 2010; Grabowski, 2004).

The nursing home industry has been described as being highly segregated (Smith, 1990; Smith et al., 2007; and Smith et al., 2008; Fennell, Miller, and Mor, 2000). Smith et al., (2007) documented the average nursing home segregation was 0.48 among 148 MSA's. An index of 0.48 indicates 48% of Black and White nursing home residents would need to move in order to create integration in nursing homes. According to this finding, almost half of Black and White nursing home residents would need to be relocated in nursing homes in order to create an even distribution between the two groups. As a result, of segregation, Blacks nursing home residents are overrepresented in nursing homes that are associated with more deficiencies, lower staffing, and lower financial viability (Smith et al., 2007 & 2008). While, seminal work by Smith et al., examined segregation in relation to nursing home quality, this study was descriptive in nature, providing only association between segregation and nursing home quality. The exposure of segregation in the nursing home industry, demonstrates the need to incorporate segregation into models when attempting to explain racial/ethnic disparities in care. This study builds on previous studies by incorporating nursing home residents' racial composition, nursing home segregation and residential segregation into multilevel models while adjusting for other significant predictors.

Nursing Home Use

Prior studies examining nursing home use among minorities have been mixed (Konetzka and Werner, 2009). Studies using earlier data have found that Black (Burr, 1990; Coughlin, McBride, and Liu, 1990, Salive et al., 1993; Kemper, 1992) and Hispanic (Kemper, 1992; Wallace, Levy-Storms, and Ferguson, 1995) nursing home

residents are less likely to utilize nursing homes compared to White nursing home residents. Several explanations have been explored as to why minorities are less likely to utilize nursing homes compared to non-minorities. These include but are not limited to family dynamics (Burr, 1990; Boyington et al., 2007; Cagney and Agree, 2005; and Eun-Young and Chang-yup, 2004); increased use of informal care (Mithcell and Krout, 1998; Tennstedt and Chang, 1998; Wallace et al., 1998; and Cagney and Agree, 1999) and more perceived social support (Kersting, 2001; Salive et al., 1993).

While these factors may contribute to lower nursing home use among minorities, a 1981 Institute of Medicine Report, *Health care in a Context of Civil Rights,* indicated the driving factor for the underlying lower use of nursing homes among Black consumers was the availability of beds, either because the beds did not exist or because of discrimination. Fennell, Miller, & Mor (2000) conducted a descriptive analyses on county demographics and Black racial composition of nursing home residents among four states. Investigators found, the racial composition of Black residents in nursing homes within counties were similar to the Black racial composition of the county's population. This finding indicated that residential segregation influenced access to nursing home care, indicating residential segregation as a possible contributor to limiting access to nursing home care for Black consumers.

Although studies have provided evidence of low nursing home utilization among minorities, other studies suggest increase nursing home use among Blacks (Smith et al., 2008; Ness, Ahmed, and Aronow, 2004) and Hispanics (Fennell et al., 2010). Changes in family dynamics due to smaller families, rising female labor participation, rising divorce rates, and increased geographic mobility, may alter the availability of

families to provide informal care (Angel and Angel, 1997). As mentioned above access to beds has been an underlying factor contributing to low use of nursing homes by minorities, however increased access to alternative long-term care services, such as assisted living facilities, may contribute to increased use of nursing home care among minorities. Akamigbo and Wolinksy (2007) found that as assisted living facilities (ALFs) emerged, Blacks were more likely to be placed in a nursing home, as Whites selected to receive care from ALFs. The substitution of ALFs among Whites may contribute to increase availability of beds for Black consumers; however, this may also indicate limited access to ALF's for minority consumers.

While studies indicate increased use of nursing homes among minorities, recent research suggests that minorities continue to face barriers to quality nursing homes. Racial/ethnic disparities are associated with hampering the quality of care for minorities, which indicates the need for long-term care policies and funding that will ensure access to high quality nursing homes for minority consumers.

Race/Ethnicity and Nursing Home Disparities

In 2007, the United States had approximately 15,000 nursing homes that housed an estimated 1.4 million residents (Harrington, Carrillo, and Blank, 2008). Nursing homes have a vital role in providing care for some of the most vulnerable adult populations which can include: individuals aged 85 years and older, individuals with multiple chronic conditions, and individuals with multiple mental/cognitive disorders (Wiener, Freiman, and Brown, 2007); however, quality remains an important concern in the nursing home industry (Institute of Medicine, 1986, 1996, & 2001). While quality remains a pertinent issue in nursing homes, recent research has begun to highlight variations in quality of care that may disproportionately affect minority nursing home

residents in such a way that racial/ethnic disparities arise in quality of care. Although several initiatives have been implemented to mitigate/eliminate health and healthcare disparities, evidence indicates that disparities continue to be widespread in the healthcare industry (National Healthcare Disparities Report, 2009). The following paragraphs describe racial/ethnic disparities in the nursing home industry.

Pressure ulcers. Prior studies have demonstrated that Black nursing home residents have a higher prevalence of pressure ulcers compared to White nursing home residents (Howard and Taylor, 2009; National Healthcare Disparities Report, 2009; Rosen et al., 2006; Cai, Mukamel, and Temkin-Greener, 2010). After controlling for clinical characteristics, Black and Hispanic nursing home residents were more likely to have pressure ulcers present compared to White nursing home residents (Gerardo, Teno, and Mor 2009). Cai, Mukamel, and Temkin-Greener (2010) suggests higher pressure ulcer presence among Black nursing home residents is due to a greater concentration of Black nursing home residents in certain facilities.

Physical restraints. The appropriate use of physical restraints has continued to be an issue in the nursing home realm. AHRQ National Healthcare Disparities Report (2009) indicated a decline in the use of physical restraints among all nursing home residents during 1999-2007; however, racial/ethnic disparities continue to persist in the use of physical restraints. While, Black nursing home residents were less likely to be physically restrained compared to White residents; Hispanic nursing home residents were more likely to be physically restrained (National HealthCare Disparities Report, 2008). Residents who are restrained daily may be at risk for other complications, such

as lower cognitive performance, lower activity of daily living (ADL's) and more walking dependence (Engberg, Castle, and McCaffry, 2008).

Other racial/ethnic disparities. The Advisory Committee on Immunization Practices (ACIP) recommends that all nursing home residents receive pneumococcal immunizations, regardless of their age (Morbidity and Mortality Weekly Report, 1997). Nevertheless, research indicates Black nursing home residents were less likely to receive pneumococcal immunizations compared to White nursing home residents (Marsteller et al., 2008; National Healthcare Disparities Report, 2008). Grabowski and McGuire (2009) demonstrated within and across nursing homes, Black nursing home residents were more likely to have feeding tubes compared to White residents, after adjusting for resident level factors. Nevertheless, investigators did not find any within and across nursing homes disparities for use of physical restraints, use of catheters, and use of anti-psychotic drugs among Black and White nursing home residents. Black nursing home residents with advance cognitive impairments were more likely to have a feeding-tube compared to White nursing home residents with cognitive impairments, after controlling for resident and facility level factors (Mitchell et al., 2003)

Black (Reynolds et al., 2008) and Hispanic nursing homes residents (Degenholtz et al., 2002) were also less likely to have living wills or do not resuscitate orders compared to White nursing home residents. The absence of these advance care plans can have an impact on the need for hospitalization at the end-of-life. Consequently, studies indicated Black nursing home residents were more likely to hospitalized compared to White nursing home residents (Gruneir et al, 2008; Culler Parchman, and Przbylski, 1998). As detailed in the paragraphs above, racial/ethnic disparities in the

nursing home industry are wide spread, suggesting the need to further examine factors that contribute to inequities in nursing homes.

Organizational Characteristics and Nursing Home Disparities

Along with being highly segregated, the nursing home industry consists of a two-tier system. The lower tier consists of nursing homes that are predominately reliant on Medicaid (e.g. 85% or more of the residents supported by Medicaid, less than 10% private pay, and less than 10% supported by Medicare) while the upper tier consists of nursing homes with more private pay residents (Mor et al., 2004). Quality nursing home care has been linked to the availability of resources in facilities (Mor et al., 2004), but Medicaid-reliant nursing homes may be at a disadvantage because of limited financial resources from other reimbursement sources. Residents in Medicaid-reliant nursing were at risk of higher restraint use, higher antipsychotic use, and having more pressure ulcers present (Mor et al., 2004). Kelly, Liebig, and Edwards (2008) examined interstate variation in the volume and severity of nursing home deficiencies. Investigators found higher deficiency severity was associated with higher proportion of Medicaid nursing home residents within a state. Black (Mor et al., 2004; Smith et al., 2007) and Hispanic nursing home residents (Fennell et al., 2010) were found to be disproportionately overrepresented in Medicaid-reliant nursing homes, which may contribute to racial/ethnic disparities in quality.

Quality care in nursing homes has also been associated with ownership status of nursing homes. A comprehensive literature review was conducted to examine the relationship between ownership status and nursing home quality (Hillmer et al., 2005). The review concluded that for-profit nursing homes provided lower quality of care on many outcomes compared to not for-profit nursing homes. While a number of studies

have examined the role of ownership and quality of care, less is known about how ownership influences racial/ethnic disparities in quality of care. Prior literature indicated, for-profit nursing homes disproportionately serve a higher proportion of Black residents (Troyer and McAuley, 2006; Miller et al., 2006; Angelelli, Grabowski, and Mor, 2006; Grabowski, 2004; and Gruneir et al., 2008). These homes were also associated with serving a higher proportion of Medicaid residents (Christensen and Arnold, 2005), which can influence the availability of slack resources to improve quality of care.

During the 1990s the nursing home industry went through a transformation with the growth of chains through mergers (Kitchener and Harrington, 2004). A 2001 Institute of Medicine Report, *Improving the Quality of Long Term Care,* identified that an estimated two-thirds of all nursing homes in the country were chain owned in 1997. Chains can be described as a collaboration of components that link together to produce similar goods and services in various markets (Banaszak-Holl, Mitchell, Baum, and Berta, 2006). The literature on nursing home chains and quality of care has been mixed. Prior research indicates nursing home chains are associated with higher deficiencies (Harrington et al., 2001) higher percentage of residents with pressure ulcers (Kamimura et al., 2007) and more restraint use (Castle and Fogel, 1998). However, Kamimura et al., (2007) demonstrated nursing home chains located in Michigan and North Carolina were associated with lower health deficiencies than non-chain nursing homes. After controlling for facility, resident, and county factors, there was no difference between chain-owned facilities and number of deficiencies in nursing homes (Grabowski, 2004). Banaszak-Holl et al., (2002) conducted a longitudinal study to examine the acquisitions of nursing home facilities by chains and quality of care.

Investigators found that chains usually acquired nursing homes that were performing poorly, so initial performance of chain-affiliated nursing homes may appear poor; however, over time chain-affiliated nursing homes were associated with increased residents' welfare. The role of chain-affiliation in relation to quality care is not clear; consequently, there is a need to continue to examine the relationship between chain-affiliation and quality of care. While the relationship between quality and chain-affiliation is unclear, little is known about the relationship between chain-affiliation and racial/ethnic disparities in the current literature. This study will expand on both of these topics.

County/MSA Characteristics and Nursing Home Disparities

On a general level, residential segregation has been defined as "the degree to which two or more groups live separately from one another, in different parts of an urban environment" (Massey and Denton, 1988, p.282). Residential segregation is a phenomenon that has occurred throughout many American cities. Studies have begun to document declines in segregation among Blacks, nevertheless segregation continues to be higher between Blacks and Whites compared to other groups (Hispanics, Asians, Pacific Islanders, American Indians and Alaskan Natives). The Hispanic population has been found to be the next most highly segregated group (Weinberg, Iceland and Steinmetz, 2002). Residential segregation has and continues to be the subject of numerous research studies.

The relationship between residential segregation and health has been a prominent issue studied for many years. Residential segregation has been associated with infant mortality (Jiobu, 1972; LaVeist, 1993; Polednak, 1996), adult mortality (LaVeist, 2003; Fang et al., 1998; Collins and Williams, 1999), tuberculosis (Acevedo-

Garcia, 2001), preterm births (Osypuk and Acevedo-Garcia, 2008) and poor mental health (Lee, 2009). Williams and Collins (2002) suggest residential segregation negatively affects health of minorities, because residential segregation can limit access to education and employment opportunities, which influences socioeconomic status (SES). Residential segregation has also been associated with limiting access to healthcare services. Hayanga et al., (2009) determined that in the most segregated counties, an increase in Black or Hispanic residents was associated with a decrease in the availability of surgical services but an increase in emergency visits, after adjusting for socioeconomic and health status. Sarrazin, Campbell, and Rosenthal (2009) found, Blacks located in highly segregated areas were more likely to be admitted to high-mortality hospitals even when a hospital with better survival rates was closer. Although the relationship between residential segregation and healthcare is multilevel, these studies incorporated segregation as an additional variable using single-level analyses. The use of single-level analyses does not deal effectively with problems of estimation error or account for clustering of levels (Arling et al., 2007; Raudenbush and Bryk, 2004).

The hospital industry is not the only healthcare sector that has been affected by residential segregation. Residential segregation has been shown to exacerbate disparities in quality of care in nursing homes. The Midwest area was found to be the most segregated region of the country, with a dissimilarity index of 0.73, and this area had the greatest Black/White disparities in staffing and financial viability (Smith et al., 2007). After adjusting for facility and county variables, nursing homes with high proportion of Black residents and located in a county with high proportion of Blacks

were more likely to have Black and White residents that were restrained (Miller et al., 2006). Miller et al. used the racial composition of residents in nursing homes and counties to measure segregation, our study purposes to examine the racial composition of residents in nursing homes and measure nursing home and residential segregation using the dissimilarity index.

Conceptual Framework

The conceptual framework used in this study integrated resource dependence theory (RDT) with Donabedian's structure-process-outcome (SPO) model. The two models are integrated in order to examine how external and organizational characteristics influence nursing home segregation; while examining how resident-, facility-, and county/MSA characteristics influence quality of care. Resource dependence theory stresses the need for organizations to develop relationships with external organizations to secure resources from the environment; as such, this theory was used to guide the hypotheses that explain the relationship between the external environment and nursing home segregation and quality. SPO model was used to guide the hypotheses developed to explain how organizational structure influences nursing home quality.

The SPO model has been used in several studies to explain structure, process, and quality measures. Structure indicates characteristics of the setting in which care occurs. Measures of structure may include material resources (i.e. facilities and equipment), human resources (i.e. qualifications of personnel), and organizational structure (i.e. methods of reimbursement) associated with providing care. Process measures refer to what is actually done when giving and receiving care. As such, patient care (i.e. use of restraints or patient care plans) would be considered an

attributes of process measures. Outcome measures describe the effects of care on patients and populations (Donabedian, 1988). These measures can vary from health outcomes to patient satisfaction with care (IOM, 1999; Donabedian, 1966&1988). The SPO model was integrated with resource dependence theory in order to examine how the structure of an organization may influence quality and nursing home segregation, while attempting to understand how external factors may contribute to nursing home quality.

Resource dependence theory (RDT) emphasizes an open system approach to environmental contingencies. The organization is viewed as being an active participant in determining their own fate, with managers monitoring and scanning for opportunities and threats in the environment (Scott & Davis, 2007). While organizations develop various dependency relationships, the organization continues to have some control over selecting exchange partners (Scott & Davis, 2007). Therefore, an organization's decision to adapt or not to the environment will vary depending on the resource and an organizations willingness to make changes.

Resource dependence theory posits that no organization is self-sufficient and that organizations need to secure outside resources for survival. As such, organizations develop relationships with other organizations or external groups to stabilize the flow of resources (Pfeffer and Salanick, 1978). Nursing homes as well as other healthcare facilities rely on resources from the environment and make accommodations to survive. Pfeffer and Salanick (1978) suggested various stakeholders in the environment may have incompatible preferences and goals which can influence organizations. Nursing homes operate in an environment that is influenced by a number of stakeholders, such

as, state and federal governments, consumers, and other healthcare facilities. The pressure to respond to the demands of the various stakeholders may create a challenge for nursing homes, which may contribute to the disparities in quality of care found across nursing homes. Resource dependence theory has also been supported as an appropriate framework to study nursing home performance (Decker, 2008; Zinn et al., 2007; Zinn et al., 2010); nursing home innovation (Banaszak-Holl, Zinn, and Mor, 1996); nursing home competition and quality (Starkey, Weech-Maldonado, and Mor, 2005); and segregation in the workplace (McTague, Stainback, Tomaskovic-Devey, 2009). Figure 2-1 depicts the causal pathways suggesting how organization and county/MSA characteristics influence nursing home segregation and residents' racial composition. The figure also indicates how resident-, nursing home-, and county/MSA factors influence quality outcomes. The figure is not indicative of all the possible pathways that may contribute to racial/ethnic disparities in nursing homes.

Organizational Factors and Residents' Racial Composition

Payer Status

Nursing homes never faced similar pressures to desegregate as hospitals did during the implementation of Medicare and Medicaid (Smith, 1990). As such, little is known about how organizational and market characteristics differ in relation to nursing home segregation. The Centers for Medicare and Medicaid Services (CMS) is an important external partner for nursing homes; together Medicare and Medicaid paid for more than 60% of long-term care services (Ng, Harrington, & Kitchener, 2010). According to RDT, nursing homes are expected to develop strategies that allow them to maintain their relationship with CMS, while also maintaining some level of dependence. Although Medicaid reimbursement may not be as high as other types of reimbursement,

it is a form of compensation for nursing homes. Therefore, some nursing homes may develop strategies to increase the number of Medicaid residents to offset the low Medicaid reimbursement.

While Medicaid is the dominant payer of long-term care services, minorities disproportionately rely on Medicaid as a source of payment for nursing home care (Ness, Ahmed, & Aronow, 2004), which may create a nursing home environment where minorities are overrepresented in Medicaid-reliant nursing homes (Mor et al., 2004). Smith et al., (2007 & 2008) demonstrated that due to nursing home segregation, Black nursing home residents were more likely to reside in nursing homes with lower percent of private-pay residents and higher percent of Medicaid residents. Nursing homes with higher proportion of Hispanic residents were also found to have lower percent of private-pay residents, but had higher percent of Medicaid residents compared to nursing homes with no Hispanics (Fennell et al., 2010).

Hypothesis 1a: Nursing homes with higher proportion of Medicaid residents will be associated with higher proportion of minority nursing home residents.

Occupancy Rates

Occupancy rates have been decreasing over time (National Center for Health Statistics, 2008) however, some nursing homes may have lower occupancy rates relative to others. Nursing homes with lower occupancy rates may encounter financial pressure to increase occupancy rates because low occupancy rates can result in lower financial performance. Therefore, nursing homes with lower occupancy rate may be less selective in their choice of consumers and may be more willing to provide access to consumers with complex needs. Prior studies indicated Black nursing home residents are more likely to be located in nursing homes with lower occupancy rates compared to

White nursing home residents (Smith et al., 2004; Smith et al., 2008; Angelelli, Garbowski, and Mor, 2006).

Hypothesis 1b: Nursing homes with lower occupancy rates will be associated with a higher proportion of minority nursing home residents.

Bed Size

Reed and Tobis (2001) used data from the 1990 Census and Illinois's 1994 Long-term Care Facility survey to examine how poverty was associated with the availability of nursing home beds. Investigators found, nursing homes in Black communities were larger. Communities have been described as a source of both staff and residents for facilities (Fennell, Miller, and Mor, 2000). Applying RDT, communities become a source of economic survival for nursing homes with the possibility of community residents becoming part of the work force or residents in the nursing home. As mentioned above, research indicated that occupancy rates have been decreasing over time in nursing homes (National Center for Health Statistics, 2008). Larger nursing homes may experience an additional vulnerability to the decrease of occupancy rates due to the added potential of empty beds in these facilities. As such, larger nursing homes may also be less discriminate in their selection of residents in order to fill necessary beds and may be more readily to accept individuals from communities in which they are located.

Hypothesis 1c: Larger nursing homes will be associated with higher proportion of minority nursing home residents.

Ownership

Not for-profit nursing homes have been associated with being more segregated than for-profit nursing homes (Fennell et al., 2010 and Smith et al., 2007), which may be

due to the fact that not for-profit nursing homes were developed by churches and fraternal organizations as a way to care for their elderly members. Consequently, these facilities have given preference to their members, and they are generally less racially and ethnically diverse (Smith et al. 2007). Not for-profit homes also tend to have higher proportion of private-pay residents than for-profit homes (Christensen & Arnold, 2005). Private pay reimbursement is usually higher than Medicaid reimbursement; as such not for-profit facilities dependency on private pay residents may allow these facilities more financially autonomy, which allows them to develop strategies that may limit access for some consumers.

Hypothesis 1d: Not for-profit nursing homes will be associated with a lower proportion of minority residents.

County/MSA Characteristics, Nursing Home Segregation, and Residents' Racial Composition

Residential Segregation

As previously discussed, individuals in communities can be viewed as resources for nursing homes; therefore, nursing home located in communities with a high proportion of minorities may have a high proportion of minority residents. Prior evidence suggest that Black and Hispanic nursing home residents follow residential patterns, residing in facilities located in their own communities (Reeds and Andes, 2001; Fennell, Miller and Mor, 2000).

Hypothesis 2a: Higher residential segregation will be associated with a higher proportion of minority residents.

Hypothesis 2b: Higher residential segregation will be associated with higher nursing home segregation.

Dissimilarity Index

Higher nursing home segregation among nursing homes located in MSA's can be associated with homes being more segregated; as such, these facilities may have a higher proportion of minority or White residents. Nursing homes in more segregated areas with lower proportion of minority residents may benefit from a diverse source of reimbursements, which allow them to limit access to certain consumers. Because, communities can be considered resources for nursing homes, nursing homes located in MSA's with higher proportion of Whites may have a racial composition of residents that resemble the racial composition of the MSA. Nursing homes in these areas may intentionally or unintentionally develop strategies that perpetrate institutional discrimination against certain consumers of specific races/ethnicity in order to maintain and secure resources.

Nursing homes in more segregated MSA's with higher proportions of minorities may also have a higher proportion of minority residents, since communities are resources for nursing homes. Nursing homes in these MSA's may face more financial pressure due to minorities' higher reliance on Medicaid. Consequently, nursing homes in MSA's with higher proportion of minority residents may develop strategies to improve financial performance, which could include increasing access to consumers.

Hypothesis 2c: Nursing homes with lower nursing home segregation will have higher proportion of minority residents.

Competition

HHI. Communities may act as an economic resource for nursing homes. According to resource dependence theory, nursing homes in competitive markets will develop strategies to secure stable sources of revenue. In the United States occupancy

rates for nursing homes overall have been decreasing over time (National Health Statistics, 2008), indicating a more competitive market for most nursing homes. As nursing home markets become more competitive, so will the need to secure stable sources of revenue. While Medicaid reimbursement rates may be lower than other types of payments, it provides a stable source of revenue for nursing homes. Consequently, nursing homes in competitive markets may be more willing to expand access to Medicaid patients, which can increase the proportion of minority residents in facilities. The following studies used the Herfindahl Index (HHI) to measure competition in the marketplace, the HHI ranges from 0-1 with higher numbers indicating less competition. Grabowski (2004) showed, White nursing home residents (0.18) were admitted to nursing homes located in less competitive markets compared to Black (0.13) and Hispanic (0.08) nursing home residents, numbers in parentheses indicate the HHI. Chisholm et al., (2010) identified nursing homes with high proportion of Black nursing home residents (0.10) were located in more competitive markets compared to nursing homes with no Blacks (0.30).

Hypothesis 2d: Nursing homes located in more competitive markets will be associated with more proportion of minority residents.

Hypothesis 2e: Nursing homes located in more competitive will be associated with lower nursing segregation.

Excess capacity. Excess capacity was measured as the “the average number of empty beds among facilities in a county”. Applying resource dependence theory, suggests that facilities located in counties with higher number of empty beds will attempt to adjust to their external environment in order to maintain resources. Similar to homes

with lower occupancy rates, nursing homes in counties with higher numbers of empty beds may be less restrictive in their selection of consumers. As such, relax restrictions may allow access to consumers who typically may have difficulty gaining access to nursing homes.

Hypothesis 2f: Nursing homes located in counties with higher average number of empty beds will be associated with higher proportion of minority residents.

Hypothesis 2g: Nursing homes located in counties with higher average number of empty beds will be associated with lower nursing home segregation.

Payer Status

Nursing homes located in counties where the average proportion of Medicaid residents was higher among facilities may indicate racially/ethnic diverse counties, because Black nursing home residents disproportionately rely on Medicaid as payment for nursing home care (Ness, Ahmed, and Aronow, 2004). Applying resource dependency theory, communities are resources for nursing homes; consequently, facilities will draw on the resources located in their communities. Therefore, nursing homes located in counties with higher proportion of Medicaid residents, may have higher proportion of minority residents because of minorities higher reliance on Medicaid.

Hypothesis 2h: Nursing home located in counties where the proportion of Medicaid residents is higher among facilities will be associated with higher proportion of minorities.

Hypothesis 2i: Nursing home located in counties where the proportion of Medicaid residents is higher among facilities will be associated with lower nursing home segregation.

Occupancy rates

Nursing homes located in counties with lower occupancy rates may have difficulty filling beds in their facilities; as such, these homes may develop strategies to make the facility more accessible to consumers in order to secure external resources. Consequently, nursing homes with lower occupancy rates develop strategies to become more accessible to consumers. Nursing homes with lower occupancy rates have been found to disproportionately serve minority residents (Smith et al., 2004; Smith et al., 2008; Angelelli, Grabowski, and Mor, 2006).

Hypothesis 2j: Nursing homes located in counties where the occupancy rates are lower will be associated with higher proportion of minority residents.

Hypothesis 2k: Nursing homes located in counties where the occupancy rates are lower among facilities will be associated with lower nursing home segregation.

For-Profit Nursing Homes

While, not for-profit nursing homes affiliations with religious and fraternal organizations may allow these homes to focus on certain consumers, which may contribute to these homes being more segregated than for-profit nursing homes (Fennell et al., 2010; Smith et al. 2007). For-profit nursing homes have been associated with providing lower quality of care (Hillmer et al., 2005), which may make it difficult for these homes to secure private pay residents. As such, for-profit nursing homes may rely heavier on Medicaid reimbursement, which can influence the racial composition of nursing home residents. Medicaid-reliant nursing homes have been associated with having higher proportion of Black nursing home residents (Mor et al., 2004). Prior literature indicates for-profit nursing homes disproportionately serve a higher proportion

of Black nursing home residents (Troyer and McAuley, 2006; Miller et al., 2006; Angelelli, Grabowski, and Mor, 2006; Grabowski, 2004; and Gruneir et al., 2008).

Hypothesis 2l: Nursing homes in counties with higher proportion of for-profit nursing homes will be associated with higher proportion of minority residents.

Hypothesis 2m: Nursing homes in counties with higher proportion of for-profit nursing homes will be associated with lower nursing home segregation.

Race/Ethnicity of Nursing Home Residents and Quality

The SPO model suggests the structure of an organization can influence quality of care; consequently, nursing homes with limited financial resources may not be able to maintain adequate structural resources (human, material, or organizational) needed to provide quality care to residents. Resource constraints may also prevent nursing homes from adopting innovations needed to improve quality of care for residents. Minority residents have been found to be overrepresented in resource deprived nursing homes (Mor et al., 2004), which can contribute to poor quality of care for residents.

Hypothesis 3a: Black nursing home residents will reside in nursing homes with higher prevalence of pressure ulcers.

Hypothesis 3b: Hispanic nursing home residents will reside in nursing homes with higher prevalence of pressure ulcers

Hypothesis 3c: Black nursing home residents will reside in nursing homes with higher use of physical restraints

Hypothesis 3d: Hispanic nursing home residents will reside in nursing homes with higher use of physical restraints

Organizational Characteristics and Quality of Care

Payer Status

Mor et al., (2004) described Medicaid-reliant nursing homes as being associated with higher restraint use, higher risk of pressure ulcers, and higher low-risk antipsychotic use compared to nursing homes less reliant on Medicaid. Resource constraints among Medicaid-reliant nursing homes may contribute to poorer quality of care in these homes. Medicaid-reliant nursing homes have fewer private-paying residents, implying less potential for cross-subsidization across payers. As mentioned above, financial constraints can limit structural resources needed to provide adequate care to patients and limit nursing homes ability to adopt innovations that could improve quality of care for residents.

Hypothesis 4a: Nursing homes with higher proportion of Medicaid residents will be associated with lower nursing home quality.

Bed Size

Larger nursing homes have been associated with being located in predominantly Black communities (Reeds and Tobis, 2001). Prior studies indicate larger nursing homes have been associated with having higher deficiencies (Harrington et al., 2000; O'Neil et al., 2003) and poorer quality of care (Wan, Zhan, and Unruh, 2006) relative to smaller nursing homes. While, larger nursing homes may benefit from additional resources, these facilities may be more difficult to manage which may contribute to poor quality of care for residents.

Hypothesis 4b: Larger nursing homes will be associated with lower nursing home quality.

Occupancy Rates

Nursing home with low occupancy rates may face financial constraints due to their inability to fill beds. Consequently, nursing homes with low occupancy rates may have limited resources to invest in quality improvements. Previous research indicated increases in occupancy rates were associated with decreases in deficiencies among nursing homes (Akinci and Krolikowski, 2005; Angelelli, Grabowski, and Mor, 2006). Hypothesis 4c: Nursing homes with lower occupancy rates will be associated with lower nursing home quality.

Ownership

Not for-profit nursing homes have been associated with providing better quality of care to residents compared to for-profit nursing homes (Hillmer et al., 2005). Not for-profit nursing homes ability to secure higher proportion of private pay residents (Christensen & Arnold, 2005) may allow these facilities to allocate monies to other resources (i.e. staffing, equipment, or wages) to improve quality of care for residents. Hypothesis 4d: For-profit nursing homes will be associated with lower nursing home quality of care.

Residents Racial Composition

As previously discussed, prior studies have provided evidence that higher nursing home segregation is associated with lower quality of care in nursing homes (Smith et al., 2008; Smith et al., 2008; Fennell et al., 2010; Gerardo, Teno, and Mor, 2009; Cai, Mukamel, Temkin-Greener, 2010; Miller et al., 2006). Nursing home segregation has been correlated with residential segregation (Reeds and Andes, 2001; Reeds and Andes, 2001; Smith et l., 2007p; Fennell, Miller and Mor, 2000), indicating individuals reside in nursing homes in their communities. Nursing homes with higher proportions of

minority residents have been associated with having high proportions of Medicaid residents, which can influence the quality of care provided residents. Medicaid-reliant nursing homes have been associated with poor quality of care (Mor et al., 2004)

Hypothesis 4e: Nursing homes with higher proportion of minority residents will be associated with decrease in quality of care.

County/MSA Characteristics and Quality of Care

Payer Status

Applying RDT, communities provide nursing homes with needed resources. As such, nursing homes in counties with higher proportion of Medicaid consumers may provide services to a higher proportion of Medicaid residents. Aforementioned, Medicaid-reliant nursing homes have been associated with providing lower quality of care to residents.

Hypothesis 5a: Nursing homes in counties with a higher proportion of Medicaid residents will be associated with lower quality of care.

For-Profit Nursing Homes

For-profit nursing homes have been associated with providing lower quality care in relation to not for-profit nursing homes (Hillmer et al., 2005); however, nursing homes located in counties where there are higher proportions of for-profit nursing homes may develop strategies to distinguish themselves from other homes in the counties. One possible strategy could involve providing high quality care in order to attract consumers.

Hypothesis 5b: Nursing homes in counties with high proportion of for-profit nursing homes will be associated with higher quality of care.

Competition

Market competition has been associated with quality of care in nursing homes; however, the literature has been mixed in determining the relationship between competition and quality. Starkey, Weech-Maldonado, and Mor (2005) demonstrated the availability of alternative nursing home care, home healthcare and hospital-based sub-acute care, were associated with improved quality of nursing home residents. However, the Herfindahl Index (HHI) was not found to be significantly associated with quality. Nursing homes in competitive markets were associated with improved ADL's, lower prevalence of pressure ulcers (Castle and Engberg ,2007), lower catheter use, and greater mortality (Zinn et al., 1993). A recent study by Zinn et al., (2010) demonstrated nursing home located in more competitive markets were associated with improved investments-higher wages and hiring of new nurse and medical director- that can influence quality of care.

Nursing homes in competitive markets may promote higher quality of care as a strategy to attract higher paying residents, while other facilities may develop different types of strategies to defend against the competitive environment. Applying RDT, competitive markets can create an environment where there are greater demands for shared resources; as such, there is a higher need to accommodate resource-providing constituents. Thus, we provide the following hypothesis:

Hypothesis 5c: Nursing homes located in more competitive markets will be associated with higher nursing home quality.

Residential Segregation

As previously discussed, communities can be resources for nursing homes; as such, community resources can influence nursing home resources. Smith et al., (2007)

found that the most segregated region in the country also had the greatest racial/ethnic disparities in quality of care. Nursing homes with a high proportion of Black residents and located in communities with a high proportion of Blacks were associated with worse quality for all residents (Miller et al., 2006). Therefore, nursing homes located in areas that are largely minority populated may have a racial composition mix composed mostly of minority residents. Nursing homes associated with having higher proportion of minority residents have been found to have lower financial viability. As such, limited resources may make it difficult for segregated nursing homes to provide high quality care to residents.

Hypothesis 5d: Nursing homes located in communities with higher residential segregation will be associated with lower quality of care.

Nursing Home Segregation

Highly segregated nursing homes may have a lower proportion of minority residents or a higher proportion of minority residents. Nursing homes with lower proportion of minority residents may have better financial performance, due to a more diverse payment source, needed to provide and maintain quality care to residents. While, lower segregated nursing homes may be more integrated, these nursing homes may also have a less diverse source of reimbursement; which could contribute to the availability of resources needed to provide quality care to residents.

Hypothesis 5e: Lower segregated nursing homes will be associated with lower quality of care.

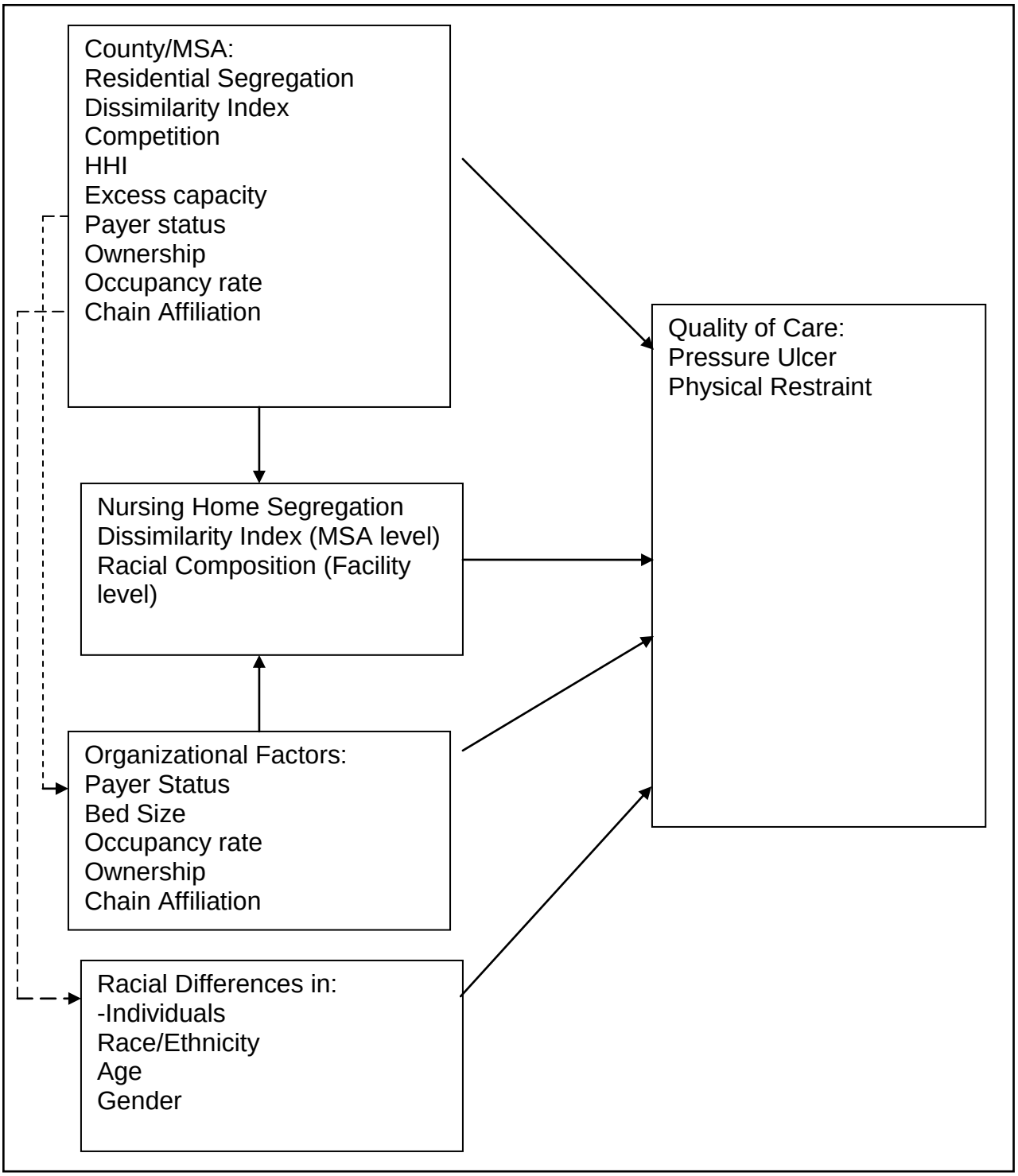

Figure 2-1: Conceptual framework

CHAPTER 3
METHODS

Data Overview

The purpose of this project was to examine the relationship between MSA and facility level nursing home segregation in relation to facility and county/MSA factors. This study also examined the relationship between residents' race, nursing home segregation, and residential segregation in relation to quality measures after adjusting for resident, facility, and county/MSA characteristics. Generalized linear models (GLM's) and generalized hierarchal linear models (GHLM's) were used to examine the relationships among the dependent and independent variables.

Study Design

This study was a retrospective observational cohort study that used 2005 data from the Minimum Data Set (MDS), which provided information on nursing home residents. Facility level information was obtained from the 2005 Online Survey Certification and Reporting (OSCAR) data acquired from the ltcfous.org website maintained by Brown University (ltcfocus.org); and 2005 county level data was also obtained from the ltcfocus.org website, which included, HHI, excess capacity, ownership, chain-affiliation status, and payer status. The 2008 Area Resource File (ARF) also provided county level data. Residential segregation data was obtained from, http://enceladus.isr.umich.edu/race/racestart.asp , a website developed by the Population Study Center at the University of Michigan. Measurements of residential segregation were calculated using the 2000 Census data

Data

The OSCAR dataset provided information on facilities structure (propriety status, chain affiliation, number of beds, etc.), staffing, case mix and operations. Surveyors evaluate the nursing homes' structural features to ensure that the minimum standards are being met (Mor et al., 2004). This information is routinely collected through the Medicare and Medicaid certification process and is gathered by state licensure and certification agencies. As a part of the recertification process for nursing homes, this data is updated annually.

MDS is resident level data that provides information on demographics, along with an assessment of activities of daily living, medications, and outcomes for treatment planning. Data are collected on all facility residents in Medicare and Medicaid-certified nursing homes, at the time of admission to the nursing home. Residents are reassessed each quarter thereafter (Bellows and Halpin, 2008).

ARF provides information on census, health, and social resources that describe counties in the United States. The county level data, obtained from the long-term care website, also provided information from the ARF and additional county-level variables that were used in this study.

Study Population (Aim I)

Nursing Homes: The sample consisted of Medicare and Medicaid certified nursing homes across the United States during the year of 2005, which consisted of 17,759 nursing homes. Approximately, 1,232 of the nursing homes were excluded from the sample because they did not have a facility number; as such, 16,527 facilities remained in the dataset. The ltcfocus.org Oscar data was merged with the ARF and county level data using state and county FIPS codes. The data was also merged with a

dataset that included residential segregation variable by metropolitan statistical area (MSA's). After the data was merged with the residential segregation data, the data set consisted of approximately 8,500 nursing homes. Merging the data with the residential segregation data allowed investigators to examine residential segregation during the analysis process. However, this process also excluded nursing homes in rural areas (approximately 8,000 nursing homes) because only nursing homes associated with a MSA remained in the dataset after merger with residential segregation data. Hospital-based nursing homes were excluded from this study because they may behave differently than freestanding nursing homes due their focus on post acute care (approximately 1,000 nursing homes). The final sample for this study consisted of 7,367 nursing homes total for the year 2005. Descriptions of the excluded nursing homes are further discussed in the univariate section of Chapter 4.

Measures

Dependent Variables

Table 3-2 provides definitions of the dependent and independent variables used for this study. Black-White and Hispanic-White nursing home segregation variables were used as dependent and independent variables in models. These variables were the dependent variables when segregation was the outcomes of interest, and they were the independent variables when the quality variables were the outcomes of interest. In order to answer aim I, nursing home segregation was measured using the Black-White and Hispanic-White dissimilarity index and residents racial composition. The following paragraphs will briefly describe these variables, beginning with the dissimilarity index.

Dissimilarity Index (nursing home segregation at the MSA level). The dissimilarity index is the most widely used measure of segregation. It describes the

percentage of a group's population that would have to change residence across an area (i.e. nursing home) in a given metropolitan statistical area to achieve an equal distribution among two groups. The dissimilarity index is not measured in absolute sense, but relative to another group (Weinberg, Iceland, and Steinmetz, 2002). The dissimilarity index ranges from 0, no segregation to 1, complete segregation. For example, a Black-White dissimilarity of 0.65 would indicate that 65% of Blacks would need to be relocated among nursing homes in order to achieve an even distribution among Black and White residents.

The dissimilarity index, a measure of evenness, has previously been used in the nursing home literature to measure Black to White disparities (Smith et al., 2007 & 2008). The dissimilarity index was used in this study compared to the other measures of evenness-exposure, concentration, centralization, and clustering- because it appears to be the most relevant measure for understanding segregation in relation to quality of care among nursing homes. The dissimilarity index allowed investigators to examine how overrepresentation or underrepresentation of minorities in nursing homes influences quality of care. The other measures of segregation-exposure, concentration, centralization, and clustering- do little to add to the existing literature on racial/ethnic composition and disparities in quality of care in nursing homes. Exposure may be a poor dimension of segregation for nursing homes because residents in nursing homes with high proportion of Blacks may still encounter individuals of other races (staff or residents). Concentration, centralization and clustering dimensions of segregation focus on the physical space between minority and majority groups. Massey and Denton

(1998) also provided evidence that the dissimilarity index contains most of the information found in the other measures of evenness.

Race categories, included in the MDS dataset, were used to create the Black-White and Hispanic-White dissimilarity index. Because the MDS is conducted quarterly, each resident had the opportunity to be in the data set more than once, which would influence an adequate count of Black, White, and Hispanic nursing home residents. Therefore, the index was constructed based on the quarterly assessments to ensure that an individual was only counted once when counting the number of residents. The variable target date was used to create the quarters for the 2005 MDS data. The quarters were divided as follow: January-March, April-June, July-September, and October-December. For each quarter, the number of Black, White, and Hispanic nursing homes residents was summed for each facility. Next, the total number of Black, White, and Hispanic nursing home residents in each MSA was calculated for this study. Three hundred and twenty-two MSA's were included in this study. Nursing home segregation for each quarter was averaged to obtain an overall Black-White and Hispanic-White nursing home segregation. Finally, I summed the index across all facilities in a MSA to obtain indexes for each MSA. As such, the nursing home segregation was measured using the following index:

- Black-White Dissimilarity Index: (1/2) SUM | (bi / B – wi / W)|
    - Bi = the number of Black residents in facility i
    - B= total number of Black nursing home residents in a metropolitan statistical area (MSA)
    - wi = number of White residents in facility i
    - W = total number of White nursing home residents in the MSA
- Hispanic-White Dissimilarity Index: (1/2) SUM | hi / H – wi / W) |

- hi = the number of Hispanic residents in facility i
- H= total number of Hispanic nursing home residents in a MSA
- wi = number of White residents in facility i
- W = total number of White nursing home residents in the MSA

- **Residents' racial composition (nursing home segregation at the facility level)**. Residents' racial composition was an indicator of nursing home segregation, at the facility level. This variable was obtained from the ltcfocus.org website and it was derived from the MDS dataset and aggregated to the facility level. Racial/ethnic categories included in the MDS are Black; not of Hispanic origin; White, not of Hispanic origin; Hispanic; American Indian/Alaskan Native; and Asian/Pacific Islander. The proportion of Black residents in a nursing home was created by summing the number of Black nursing home residents for each nursing home and dividing that number by the total number of residents in each nursing home. A similar method was used to create the racial composition variable for Hispanic nursing home residents.

The racial composition variables were categorized into three categories- no, medium, and high percent of Blacks or Hispanics in a nursing-based on the distribution quantiles, to analyze bivariate relationships. As such, approximately 50% of nursing homes had no Black nursing home residents, the top 10% of nursing homes had a high proportion of Black residents (more than 38% of residents were Black) and nursing homes with medium proportion of Black residents represented the nursing homes between the two groups. An estimated 90% of nursing homes had no Hispanic residents, 5% of nursing homes had a medium proportion of Hispanic residents, and 5% of nursing homes had a high proportion of Hispanic residents (more than 17% of the residents were Hispanic). For the purpose of our analyses, we excluded American

Indian/Alaskan Native and Asian/Pacific Islander in order to focus on Black-White and Hispanic-White disparities.

Independent Variables

Organizational. Table 3-2 provides definitions of dependent and independent variables. Independent variables pertaining to nursing home level factors included ownership status, chain-affiliation status, percent Medicaid, percent Medicare, total beds, and occupancy. Ownership status defined nursing homes as for-profit or not for-profit. Chain-affiliation indicated whether a facility was part of chain or not affiliated with a chain. Percent Medicaid was defined as the proportion of facility residents whose primary support was Medicaid. Percent Medicare was defined as the proportion of facility residents whose primary support was Medicare. Total beds were the number of beds reported on the OSCAR annually. Occupancy rate was measured as the number of occupied beds divided by the total number of beds.

County/MSA. County/MSA level independent variables included HHI, excess capacity, ownership, payer status, occupancy rate, chain-affiliation, Black-White and Hispanic-White nursing home segregation and Black-White residential segregation and Hispanic-White residential segregation. HHI measured nursing home concentration/competition in the county, values closer to one indicated less competition. The HHI was derived by squaring each facility's total beds and the sum for all facilities in the county was calculated. Excess capacity was measured as the average number of empty beds in a county divided by the number of nursing homes in the county. Ownership was measured as the proportion of facilities that are for-profit in counties. Percent of Medicaid residents was measured as the average proportion of residents whose primary support was Medicaid among all facilities. Percent of Medicare

residents was measured as the average number of residents whose primary support was Medicare among all facilities. Occupancy rates was the average number of occupied beds divided by the total number of beds among all facilities. Chain-affiliation indicated facilities that were part of chains in counties.

The following paragraph describes the measurement of residential segregation. The Population Study Center at the University of Michigan measures segregation using the index of dissimilarity and index of exposure. The website obtains information on the numerator for residential segregation at the census tract level, block group level, and block level, while the denominator is calculated for the county, metropolitan areas or U.S. cities with more than 10,000 people. This website provides information on residential segregation for four different races, Whites, Blacks, American Indians, Hispanics and Asians. For this study, residential segregation was measured using the index of dissimilarity, the numerator was calculated at the census tract and the denominator was calculated at the metropolitan area. Black-White and Hispanic-White dissimilarity index were measured in this study. The following dissimilarity indexes were used to measure residential segregation:

- Residential Segregation Formulas:
-
- Black-White Dissimilarity Index : $(1/2) \sum (b_i / B - w_i / W)$
    - b_i = the number of Blacks in census tract i
    - B= total number of Blacks in a MSA
    - w_i = number of Whites in census tract i
    - W = total number of Whites in the MSA
    -
- Hispanic-White Dissimilarity Index -(1/2) ∑ (hi / H – wi / W)
    - hji = the number of Hispanics in census tract i
    - H= total number of Hispanics in a MSA
    - wi = number of Whites in census tract i
    - W = total number of Whites in the MSA
    -

Data Analysis (Aim 1)

The data analysis plan included univariate, bivariate, and multivariate analyses conducted using SAS 9.2 software. Frequency distributions for dependent and independent variables were examined using univariate analyses. Unadjusted bivariate analyses included chi-square tests, t-tests, and analysis of variances (ANOVA's). Chi-square tests were conducted with categorical independent and control variables and analysis of variances (ANOVA's) or t-tests were conducted with continuous independent and control variables.

Generalized linear models (GLM's) were used to analyze the relationship between Black-White and Hispanic-White nursing home segregation. Generalized hierarchical linear models (GHLM's) were utilized to explore the relationship between facility and county/MSA factors in relation to residents' racial composition. Table 3-1 provides descriptive information of the dependent variables. Dependent variables with normal distributions are expected to have a skewness equal to 0 and a kurtosis equal to 3. As detailed in table 3-1, both the nursing home segregation and residents' racial composition variables violate the assumption of normality; as such, generalized linear models and generalized hierarchical linear models were used in this study. These models were utilized because the dependent variables are derived from proportions. Hox (2002) suggests, proportion dependent variables violate the assumption of normality and continuous scores, as such, they violate the assumption of homoskedasticity errors and there is a different variance for each of the observations.

Generalized Linear Models (GLM's)

Generalized Linear Models (GLM's) explicitly include the necessary transformation and the choice of the appropriate error distribution in the statistical model

needed to deal with non-normality and heteroskedaticity (Hox, 2002). The GLM extends on the standard regression by allowing for non-normal error distribution or using nonlinear link functions. GLM's were used in this study to examine how county/MSA factors were associated with Black-White and Hispanic-White nursing home segregation. GLM models were used with these variables because the variables are proportions and they violate the assumption of normality. GLM's account for the issue of non-normality and heteroscedastic error terms, as previously stated. GLM's were also used because Black-White and Hispanic-White nursing home segregation were measured at the MSA level in this study; as such, the MSA level is the highest level in used in this study and there is no clustering associated with this model. Investigators examined the role of county/MSA factors (level-3 independent variables) relative to the dependent variables Black-White and Hispanic-White nursing home segregation (level-3 dependent variable).

2-Level Generalized Hierarchical Linear Models (GHLM's)

To appropriately analyze facility and county/MSA region level factors relative to racial composition of residents, the hierarchical nature of the data must be taken into account. Nursing homes are nested within MSA's, which makes multilevel modeling a more appropriate model than conventional methods (OLS or logistic regression) (Raudenbush and Bryk, 2002). Failure to take into account the dependency found among nursing homes within markets can result in erroneous conclusion. Multilevel modeling relaxes the independence assumption of OLS (ordinary least square) regression, which allows for correlated error structures. The use of OLS with clustered data with can result in error terms that are smaller than they should be, which may result in Type I error (false-positive, interpret findings as significant when it is not

Rothman and Greenland, 1998) (Raudenbush and Bryk, 2002; Luke, 2004). The data will be analyzed in a 2-level structure, because there are two levels of clustering with nursing homes (level-1) nested within MSA's (level-2)

One possible issue that may arise with the models was cross-sectional autocorrelation, which may arise because nursing homes within the same state may not be independent of each other, because of regulations that may make facilities similar to each other. State fixed effects were used to control for state differences that may occur among facilities in the same state. Another possible issue that may arise was due to the multiple observations among residents and nursing homes that occur in the MDS and OSCAR data. As such, facility and resident level fixed effects were used to account for multiple observations in both datasets.

Aim 1. To examine how organizational and county/MSA region characteristics are associated with nursing home segregation

GLM's - Examine how county/MSA characteristics are associated with nursing home segregation

$y = e^{(B_0 + BX + Bx)} / 1 + e^{(B_0 + BX + Bx)} + e$

y represents nursing home segregation (Black-White nursing home segregation or Hispanic-White nursing home segregation), the dependent variables. B_0 is the intercept of the model. B represents the coefficients for each of the X's and the X's indicates the predictor variables. e represents the error term. Models were ran using a binomial distribution with a logit link using proc Glimmixx in SAS 9.2.

2-Level GHLM's-Examine how organization and county/MSA region characteristics are associated with nursing home segregation

- $n_{ij} = \pi i_{ij}$; $\pi \sim \text{Binomial}(n_{ij}, \mu)$
- $\pi_{ij} = \text{logitstic}(\gamma_{00} + \gamma_{10}X_{ij} + \gamma_{01}Z_j + \mu_{0j})$
-

π_{ij} represents residents' racial composition (proportion of Black or Hispanic racial composition) for the *ith* nursing home in *jth* county/MSA. λ_{00} represents the expected value of nursing home segregation when the predictor values are all 0. $\lambda_{10}X_{ij}$ indicates the coefficient of the level-1 predictor variables and $\lambda_{01}(Z)_j$ indicates the coefficient of level-2 predictor variables on the intercept. X_{ij} indicates the level-1 predictors and W_j represents the level-2 predictors in the formula above. u_{oj} represents the county/MSA level residual variance. The model has no term for the facility level (level-1) error variance (rij), because when the error distribution is binomial the level-1 residual error variance is a function of the population proportion (Hox, 2002). This model had a binominal distribution with a logit link to account for the proportion dependent variables. Proc Glimmixx was used to run the 2-level GHLM model in SAS 9.2.

Study Population (Aims II, III, IV, and V)

Nursing Homes

The sample consisted of Medicare and Medicaid certified nursing homes across the United States during the year of 2005, which consisted of 17,759 nursing homes. The ltcfocus.org Oscar data was merged with the ARF and county level data using state and county FIPS codes. This data was also merged with the residential segregation dataset by metropolitan statistical area (MSA's). After final merger the dataset had approximately 8,500 nursing homes. Nursing homes in hospital-based facilities were excluded because they may behave differently than free-standing nursing homes due to their focus on post-acute care (approximately 1,000 nursing homes). The final sample consisted of 7,367 nursing homes total for the years 2005.

Residents

The sample for this study included long-term care nursing home residents. Investigators selected to focus on long-term care nursing home residents to assess the quality of care of facilities because these residents are a likely reflection of the quality of care provided in nursing homes. Nursing home residents with either a quarterly or annual assessment were considered long-term, to ensure that the length of stay for a nursing home resident was at least 90 days (Cai et al., 2010; Gerardo, Teno, & Mor, 2009).

The Minimum Data Set (MDS) provided information at the resident level. The 2005 MDS data consisted of approximately 4.6 million observations and after the merge with ltcfocus.org Oscar data, which included 7,367 nursing homes there were approximately 2.6 million observations in the dataset. This dataset also only included nursing homes located in MSA's; as such data pertaining to residents in facilities located in MSA's were maintained in the final dataset. The MDS data was merged with OSCAR data using the facility id number. Description of the full data set is further discussed in the univariate section of the MDS and OSCAR paragraph.

Measures

Dependent Variables

Currently, there are no preferred measures used to assess quality of care in nursing homes; however, the Centers for Medicare and Medicaid have developed the Nursing Home Compare website, which reports quality ratings derived from Minimum Data Set (MDS) for Medicare and Medicaid certified nursing homes. Long stay resident quality measures include: percent of residents who need help with daily activities has increased; percent of residents whose ability to move in and around their room got

worse; percent of high risk residents with pressure sores; percent of residents who had a catheter inserted and left in the bladder; percent of residents who were physically restrained; percent of resident with urinary tract infection; and percent of residents who have moderate to severe pain. Quality measures that were associated with racial/ethnic disparities in previous nursing home literature, along with measures used for the Nursing Home Compare website helped guide the selection of the quality variables used in this study. As such, prevalence of pressure ulcer and physical restraint use were the quality dependent variables selected for this study.

Pressure ulcers. Section M (skin condition) of the MDS measures the presence of pressure ulcers at four different stages, the stages range from 0 indicating no pressure ulcers present to 1-9 indicating presence of pressure ulcers among residents. At the resident level, quality indicators are defined as the presence (0) or absence of the condition (1) (Zimmerman, 2003). Consequently, the pressure ulcer variable was measured as 0 indicating no pressure ulcers present and 1 indicating pressure ulcers present. Residents housed in nursing homes where a few residents have pressure ulcers present may still be receiving quality care, because some factors contributing to the presence of pressure ulcers may be beyond the facilities control. While, residents who are in nursing homes where the presence of pressure ulcers are a commonality, may be at risk of receiving poor quality of care.

Physical restraint. Section P of the MDS provides information on the physical restraint measure. Physical restraints are measured as 0-not used daily, 1-used less than daily, and 2- used daily within the last seven days. Types of physical restraint include bed rail, trunk restraint, limb restraint, and chairs preventing rising. This study

will include all types of physical restraints to measure physical restraint use. The physical restraint variable was coded as 0 if none of the restraints listed above were used and coded as a 1 if any of the restraints were used. The overuse of physical restraints among residents can be an indicator of poor quality and lead to other serious complications among residents.

Risk adjusting. Investigators used the National Nursing Home Measures User's Manual produced by the Abt Association to guide the risk adjustment of the quality measures. Abt Association created the manual as a part of the Centers for Medicare and Medicaid Services (CMS) Nursing Home Quality Initiative. The manual provides investigators with algorithms to calculate quality measures, using inclusion and exclusion criteria. Prior research suggests the use of exclusion techniques are straightforward to perform and easy to understand; however this technique is subject to measurement error when risk categories are small or when high or low residents are concentrated in certain facilities (Mor et al., 2003; Mor et al., 2003; Arling et al., 2007). Arling et al., (2007) suggest risk adjustment with statistical models, and preferable multilevel modeling to handle the clustering of the data. As such, multilevel risk adjusted models were conducted when necessary to properly assess quality measures.

Independent Variables

Table 3-2 provides definitions of resident, nursing home and county/MSA variables used in this study. The primary independent variable at the resident level was race/ethnicity of nursing home residents, at the organization level was racial composition, and payer status, and at the county/MSA level was nursing home and residential segregation. MDS collects information on race/ethnicity of nursing home residents for the following categories: American Indian/Alaskan Native; Asian/Pacific

Islander; Black, not of Hispanic origin; Hispanic; and White, not of Hispanic origin. This study focused on Black, Hispanic and White nursing home residents. Table 3-2 provides definitions for percent Medicaid and percent Medicare; these variables were also defined in the independent variable section of Aim 1. Nursing home and residential segregation were also measured as previously discussed in Aim 1.

Control Variables

Control variables were selected to adjust for factors that may influence quality of care at a nursing home. Resident level control factors included gender and age; additional risk factors were adjusted for in the model depending on the outcome variable. Age was categorized as individuals age 65, 66-75, 76-85, and greater than 86. Facility level variables included ownership, chain status, total beds, and occupancy rates. County/MSA region level factors included HHI, excess capacity, ownership, payer status, chain-affiliation, and occupancy rates. Facility and county/MSA region variables were previously defined in aim 1, too.

Data Analysis (Aims II, III, IV, and V)

3-level GHLM's were conducted to examine the relationships between quality dependent variables (restraint use and pressure ulcer) and resident, facility, and county/MSA characteristics. Table 3.1 indicates the restraint use and pressure ulcer variables do not have a normal distribution, which suggests the need for GHLM models to account for the non-normal distribution. The hierarchical nature of the data must be taken into account, there are three levels of clustering in the model. Models included resident factors (level-1), nursing home factors (level-2) and county/MSA factors (level-3). Residents are nested within nursing homes and nursing homes are nested within county/MSA; therefore, it is necessary to use 3-level GHLM's to account for the

clustering. State, facility, and residents fixed effects are included in the models to control for cross-sectional autocorrelation.

3-Level Generalized Hierarchical Linear Model

The primary outcomes of aims II-V were pressure ulcer and physical restraint use, which are evaluated as binary variables. Therefore, a generalized hierarchical linear model was utilized for this portion of the study. Aforementioned, this model consisted of three levels, the resident, facility, and county/MSA, which justifies the use of a 3-level GHLM.

Resident level model (level-1)

Aim II. To examine if nursing home resident factors, specifically nursing home residents' race/ethnicity are independently associated with quality of care after controlling for county/MSA and organizational factors.

- $\eta_{ijk} = \text{logit}(Y_{ijk})$ $\pi \sim \text{Binomial}(n_{ij}, \mu)$
- $y_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{casemix})_{ijk} + \ldots\ldots\ldots\ldots + \pi_{njk}(\text{casemix})_{1jjk}$
- y_{ijk} represents the quality care for resident i in nursing home j and region k. π_{0jk} indicates the intercept for nursing home j in region k. Casemix $_{1ijk}$ indicates resident characteristics that predict quality (age, race, and gender). π_{1jk} are the corresponding level-1 coefficients that indicate the direction and strength of the association between each resident characteristics and the outcome in nursing home jk. This model had a binomial distribution with a logit link, because of the binary dependent variables.

Nursing home level model (level-2)

Aim III. To determine if nursing home factors, specifically residents' racial composition, are independently associated with quality of care in nursing homes after controlling for nursing home resident and county/MSA factors.

- $\pi_{0jk} = \beta_{00k} + \beta_{01k}(casemix)_{jk} + \ldots\ldots + \beta_{0nk}(casemix)_{jk} + r_{0jk}$, where $r_{0jk} \sim N(0,\sigma^2)$

β_{00k} is the intercept for county/MSA k in modeling the nursing home effect π_{0jk}. B_{00k} represents the mean initial status within in nursing home *j.* $Casemix_{ij}$ represents the nursing home characteristics used as predictors of the nursing home effect. β_{01k}..... β_{0nk} are the corresponding coefficients that represent the direction and strength of association between nursing home characteristics and π_{0jk} ; and r_{0jk} is a level-2 random effect that represents the deviation of nursing homes jk's level-1 coefficient , π_{0jk} , from its predicted value based on the nursing home-level model.

County/MSA level (level-3)

Aim IV. To determine if county/MSA factors, specifically nursing home and residential segregation, are independently associated with quality of care in nursing homes after controlling for nursing home resident and organizational factors.

- $B_{00k} = \gamma_{000} + \gamma_{001}(casemix)_k + \ldots\ldots + \gamma_{00n}(casemix)_k + \mu_{00k}$, where $\mu_{00k} \sim N(0, t_{00})$

γ_{000} is the intercept term in the region-level model for B_{00k}, which represents the expected value of quality after controlling for the predictor variables . $Casemix_k$ are the region characteristics used as predictors for the region effect. γ_{001}…… γ_{00n} represent the corresponding level-3 coefficient that represents the direction and strength of the association between region characteristics predictors and B_{00k} ; and μ_{00k} is a level-3 random effect that represents the deviation of county/MSA region k's coefficient, B_{00k} , from its predicted value based on the region-level model.

3-Level GHLM Full Model

$Y_{ijk} = \gamma_{000} + \gamma_{001}casemix_k + \ldots\ldots\ldots + \gamma_{00n}casemix_k + \beta_{01k}casemix_{jk} + \ldots\ldots + \beta_{0nk}casemix_{jk} + \pi_{1jk}casemix_{ijk} + \ldots\ldots + \pi_{njk}casemix_{ijk} + r_{0jk} + \mu_{00k}$

Model was created by substituting each of the intercepts back into the models of the previous levels. Therefore, the intercept of the county/MSA region (level-3) model, $B_{00k,}$ was substituted into the nursing home level model (level-2) and then the intercept for the nursing home model (level-2), π_{0jk}, was substituted into resident level model (level-1) and $r_{0jk} + \mu_{00k}$ represent the facility and county/MSA variance, respectively.

Intraclass Coefficient

- Investigators will use a non-parametric measure of the intraclass coefficient due to the binary nature of the outcome variables. The use of the ICC in linear models is based on the distinction between the level-1 variance and variance of other levels; however, with a binary variable the residual error variance (level-1 variance) is a function of the population proportion (Hox, 2002). As such, Merlo et al., (2006) discussed the level-1 residual variance as being on a probability scale for multilevel logistic models, while the level-2 residual variance is a logistic scale. Snijders and Bosker (1999) suggest the use of the linear threshold model method or latent variable method, which converts level-1 variance from a probability scale to the logistic scale. When conducting the linear threshold model method the logistic distribution for the level-one residual implies a variance of $\pi^2/3 = 3.29$ (Snijders and Bosker, 1999; Goldstein, Browne, and Rasbash, 2002; Rasbash, Steele, and Browne,). Prior studies have used the linear threshold model method to calculate the ICC for binary outcomes (Merlo et al., 2006; D'Errigo et al., 2007; and Theall et al., 2008).

Aim V. Examine the proportion of variance from each level (resident, nursing home, and county/MSA factors) that is associated with quality of care in nursing home.

- Resident (level-1) Intraclass coefficient ($ICC_{residents}$): $\rho = 3.29/(\sigma^2 + t_{00} + 3.29)$
-

As mentioned previously the level-1 variance is not obtained in generalized linear models. Following Snijders and Bosker (1999) method, the resident level variance (level-1) was represented as 3.29. The facility level variance (level-2) was estimated from the σ^2 variance which is associated with r_{ij} error term in the nursing home level model above. The county/MSA (level-3) variance was estimated from t_{00} associated with μ_{00k} error term in the county/MSA level model above. The ICC formula above was used for this model. Resident level ICC is defined as the proportion of total random variation (the denominator) due to the variance of the resident effect.

- ICC $_{\text{nursing homes}}$: $\rho = \sigma^2 / (\sigma^2 + t_{00} + 3.29)$
-

- The ICC formula above was used for the nursing home model (level-2). Nursing home level ICC was defined similar to the resident level ICC, however, the numerator was changed to σ^2. Nursing home level ICC was defined as the proportion of total random variation due to the variance of the nursing home effect.

-
- ICC $_{\text{county/MSA}}$: $\rho = t_{00} / (\sigma^2 + \sigma^2_r + 3.29)$
-

The ICC formula above was used for the county/MSA region model. The county/MSA level ICC was defined similar to the resident and facility level ICC, however, the numerator has changed to t_{00}. County/MSA region level ICC was defined as the proportion of total random variation due to the variance of the county/MSA region effect.

Table 3-1. Descriptive statistics of dependent variables

	Mean	SD	Minimum	Maximum	Skewness	Kurtosis	N
Variables							
Quality							
Pressure ulcer	0.09	0.29	0	1.00	2.78	5.74	2,568,613
Physical restraint	0.36	0.48	0	1.00	0.57	-1.67	2,568,064
Segregation							
Black-White Nursing Home Segregation	0.54	0.12	0.07	0.94	-0.31	0.11	7,367
Hispanic-White Nursing Home Segregation	0.58	0.17	0.08	0.96	0.07	-0.66	7,367
Percent Black	0.18	1.83	0.00	0.59	24.50	638.83	7,367
Percent Hispanic	0.04	0.67	0.00	0.39	43.36	2110.76	7,367

Nursing Home Segregation variable means obtained from OSCAR data; Quality variable means obtained from MDS data

Table 3-2. Resident and nursing homes variables used in analyses

Variables	Definitions
Resident (Level-1)	
Dependent Variables	
Pressure Ulcer	Presence or absence of pressure ulcers
Physical Restraint	Use or none use of physical restraints
Independent Variables	
Race/Ethnicity	Residents who self-identified as White, Black, or Hispanic
Age	Residents greater than or equal to the age 65
Gender	Residents who self-identified as male or female
Nursing Homes (Level-2)	
Dependent Variables	
Black Racial Composition of Residents	Proportion of residents in the facility who are Black
Hispanic Racial Composition of Residents	Proportion of residents in the facility who are Hispanic
Independent Variables	
Percent Medicaid	Proportion of residents whose primary support is Medicaid
Percent Medicare	Proportion of residents whose primary support is Medicare
Bed Size	The average number of beds among facilities
Occupancy Rate	Number of occupied beds in a facility divided by the total number of beds
Ownership	For-profit or not for-profit
Chain Affiliation	Whether or not a facility is part of a chain

Resident level variables were obtained from MDS data set; Nursing home dependent variables were created from MDS data, independent variables were obtained from OSCAR data located on the ltcfocus.org website.

Table 3-2. continued

Variables	Definitions
Market Area (Level-3)	
Dependent Variables	
Black-White Nursing Home Segregation	The number of Black nursing homes residents that need to relocate among nursing homes in a MSA to create an even distribution among Black and White residents
Hispanic-White Nursing Home Segregation	The number of Hispanic nursing homes residents that need to relocate among nursing homes in a MSA to create an even distribution among Hispanic and White residents
Independent Variables	
Black-White Residential Segregation	The number of Black residents that need to relocate among census tracts in a MSA to create an even distribution among Black and White residents
Hispanic-White Residential Segregation	The number of Hispanic residents that need to relocate among census tracts in a MSA to create an even census tracts in a MSA to create an even distribution among Hispanic and White residents
Herfindahl Index (HHI)	Measure of nursing home concentration/competition in the county ranging from 0 to 1. The closer to 1, the closer the county is to having a monopoly in nursing home beds
Excess Capacity	The average number of empty beds in the county
Percent Medicaid	The average proportion of residents whose primary support is Medicaid among all facilities
Percent Medicare	The average proportion of residents whose primary support is Medicare among all facilities
Occupancy Rate	The average number of occupied beds divided by the total number of beds among all facilities
Ownership	Proportion of facilities that are for-profit
Chain Affiliation	Proportion of facilities that are part of chains

Resident level variables were obtained from MDS data set; Nursing home dependent variables were created from MDS data, independent variables were obtained from OSCAR data located on the ltcfocus.org website.

CHAPTER 4
RESULTS

Univariate

Oscar data. Description of the Oscar data was presented in tables 4-1, 4-2 and 4-3. Tables 4-1 and 4-2 provide information on OSCAR continuous independent variables, while table 4-2 provides information on OSCAR categorical independent variables. Table 4-1 indicates that among the facility level factors, on average, nursing homes had an estimated 63% of Medicaid residents and 14% of Medicare residents. The average occupancy rate for nursing homes in this sample was 87%, with nursing homes having an average of 122 beds. The average proportion of Black and Hispanic nursing home residents was 18% and 4%, respectively.

Among the county/MSA factors, Hispanic-White nursing home segregation was 0.58 and Black-White nursing home segregation was 0.54, as depicted in table 4-2. This finding indicates 58% of Hispanic and White nursing home residents would need to be relocated among nursing homes in order to achieve integration, and 54% of Black and White residents would need to be relocated among nursing homes in order to achieve integration. Hispanic-White residential segregation was 0.44 and Black-White residential segregation was 0.61; suggesting higher residential segregation among Blacks and Whites. The average HHI was 0.11; suggesting nursing homes in this sample are generally in competitive markets. Excess capacity indicates the average number of empty beds per county was approximately 16.

Among nursing homes in counties, the average proportion of Medicaid residents was 60% and the average proportion of Medicare residents was 16%. An estimated 69% of nursing homes in counties were for-profit and slightly more than half were chain-

affiliated. The average occupancy rate among nursing homes in counties was 86%. Table 4-3 indicates an estimated 73% of the nursing homes were for-profit and 27% were not for-profit. More than half of nursing homes were chain-affiliated (54%), while an estimated 46% have no chain affiliation.

Results are not shown in this paper, but univariate statistics were conducted on full data set with 15,926 nursing homes. The results indicated little difference between final sample (N=7,367) and the full sample (N=15,926). Among the full sample, the average proportion of Medicaid and Medicare residents was 0.61 and 0.15, respectively. The average occupancy rate was 84%, with a slightly lower number of totals beds on average, 105. The average proportion of Black nursing home residents was 13% and the average proportion of Hispanic nursing home residents was 3%. The sample consisted mostly of for-profit nursing homes (66%) compared to for-profit nursing homes (34%) and more than half of the facilities were chain-affiliated (52%) relative to nursing homes not affiliated with chains (34%).

MDS and OSCAR data. Descriptive statistics of the MDS and Oscar datasets are presented in tables 4-4, 4-5 and 4-6. Table 4-4 and 4-5 provide information on facility and county/MSA continuous independent variables and table 4-6 provides information on categorical independent variables. Tables 4-4 and 4-5 indicate the average percent of Medicaid residents was 66% and the average percent of Medicare residents was 13% among nursing homes. The average occupancy rate was 88% among nursing homes in this sample. Nursing homes had an average of 161 beds. The average proportion of Black nursing home residents was 38% and the average proportion of Hispanic residents was 8%. Hispanic-White nursing home segregation was 0.58 and

the Black-White nursing home segregation was 0.54, indicating relatively high segregation in nursing homes. Hispanic-White and Black-White residential segregation were 0.45 and 0.62, respectively. The average HHI was 0.10 and the average number of empty beds per facility (excess capacity) was 16 beds.

In table 4-6, approximately 71% of residents were female and 29% were male. Eighty percent of nursing home residents were White, 15% were Black, and 5% were Hispanic. For-profit nursing homes (70%) represented the majority of nursing homes. Half of the nursing homes in this sample were affiliated with chains, while 49% had no chain-affiliation.

Results are not shown in paper, but univariates were conducted on the full sample of MDS and OSCAR data (N=4,564,726). Descriptive statistics from the full sample were similar to the final sample used in this study. The full sample consisted of 14% Black residents, 4% Hispanic residents and 82% White residents. Seventy percent of the sample was female and 30% were males, and the average age was 84 years old. The average proportion of Medicaid residents was 0.66 and the average proportion of Medicare residents was 0.12. Occupancy rate among facilities on average was 0.88 and the average number of beds was 162. The proportion of Black (0.18) nursing home residents was lower in the full sample relative to the final sample, but proportion of Hispanic (0.04) nursing home residents was similar in both samples. An estimated, 67% of nursing homes were for-profit and 33% were not for-profit, and a little more than half of the facilities were chain-affiliated.

Bivariate

Proportion of Black nursing home residents. Table 4-7 provides information on the association between nursing homes with no-, medium-, and high proportion of Black

nursing home residents in relation to facility and county/MSA factors. Nursing home with high proportion of Black nursing home residents had more Medicaid residents and lower Medicare residents, compared to nursing homes with no and medium proportion of Black nursing home residents. Nursing homes with high proportion of Black residents had lower occupancy rates (0.85) relative to nursing homes with no Black residents (0.87) and medium proportion Black residents (0.87). Nursing homes with no Black residents had lower number of beds on average (106 beds) compared to nursing home with high proportion of Black residents (145 beds). Approximately, 6% of not for-profit nursing homes had high proportion of Black residents compared to 11% of for-profit nursing having a high proportion of Black nursing home residents. An estimated, 11% of nursing homes not affiliated with chains had high proportion of Black residents compared to 9% of chain-affiliated nursing homes having a high proportion of Black residents. Findings indicate nursing homes with high proportion of Black residents were associated with higher Medicaid residents, lower Medicare residents, lower occupancy rates, were larger in size and more likely to be for-profit nursing homes compared to nursing homes with no Black residents.

Nursing homes with high proportion of Black residents were in less competitive markets (HHI=0.09), compared to nursing homes with no Black residents (HHI=0.15) and medium proportion of Blacks residents (HHI=0.15). Nursing homes with high proportion of Black residents had higher excess capacity (19) relative to facilities with no Black residents (15) and facilities with medium proportion of Black residents (17). This results, indicates facilities with high proportion of Black nursing home residents were located in counties with a higher average number of empty beds compared to nursing

homes with no and medium proportion of Black nursing home residents. Nursing homes with high proportion of Black nursing home residents were located in counties with higher proportion of Medicaid residents (0.65) in facilities and facilities with lower chain-affiliations (0.50) compared to nursing homes with no Black residents.

Black-White residential segregation was 0.66 among nursing homes with high proportion of Black residents, 0.63 among nursing homes with medium proportion of Black residents, and 0.60 among nursing homes with no Black residents. This suggests that higher Black-White residential segregation was associated with higher proportion of Black residents in nursing homes. There was no significant difference between nursing homes with high proportion of Black residents and nursing homes with no Black residents relative to Black-White nursing home segregation because both types of nursing homes indicate separation of Black and White residents from each other in facilities. However, nursing homes with medium proportion of Black residents, nursing homes with more heterogeneous racial composition, had significantly lower Black-White nursing home segregation compared to nursing homes with no and high proportion of Black residents.

Proportion of Hispanic nursing home residents. The relationship between nursing homes with no Hispanics, medium proportion of Hispanics, and high proportion of Hispanics in relation to facility and county/MSA region factors are described in tables 4-8 and 4-9. Nursing homes with high proportion of Hispanic residents had a higher percent of Medicaid residents (0.76) compared to nursing homes with no Hispanic residents (0.62). Nursing homes with high and medium proportion of Hispanic residents had lower percent of Medicare residents (0.11) compared to nursing homes with no

Hispanics. Nursing homes with high and medium proportion of Hispanic residents were larger in size compared to nursing homes with no Hispanics. An estimated, 93% of not for-profit nursing homes had no Hispanic residents, while 89% of for-profit nursing homes had no Hispanic residents. Ninety-two percent of chain-affiliated nursing homes had no Hispanic nursing home residents relative to 89% of non-chain affiliated nursing homes having no Hispanics. Nursing homes with high proportion of Hispanic residents had higher percent of Medicaid resident, lower percent of Medicare residents, were large in size, and more likely to be for-profit compared to nursing homes with no Hispanic residents.

Table 4-9 indicates nursing homes with high proportion of Hispanic residents were in more competitive markets (HHI=0.08) compared to nursing homes with no Hispanics (HHI=0.12). The average number of empty beds per facility was higher among nursing homes with medium and high proportion of Hispanic residents (18) relative to nursing homes with no Hispanics residents (16). Nursing home with high proportion of Hispanic residents were located in counties where facilities had higher proportions of Medicaid residents and higher proportion of for-profit facilities relative to nursing homes with no Hispanic residents.

Hispanic-White nursing home segregation was 0.40 among nursing home with high proportion of Hispanics, 0.47 among nursing homes with medium proportion of Hispanics, and 0.60 among nursing homes with no Hispanic residents. Nursing homes with no Hispanic nursing home residents were highly segregated, however facilities with high proportion of Hispanic residents were relatively segregated and were less segregated in relation to nursing homes with medium proportion of Hispanic nursing

home residents. Nursing homes with medium proportion of Hispanics were also located in areas with more Hispanic-White residential segregation compared to homes with high proportion of Hispanics, which may partially explain higher segregation among nursing homes with medium proportion compared to homes with high proportion of Hispanics.

Unadjusted Generalized Linear Model for Nursing Home Segregation

Black-White Dissimilarity index. Table 4-10 describes the association between Black-White nursing home segregation and county/MSA variables. The unadjusted odds ratios (OR) were calculated by exponentiating the coefficients for each independent variable. The inverse (1/OR) was calculated to explain OR's less than 1. Findings indicate nursing homes in counties with higher Black-White residential segregation (OR 1.02, p<p.001) or higher excess capacity (OR 1.01, p0.04) were associated with a higher likelihood of Black-White nursing segregation. Facilities located counties in more competitive markets (HHI) (OR 0.993, p<0.001) had a 1% greater odd of Black-White nursing home segregation. Nursing homes in counties with lower proportion of chain-affiliated (OR 0.997, p 0.01) facilities were associated with Black-White nursing home segregation, but there was a minimal difference between counties with high and low proportion of chain-affiliated nursing homes in relation to Black-White nursing home segregation. Nursing homes located in counties with higher proportion of Medicare (OR 0.995, p 0.18), higher proportion Medicaid (OR 0.997, p 0.21) residents, and higher occupancy rates (OR 0.996, p 0.28) had a lower likelihood of Black-White nursing home segregation. Nursing homes in counties with higher proportion of for-profit facilities (OR 0.997, p 0.07) also had a lower likelihood of Black-White nursing home segregation.

Hispanic-White Dissimilarity index. The relationship between Hispanic-White nursing home segregation and county/MSA region factors were described in Table 4-11. Nursing homes located in counties with higher Hispanic-White residential segregation (OR 0.985, p<0.001) had a 2% lower likelihood of Hispanic-White nursing home segregation. Nursing homes located in counties with fewer Medicare residents (OR 0.990, p<0.001) were associated with 1% greater odds of Hispanic-White nursing home segregation. Facilities located in counties with lower proportion of for-profit nursing homes (OR 0.996, p 0.002) were associated with higher Hispanic-White nursing home segregation, but there was minimal difference between homes located in counties with lower or greater proportion of for-profit nursing homes in relation to Hispanic-White nursing home segregation. Nursing homes located in counties with lower number of empty beds on average (OR 0.985, p<0.001) were associated with 2% greater odds of Hispanic-White nursing home segregation. Nursing homes located in counties with an increase in occupancy rates (OR 1.01, p< 0.001) and lower competitive markets (HHI) (OR, 1.01, p<0.001) were associated with 1% greater odds of higher Hispanic-White nursing home segregation. Nursing homes located in counties with higher proportion of Medicaid residents (OR 1.04, p 0.08) had a higher likelihood of Hispanic-White nursing home segregation. While, nursing homes located in counties with higher proportion of chain-affiliated facilities (OR 0.990, p 0.18) had a lower likelihood of Hispanic-White nursing home segregation.

Bivariates for Quality Variables

Pressure Ulcer. Table 4-12 provides descriptive statistics of nursing home residents with and without pressure ulcers. A higher percentage of male residents (11%) had pressure ulcers compared to female residents (9%). Approximately, 11% of Black

nursing home residents, 9% of Hispanic nursing home residents, and 9% of White nursing home residents had pressure ulcer presents. The odds of have a pressure ulcer present decreased as residents got older.

Physical Restraints. Table 4-13 provides descriptive statistics of nursing home residents who are physically restrained and not physically restrained. Among residents that were physically restrained, 33% were male and 37% were female. An estimated 39% of Hispanic residents were physically restrained, 37% of Black residents were physically restrained, and 36% of White residents were physically restrained. The use of physical restraints increased as residents got older.

Multivariate Models

Generalized Linear Models (GLM's)

Aim 1. To examine how county/MSA region- and organizational characteristics are associated with nursing home segregation

Black-White Dissimilarity Index. Table 4-14 describes the relationship between Black-White nursing home segregation and county/MSA characteristics. Similar to the unadjusted generalized linear models explained in the bivariate section of the paper, odds ratios (OR's) were calculated by exponentiating the coefficients for each independent variable. The inverse of OR's were calculated for OR's less than 1. After adjusting for county/MSA factors, nursing homes located in counties with higher Black-White residential segregation (OR 1.02, $p < 0.001$) were associated with 2% greater odds of Black-White nursing home segregation, which provides support for hypothesis 2b. Nursing homes located in more competitive markets (HHI) (OR 0.996, p 0.03) were significantly associated with higher Black-White nursing home segregation, this finding does not support for hypothesis 2e. Nursing homes with fewer numbers of

empty beds on average (OR 0.990, p 0.38) had greater likelihood of Black-White nursing home segregation, which does not support hypothesis 2g. Contrary to hypothesis 2i, nursing homes located in counties with fewer Medicaid residents (OR 0.996, p 0.22) had a greater likelihood of higher Black-White nursing home segregation, although this finding was not statistically significant. Hypothesis 2k was not supported but the finding went in the direction that was expected, nursing homes with lower occupancy rates (OR 0.988, p 0.06) had greater odds of higher Black-White nursing home segregation. Nursing homes in counties with fewer proportions of for-profit facilities (OR 0.998, p 0.20) had greater odds of Black-White segregation, this finding does not provide support for hypothesis 2m. Nursing homes in counties with fewer proportions of chain-affiliated facilities (OR 0.999, p 0.58) had a greater likelihood of Black-White nursing home segregation. Nursing homes located in counties with fewer proportions of Medicare residents (OR 0.991, 0.05) were associated with 1% greater odds of nursing home segregation.

Hispanic-White Dissimilarity Index. The relationship between Hispanic-White nursing home segregation and county/MSA level factors are described in table 4-15. This study did not find support for hypothesis 2b, lower Hispanic-White residential segregation (OR 0.990, p<0.001) was associated 1% greater odds of higher Hispanic-White nursing home segregation. Hypothesis 2e was not supported in this study but this finding went in the direction that was hypothesized, nursing homes in less competitive environments (HHI) (OR 1.003, p 0.14) had greater odds of higher Hispanic-White nursing home segregation. Nursing homes located in counties with lower number of empty beds on average (OR 0.990, p 0.01) were associated with a 1%

greater odd of Hispanic-White nursing home segregation, which does support hypothesis 2g. Hypothesis 2i was not supported in this study, nursing home in counties with higher proportion of Medicaid residents (OR 1.004, p 0.21) had a minimal effect on Hispanic-White nursing home segregation. While hypothesis 2k was not supported, the finding went in the direction that was expected, nursing homes located in counties with lower occupancy rates (OR 0.977, p 0.69) had a greater likelihood of higher Hispanic-White nursing home segregation. Results indicate no support for hypothesis 2m, nursing homes located in counties with higher proportion of for-profit nursing homes (OR 0.998, p 0.09) had minimal effect on Hispanic-White nursing home segregation. Nursing homes in counties with higher proportion of chain-affiliated nursing homes (OR 0.977, p 0.02) were significantly associated with Hispanic-White nursing home segregation; however, the proportion of chain-affiliated nursing homes in counties had minimal effect on Hispanic-White nursing home segregation. Nursing homes located in counties with fewer proportions of Medicare residents (OR 0.997, p 0.65) were not significantly associated with Hispanic-White nursing home segregation.

2-Level Generalized Hierarchical Linear Models (GHLM's)

Proportion of Black nursing home residents. Tables 4-16 and 4-17 describe the relationship between organizational and county/MSA characteristics in relation to the percent of Black residents in facilities. Results support hypothesis 1a, higher proportion of Medicaid (OR 1.07, p<0.001) and Medicare (OR 1.05, p <0.001) residents were associated with 7% and 5 % greater odds of nursing homes having higher proportion of Black residents in nursing homes, respectively. This study found no support for hypothesis 1b, nursing homes with lower occupancy rates (OR 0.999, p 0.96) were not significantly associated with a higher proportion of Black residents in

nursing homes. Hypothesis 1c was supported, larger nursing homes (OR 1.003, p <0.001) were significantly associated with higher proportion of Black residents in nursing homes, but the effect was small on this relationship. For-profit nursing homes were associated with 27% greater odds of having higher proportion of Black residents in nursing homes relative to not for-profit nursing homes (OR 0.79, p 0.05), this finding provides support for hypothesis 1d.

Higher Black-White residential segregation (OR 1.05, p<0.001) was associated with 5% greater odds of nursing homes having higher proportion of Black nursing home residents, providing support for hypothesis 2a. Results support hypothesis 2c, lower Black-White nursing home segregation (OR 0.97, p <0.001) was associated with 3% greater odds of nursing homes having higher proportion of Black residents, indicating less segregated nursing homes were associated with higher proportion of Black residents. Nursing homes located in more competitive markets (HHI) (OR 0.982, p<0.001) were associated with 2% greater odds of nursing homes having higher proportion of Black nursing home residents, providing support for hypothesis 2d. Nursing homes with higher number of empty beds on average (OR 1.03, p 0.01) were associated with 3% greater odds of nursing homes having higher proportion of Black nursing home residents, providing support for hypothesis 2f. Nursing homes located in counties with higher proportion of Medicaid (OR 1.04, p<0.001) and Medicare (OR 1.04, p 0.001) residents were associated with 4% greater odds of nursing homes having higher proportion of Black residents in facilities, indicating support for hypothesis 2h. Homes in counties with fewer proportions of for-profit nursing homes (OR 0.99, p 0.01)

were associated with 1% greater odds of nursing homes having higher proportion of Black nursing home residents, not supporting hypothesis 2l.

Proportion of Hispanic nursing home residents. The relationship between proportion of Hispanic nursing home residents and organizational and county/MSA region factors are described in tables 4-18 and 4-19 . After adjusting for facility and county/MSA characteristics, nursing homes located in counties with higher proportion of Medicaid (OR 1.05, p<0.001) residents were associated with 5% greater odds of nursing homes having higher proportion of Hispanic residents, supporting hypothesis1a. Support for hypothesis 1b was not found, nursing homes with lower occupancy rates (OR 1.01, p 0.37) were associated a greater likelihood of homes having higher proportion of Hispanic residents. This study did find support for hypothesis 1c, larger nursing homes (OR 1.003, p 0.01) were significantly associated with higher proportion of Hispanic residents; however, this nursing home size had minimal effect on the proportion of Hispanic residents in a nursing home. Hypothesis 1d was not supported, but results went in the direction hypothesized, nursing homes in counties with higher proportion of for-profit nursing homes were associated with 22% greater odds of having higher proportion of Hispanic residents relative to not for-profit nursing homes (OR 0.82, p 0.93).

Hypothesis 2a was supported, higher Hispanic-White residential segregation (OR 1.11, <0.001) was associated with 11% greater odds of nursing homes having higher proportion of Hispanic residents. Hypothesis 2c was supported, lower Hispanic-White nursing home segregation (OR 0.86, p<0.001) was associated with 16% greater odds of nursing homes having higher proportion of Hispanic residents. This finding

suggests that less segregated homes are associated with higher proportions of Hispanic nursing home residents. There was no support for hypothesis 2d but finding went in direction that was expected, nursing homes located in more competitive markets (HHI) (OR 0.979 p 0.10) were associated with 2% greater odds of nursing homes having higher proportion of Hispanic residents. Hypothesis 2f was also not supported in this study but the finding went in the direction that was expected, higher average numbers of empty beds per facility (OR 1.01, p 0.85) were associated 1% greater odds of nursing homes having higher proportion of Hispanic nursing home residents. Support was found for hypothesis 2h, facilities located in counties with higher proportions of Medicaid (OR 1.09, p 0.001) and Medicare (OR 1.10, p0.003) residents were associated with 9% and 10% greater odds of nursing homes having higher proportions of Hispanic residents, respectively. Hypothesis 2j was not supported, nursing homes in counties with lower proportion of for-profit nursing homes (OR 0.994, p 0.46) were associated with 1% greater odds of nursing homes having higher proportion of Hispanic residents. Hypothesis 2l was also not supported in this study, nursing homes with lower occupancy rates (OR 0.996, 0.92) were associated with lower likelihood of having a higher proportion of Hispanic nursing home residents.

3-Level Generalized Hierarchical Linear Model for Physical Restraint Use

Aim II. To examine if nursing home resident factors, specifically nursing home residents' race/ethnicity are independently associated with quality of care after controlling for region and organizational factors.

Physical restraint use. Table 4-20 describes the association between being physically restrained in relation to residents' characteristics. Hypothesis 3c and 3d were supported in this study, an increase in Black and Hispanic nursing home residents was associated with 2% and 3% greater odds of being physically restrained relative to White

nursing home residents, respectively. An increase in female residents (OR 1.06, p <0.001) was associated with 6% greater odds of being physically restrained compared to male residents. A decrease in residents age 66 and older (OR 0.90, p<0.001) was associated with 11% greater odds of being physically restrained relative to residents age 65.

Aim III. To determine if nursing home factors are independently associated with quality of care in nursing homes after controlling for nursing home resident and county/MSA region factors.

Table 4-21 describes the relationship between use of physical restraints and facility level factors. Nursing homes with a higher proportion of Medicaid residents (OR 1.01, p 0.20) had a greater likelihood of residents being physically restrained, hypothesis 4a was not supported but finding went in direction that was hypothesized. Hypothesis 4b was not supported, nursing home size (OR 0.999, p 0.29) had minimal effect on physical restraint use among residents. Support for hypothesis 4c was found, nursing homes with lower occupancy rates (OR 0.994, p 0.03) were associated with 1% greater odds of residents being physically restrained. Not for-profit nursing homes (OR 1.34, p<0.001) were associated with 34% greater odds of physical restraint use relative to for-profit nursing homes, hypothesis 4d was not supported. Nursing homes with lower proportion of Black (OR 0.96, p 0.01) and Hispanic (OR 0.96, p 0.39) residents had 4% greater odds of physical restraint use among residents, not supporting hypothesis 4e. Nursing homes not affiliated with chains (OR 1.30, p <0.001) were associated with 3% greater odds of physical restraint use among residents relative to chain-affiliated nursing homes. An increase in proportion of Medicare residents (OR 1.01, p 0.04) was associated with 1% greater odds of physical restraint use among residents.

Aim IV. To determine if county/MSA region factors, specifically residential segregation are independently associated with quality of care in nursing homes after controlling for nursing home resident and organizational factors.

Table 4-22 describes the relationship between county/MSA factors in relation to the use of physical restraints. No support was found for hypothesis 5a, nursing homes located in counties with lower proportion of Medicaid residents (OR 0.998, p 0.78) had minimal effect on residents being physically restrained. Facilities in counties with an increase in proportion of for-profit nursing homes (OR 1.01, p 0.01) were associated with 1% greater odds of physical restraint use among residents, not supporting hypothesis 5b. Hypothesis 5c was not supported, nursing home competition (HHI) (OR 1.00, p 0.55) had a minimal effect on physical restraint use among residents. Hypothesis 5c was not supported but this finding went in direction that was hypothesized; for each additional empty bed on average per facility (OR 1.01, p 0.40) there was a greater likelihood of residents being physically restrained. Nursing homes located in MSA's with higher Black-White residential segregation (OR 1.01, <0.001) were associated with 1% greater odds of physical restraint use among residents, supporting hypothesis 5d. Support for hypothesis 5e was found, facilities located in counties with higher Black-White (OR 0.96, p<0.001) or Hispanic-White nursing home segregation (OR 0.99, p 0.02) were associated with 4% and 1% lower likelihood of physical restraint use, respectively. Nursing homes with lower occupancy rates (OR 0.98, p0.02) were associated with 2% greater odds of residents being physically restrained. Nursing homes in counties with higher proportion of Medicare residents (OR 1.01, p 0.02) were associated 1% greater odds of residents being physically restrained.

3-Level Generalized Hierarchical Linear Model for Presence of Pressure Ulcers

Aim II. To examine if nursing home resident factors, specifically nursing home resident's race/ethnicity are independently associated with quality of care after controlling for region and organizational factors.

Pressure ulcer. Table 4-23 describes the relationship between the presence of pressure ulcer and resident level characteristics, after controlling for resident, facility and county/MSA factors. An increase in Black nursing home residents (OR 1.01,p <0.001) was associated with 1% greater odds of having pressure ulcer presents relative to White residents, providing support for hypothesis 3a. Hypothesis 3b was not supported, an increase in White nursing home residents was associated with 10% greater odds of residents having pressure ulcers present relative to Hispanic nursing home residents(OR 0.91, p<0.001). An increase in male residents per facility, was associated with 40% greater odds of having a pressure ulcer present relative to female residents (OR 0.73, p <0.001). Nursing homes with an increase in residents age 66-75 (OR 0.92, p <0.001), 76-85 (OR 0.86, p <0.001), and greater than 85 (OR 0.78, p <0.001) were associated with a lower likelihood of residents having pressure ulcers present relative to residents age 65.

Aim III. To determine if nursing home factors are independently associated with quality of care in nursing homes after controlling for nursing home resident and county/MSA region factors.

Presence of pressure ulcers and facility level factors are described in table 4-24. Partial support for hypothesis 4a and 4b were found, nursing homes with higher proportion of Medicaid residents (OR 1.001, p 0.002) and larger in size (OR 1.00 p<0.001) were significantly associated with presence of pressure among residents, but this factor had minimal effect on the presence of pressure ulcers among residents. Hypothesis 4c was supported, facilities with lower occupancy rates (OR 0.995, p<0.001)

were associated with 1% greater odds of residents having pressure ulcers present. For-profit nursing homes were associated with 1% greater odds of resident's having pressure ulcers present relative to not for-profit nursing homes (OR 0.99, p 0.74), hypothesis 4d was not supported but finding went in direction that was hypothesized. A higher proportion of Black (OR 0.999, p 0.96) and Hispanic (OR 0.998, p 0.75) nursing home residents had a minimal effect on the presence of pressure ulcers among residents, not supporting hypothesis 4e. A higher proportion of Medicare residents in a nursing home (OR 1.01, p <0.0001) was associated with 1% greater odds of residents having pressure ulcers present. Nursing homes not affiliated with chains (OR 1.03, p 0.05) were associated with a higher likelihood of having pressure ulcers present among residents.

Aim IV. To determine if county/MSA region factors, specifically residential segregation are independently associated with quality of care in nursing homes after controlling for nursing home resident and organizational factors.

Table 4-25 describes the relationship between the presence of pressure ulcers and county/MSA region factors. Hypothesis 5a was not supported, nursing homes in counties with higher proportions of Medicaid (OR 1.00, p 0.46) residents or higher proportion of Medicare (OR 1.00, p 0.69) residents, had minimal effect on the presence of pressure ulcers among residents in nursing homes. Support for hypothesis 5b was not found, nursing homes located in counties with lower proportion of for-profit (OR 0.999, 0.03) nursing homes or lower proportion of chain-affiliated (OR 1.00, p<0.001) nursing homes were significantly associated with presence of pressure ulcers among residents, however these factors had minimal effect on the presence of pressure ulcers. Competition in markets (HHI) (OR 0.999, p 0.99) had a small effect on the presence of pressure ulcers among residents in nursing homes, not supporting hypothesis 5c. An

increase in the average number of empty beds per facility (OR 1.002, p 0.20) had a minimal effect on pressure ulcers being present among residents, providing no support for hypothesis 5c. Nursing homes in MSA's with higher Black-White (OR 1.001, p 0.02) or Hispanic-White (OR 1.002, p 0.01) residential segregation were significantly associated with the presence of pressure ulcers among residents; however, increases in residential segregation had minimal effect on the presence of pressure ulcers, providing partial support for hypothesis 5d. Support for hypothesis 5e was found in this study, lower Black-White (OR 1.12, p 0.05) and Hispanic-White (OR 1.14, p 0.004) nursing home segregation were associated with 12% and 14% greater odds of pressure ulcers being present among residents, respectively. Nursing homes with higher occupancy rates (OR 1.01, p 0.004) were associated with 1% greater odds of pressure ulcers being present among residents.

Intraclass Coefficient (ICC)

Physical restraint. Table 4-26 provides covariance estimates for the facility (level-2) and county/MSA region (level-2) level factors, using physical restraints as the dependent variable. The covariance estimator for the facility level factors was 3.46 and the covariance estimator for the county/MSA region factors was 2.72. This study used the Snijders and Bosker (1999) approach discussed in the methods section, which uses 3.29 to account for the level-1 covariance. Resident level (level-1) variance was obtained using the following equation: 3.29/ 3.29+3.46+2.72. Similar equations were used to obtain the variances for facility level (level-2) and county/MSA level (level-3) characteristics but the numerator changed depending on the variance of interest. The resident level variance for physical restraint use was 0.35, which indicates resident factors accounted for 35% of the variance associated with physical restraint use among

nursing home residents. Facility factors (level-2) accounted for 37% of the variance and county/MSA factors (level-3) accounted for 29% of the variance associated with physical restraint use among nursing home residents. As such, each level accounts for about a third of the variance associated with the use of physical restraints among nursing home residents.

Pressure ulcer: Snijders and Bosker method was used again to obtain the variances for resident, nursing home, and county/MSA characteristics relative to the pressure ulcer dependent variable. Table 4-27 indicates the facility level (level-2) covariance estimator was 0.11 and the county/MSA level (level-2) covariance estimator was 0.10. The resident level (level-1) variance accounted for 94% of the variance associated with the presence of pressure ulcers among nursing home residents. Nursing home factors (level-2) accounted for 3% of the variance and county/MSA factors (level-3) accounted for another 3% of the variance. Resident level factors contributed to a majority of the variance associated with the presence of pressure ulcers among residents.

Summary Overview of Significant Predictors for Nursing Home Segregation and Quality Outcomes for Multivariate Models

Tables 4-28 through 4-33 present a summary of the significant associations between dependent and independent variables derived from multivariate analyses. Results from this study expand on the current literature by identifying factors that contribute to MSA level and facility level nursing home segregation. In addition, this study incorporates resident, facility, and county/MSA level factor in order to explain contributing factors of nursing home quality. The results for Black-White and Hispanic-White nursing home segregation suggest external resources and residential segregation

contribute to Black-White and Hispanic-White nursing home segregation. Table 4-28 indicates Black-White nursing home segregation was associated with nursing homes being in more competitive markets and being located in counties with lower proportion of Medicare residents. Higher Black-White residential segregation was associated with higher Black-White nursing home segregation, while lower Hispanic-White residential segregation was associated with higher Hispanic-White nursing home segregation. Nursing homes with a lower number of empty beds on average and nursing homes located in counties with lower proportions of chain-affiliated nursing homes were associated with higher Hispanic-White nursing home segregation.

Table 4-29 indicates Black and Hispanic residents were overrepresented in nursing homes with higher proportion of Medicaid residents. Large nursing homes were also associated with serving higher proportion of Black and Hispanic residents. Nursing homes that served higher proportion of Medicare residents were also associated with serving higher proportion of Black nursing homes residents. For-profit nursing homes were associated with housing higher proportion of Black residents relative to not for-profit nursing homes.

Table 4-30 suggests nursing homes with higher proportion of Black residents were more integrated, were in competitive markets, were located in higher residential segregated areas and had a higher number of empty beds on average. Nursing homes with higher proportion of Hispanic residents were also found to be more integrated. Hispanic residents were also overrepresented in nursing homes that were located in areas with higher residential segregation.

Tables 4-31-4-33 demonstrate the relationship between resident, facility, and county/MSA factors in relation to the use of physical restraints and the presence of pressure ulcers. Findings from this study indicate Black nursing home residents were at greater risk of being physically restrained and having pressure ulcer presents compared to White residents. Hispanic nursing home residents were at a greater risk of being physically restrained, but were at a lower risk of having pressure ulcers present compared to White residents. Nursing homes with lower proportion of Black residents were associated with greater use of physical restraints among residents. Racial composition of Hispanic residents was not significantly associated with either physical restraint use or presence of pressure ulcers among residents. Black-White and Hispanic-White nursing home segregation were both associated with the use of physical restraints and the presence of pressure ulcers among residents.

Table 4-1. Descriptive statistics of OSCAR continuous facility variables

Variables	Mean	Standard deviation	Minimum	Maximum	N
Payer Status					
Percent Medicaid	0.63	0.22	0.00	1.00	7,367
Percent Medicare	0.14	0.12	0.00	1.00	7,367
Nursing Home Segregation					
Percent Black	0.18	1.83	0.00	59.34	7,367
Percent Hispanic	0.04	0.67	0.00	39.02	7,367
Total Beds	122.02	68.29	6.00	908	7,367
Occupancy	0.87	0.12	0.08	1.00	7,362

Table 4-2. Descriptive statistics of OSCAR and County/MSA continuous variables

Variables	Mean	Standard deviation	Minimum	Maximum	N
Nursing Home Segregation					
Hispanic-White Nursing Home Segregation	0.58	0.17	0.08	0.96	7,367
Black-White Nursing Home Segregation	0.54	0.12	0.07	0.94	7,367
Residential Segregation					
Hispanic-White Residential Segregation	0.44	12.54	11.2	75.4	7,367
Black-White Residential Segregation	0.61	12.41	22.9	85.5	7,367
Competition					
Excess capacity	16.07	8.27	0.00	71.67	7,367
HHI	0.11	0.15	0.00	1.00	7,367
Payer Status					
Percent Medicaid (county)	0.60	0.09	0.25	1.00	7,367
Percent Medicare (county)	0.16	0.06	0.00	0.52	7,367
For-profit (county)	0.69	0.19	0.00	1.00	7,367
Chain-Affiliated (county)	0.52	0.21	0.00	1.00	7,367
Occupancy Rate (county)	0.86	0.07	0.41	1.00	7,367

Table 4-3. Descriptive statistics of OSCAR categorical variables

Categorical Variables	Frequency (%)	N
Ownership		7,367
Not For-Profit	2,017 (27.38)	
For-Profit	5,350 (72.62)	
Chain-Affiliation		
No	3,381 (45.89)	7,367
Yes	3,986 (54.11)	

Table 4-4. Descriptive statistics of MDS and OSCAR facility continuous variables

Variables	Mean	Standard deviation	Minimum	Maximum	N
Percent Medicaid	0.66	0.18	0.00	1.00	2,568,685
Percent Medicare	0.13	0.10	0.00	1.00	2,568,685
Total Beds	161.86	101.5	6.00	908.00	2,568,685
Occupancy Rate	0.88	0.10	0.08	1.00	2,565,213
Nursing Home Segregation					
Percent Black	0.38	2.62	0.00	0.59	1,520,952
Percent Hispanic	0.08	0.84	0.00	0.39	1,426,966

Table 4-5. Descriptive statistics of MDS and OSCAR county/MSA continuous variables

Variables	Mean	Standard deviation	Minimum	Maximum	N
Nursing Home Segregation (MSA)					
Hispanic-White Nursing Home Segregation	0.58	0.16	0.08	0.96	2,568,685
Black-White Nursing Home Segregation	0.54	0.12	0.07	0.94	2,568,685
Residential Segregation					
Hispanic-White Residential Segregation	0.45	0.12	0.11	0.75	2,568,685
Black-White Residential Segregation	0.62	0.12	0.22	0.86	2,568,685
Competition					
HHI	0.1	0.15	0.006	1	2,568,685
Excess capacity	16.07	8.2	0	71.67	2,568,685
Payer Status					
Percent Medicaid (county)	0.61	0.1	0.25	1	2,568,685
Percent Medicare (county)	0.16	0.06	0	0.53	2,568,685
For-profit (county)	0.67	0.19	0	1	2,568,685
Chain-Affiliated (county)	0.49	0.22	0	1	2,568,685
Occupancy Rate (county)	0.86	0.07	0.42	1	2,568,685

Table 4-6. Descriptive statistics of MDS and OSCAR resident categorical variables

Variables	Frequency (%)	N
Gender		2,568,378
Male	735,866 (28.65)	
Female	1,832,512 (71.35)	
Race		2,523,109
Black	364,253 (14.44)	
Hispanic	106,599 (4.22)	
White	2,052,257 (81.34)	
Age(mean, SD)	85 (13.81)	2,321,952
65	16,497 (0.71)	
66-75	235,704 (10.15)	
76-85	530,709 (22.86)	
>86	1,539,042 (66.28)	
Facility		
Ownership		2,568,685
Not for-profit	772,779 (30.08)	
For-profit	1,795,906 (69.92)	
Chain-Affiliation		2,568,685
No	1,266,059 (49.29)	
Yes	1,302,626 (50.71)	

Table 4-7. Bivariate statistics of nursing homes with no, medium and high proportion of Black nursing home residents and facility and County/MSA characteristics

Variables	No Black (N=5,064)	Medium Black (N=1,549)	High Black (N=726)
Facility			
Payer Status			
Percent Medicaid (mean, SD)	0.58 (0.22)***	0.70 (0.16)***	0.80 (0.12)
Percent Medicare (mean, SD)	0.14 (0.13) ***	0.14 (0.10)***	0.10 (0.08)
Occupancy (mean, SD)	0.87 (0.12)***	0.87 (0.11)***	0.85 (0.13)
Total Beds (mean, SD)	105.89 (52.37)***	163.95 (87.60)***	144.56 (75.11)
*Ownership****			
Not for-profit	1,569 (77.87)	317 (15.73)	129 (6.40)
For-profit	3,495 (65.65)	1,232 (23.14)	597 (11.21)
Chain			
No	2,326 (69.04)	693 (20.57)	350 (10.39)
Yes	2,738 (68.97)	856 (21.56)	376 (9.47)
County/MSA Region			
Competition			
HHI (mean, SD)	0.09 (0.17)***	0.10 (0.15)	0.12 (0.15)
Excess capacity (mean, SD)	15.34 (7.96)***	16.90 (8.41)***	19.17 (8.84)
Nursing Home Segregation			
Black-White Nursing Home Segregation	0.54 (0.12)	0.51 (0.12)***	0.55 (0.12)
Residential Segregation			
Black-White Nursing Residential Segregation (mean, SD)	0.60 (12.85)***	0.63 (10.44)***	0.66 (11.30)
Payer Status			
Percent Medicaid (county)	0.59 (0.09)***	0.62 (0.10)***	0.65 (0.10)
Percent Medicare (county)	0.16 (0.06)	0.17 (0.06)***	0.16 (0.06)
For-profit (county)	0.68 (0.20)	0.70 (0.17)	0.70 (0.17)
Chain-affiliated (county)	0.53 (0.20)***	0.50 (0.22)	0.50 (0.22)

Continuous variables include means and standard deviation
Categorical variables include frequencies and percentages
*p <0.05; **p <0.01; p<0.001***

Table 4-8. Bivariate statistics of nursing homes with no, medium and high proportion of Hispanic nursing home residents and facility characteristics

Variables	No Hispanics (N=6,645)	Medium Hispanics (N=344)	High Hispanics (N=378)
Payer Status			
Percent Medicaid (mean, SD)	0.62 (0.22)***	0.75 (0.13)	0.76 (0.15)
Percent Medicare (mean, SD)	0.14 (0.12) ***	0.11 (0.08)	0.11 (0.08)
Occupancy (mean, SD)	0.87 (0.12)	0.89 (0.10)***	0.88 (0.10)
Total Beds (mean, SD)	115 (59.43)***	214 (107.77)***	147 (97.76)
*Ownership****			
Not for-profit	1,884 (93.59)	68 (3.38)	61 (3.03)
For-profit	4,761 (89.27)	255 (4.78)	317 (5.94)
*Chain****			
No	2,998 (88.94)	205 (6.08)	168 (4.98)
Yes	3,647 (91.75)	118 (2.97)	210 (5.28)

Continuous variables include means and standard deviation
Categorical variables include frequencies and percentages
*p <0.05; **p <0.01; p<0.001***

Table 4-9. Bivariate statistics of nursing homes with no, medium and high proportion of Hispanic nursing home residents and County/MSA characteristics

Variables	No Hispanics (N=6,645)	Medium Hispanics (N=344)	High Hispanics (N=378)
Competition			
HHI (mean, SD)	0.12 (0.16)***	0.05 (0.06)***	0.08 (0.11)
Excess capacity (mean, SD)	15.82 (8.36)***	18.84 (7.91)	17.71 (6.07)
Nursing Home Segregation			
Hispanic-White Nursing Home Segregation (mean, SD)	0.60 (0.16)***	0.47 (0.10)***	0.40 (0.12)
Residential Segregation			
Hispanic-White Residential Segregation (mean, SD)	0.43 (12.70)***	0.52 (7.70)***	0.48 (6.83)
Payer Status			
Percent Medicaid (county)	0.60 (0.09)***	0.64 (0.10)	0.65 (0.10)
Percent Medicare (county)	0.16 (0.06)	0.17 (0.05)	0.16 (0.06)
For-profit (county)	0.69 (0.19)***	0.70 (0.16)	0.72 (0.16)
Chain-affiliated (county)	0.53 (0.20)	0.41 (0.26)***	0.52 (0.25)
Occupancy (county)	0.86 (0.07)	0.86 (0.06)	0.85 (0.06)

Continuous variables include means and standard deviation
Categorical variables include frequencies and percentages
*p <0.05; **p <0.01; p<0.001***

Table 4-10. Bivariate descriptions of Black-White nursing home segregation in relation to continuous County/MSA characteristics

Variables	β	OR's	SE	p-value	95% OR's Confidence Interval	N
Payer Status						
Percent Medicare	-0.0054	0.995	0.40	0.18	0.27-1.27	7,367
Percent Medicaid	-0.0031	0.997	0.25	0.21	0.45-1.20	7,367
Occupancy	-0.0036	0.996	0.34	0.28	0.36-1.34	7,367
Profit	-0.0023	0.997	0.12	0.07	0.62-1.02	7,367
Chain-Affiliation	-0.0029	0.997	0.11	0.01	0.60-0.93	7,367
Competition						
HHI	-0.0064	0.993	0.15	<0.001	0.39-0.71	7,365
Excess Capacity	0.01	1.01	0.003	0.04	1.00-1.01	7,365
Residential Segregation						
Black-White Residential Segregation	0.02	1.02	0.00	<0.001	1.01-1.02	7,367

Table 4-11. Bivariate descriptions of Hispanic-White nursing home segregation in relation to continuous County/MSA characteristics

Variables	β	OR's	SE	p-value	95% OR's Confidence Intervals	N
Payer Status						
Percent Medicare	-0.0085	0.990	0.4	0.03	0.20-0.94	7,367
Percent Medicaid	0.0045	1.04	0.25	0.08	0.95-2.58	7,367
Occupancy	0.0011	1.01	0.34	0.001	1.53-5.77	7,367
For-Profit	-0.0039	0.996	0.13	0.002	0.53-0.87	7,367
Chain-Affiliation	-0.0015	0.998	0.11	0.18	0.67-1.08	7,367
Competition						
HHI	0.0066	1.01	0.16	<0.001	1.41-2.65	7,367
Excess Capacity	-0.01	0.985	0.002	<0.001	0.98-0.99	7,367
Residential Segregation						
Hispanic-White Residential Segregation	-0.02	0.985	0.002	<0.001	0.98-0.99	7,367

Table 4-12. Resident characteristics of residents with and without pressure ulcers

Variables	Pressure Ulcer Present	No Pressure Ulcer Present	N	p-value
Gender				<0.0001
Male	80,055 (10.88)	655,792 (89.12)	735,847	
Female	161,348 (8.80)	1,671,111 (91.20)	1,832,459	
Race				<0.0001
Black	40,476 (11.11)	323,772 (88.89)	364,248	
Hispanic	9,511 (8.92)	97,087 (91.08)	106,598	
White	187,570 (9.14)	1,864,621 (90.86)	2,052,191	
Age				<0.0001
65	1,726 (10.46)	14,771 (89.54)	16,497	
66-75	24,039 (10.20)	211,661 (89.90)	235,700	
76-85	52,598 (9.91)	478,094 (90.09)	530,692	
>86	137,538 (8.94)	1,401,458 (91.06)	1,538,996	

Chi-squares conducted include frequencies and percentages in parentheses

Table 4-13. Resident characteristics of residents with and without physical restraints

Variables	Physical Restraint Use	No Physical Restraint Use	N	p-value
Gender				<0.0001
Male	245,900 (33.42)	489,833 (66.58)	735,733	
Female	685,662 (37.43)	1,146,362 (65.57)	1,832,024	
Race				<0.0001
Black	136,513 (37.48)	227,689 (62.52)	364,202	
Hispanic	41,199 (38.65)	65,383 (61.35)	106,582	
White	736,270 (37.83)	1,315,440 (62.17)	2,051,710	
Age				<0.0001
65	5,272 (31.97)	11,218 (68.03)	16,490	
66-75	77,422 (32.85)	158,246 (67.15)	235,668	
76-85	190,431 (35.89)	340,098 (64.11)	530,529	
>86	582,070 (37.83)	956,602 (65.17)	1,538,672	

Chi-squares conducted include frequencies and percentages in parentheses

Table 4-14. Generalized linear model predicting the association between Black-White nursing home segregation and County/MSA characteristics (N=7,367)

Fixed Effects	β	OR's	SE	p-value
Intercept	0.0085	1.01	0.62	0.17
Payer Status				
Percent Medicaid Residents	-0.0040	0.996	0.32	0.22
Percent Medicare Residents	-0.0095	0.991	0.48	0.05
For-profit	-0.0018	0.998	0.14	0.20
Chain-Affiliation	-0.0007	0.999	0.12	0.58
Occupancy Rates	-0.0122	0.988	0.65	0.06
Competition				
HHI	-0.0037	0.996	0.16	0.03
Excess capacity	-0.01	0.99	0.01	0.38
Black-White Residential Segregation	0.02	1.02	0.002	<0.001

Table 4-15. Generalized linear model predicting the association between Hispanic-White nursing home segregation and County/MSA characteristics (N=7,367)

Fixed Effects	β	OR's	SE	p-value
Intercept	0.015	1.02	0.63	0.01
Payer Status				
Percent Medicaid Residents	0.0041	1.00	0.32	0.21
Percent Medicare Residents	-0.0022	0.997	0.48	0.65
For-profit	-0.0025	0.998	0.14	0.09
Chain Affiliation	-0.0029	0.997	0.13	0.02
Occupancy Rates	-0.0026	0.997	0.66	0.69
Competition				
HHI	0.0025	1.00	0.17	0.14
Excess Capacity	-0.01	0.99	0.01	0.01
Hispanic-White Residential Segregation	-0.01	0.99	0.002	<0.001

Table 4-16. 2-Level generalized hierarchical linear model predicting the association between residents' racial composition (proportion of Black nursing home residents) and facility characteristics (N=7,345)

Fixed Effects	β	OR's	SE	p-value
Nursing home segregation (intercept)	-0.131	0.88	1.66	0.001
Payer Status				
Percent Medicaid Residents	0.07	1.07	0.01	0.001
Percent Medicare Residents	0.05	1.05	0.01	0.001
Ownership				
Not for-profit	-0.23	0.79	0.12	0.05
For-profit (reference)				
Chain-Affiliation				
No	-0.06	0.94	0.10	0.57
Yes (reference)				
Total Beds	0.003	1.003	0.00	0.001
Occupancy Rates	-0.0002	0.999	0.40	0.96

Table 4-17. 2-Level generalized hierarchical linear model predicting the association between residents' racial composition (proportion of Black nursing home residents) and County/MSA characteristics (N=7,345)

Fixed Effects	β	OR's	SE	p-value
Black-White Nursing Home Segregation	-0.03	0.97	0.01	0.001
Payer Status (county)				
Percent Medicaid	0.0416	1.04	0.90	0.001
Percent Medicare	0.0424	1.04	1.30	0.001
For-profit (county)	-0.0092	0.999	0.34	0.01
Chain-Affiliation (county)	0.0050	1.01	0.33	0.13
Occupancy Rates (county)	-0.0017	0.998	1.3	0.91
Competition (county)				
HHI	0.0174	0.982	0.39	0.001
Excess Capacity	0.03	1.03	0.01	0.01
Residential Segregation (county)				
Black-White Segregation	0.05	1.05	0.009	0.001
Random effects				
Intercept,	0.74	2.09	0.17	

Table 4-18. 2-Level generalized hierarchical linear model predicting the association between residents' racial composition (proportion of Hispanic residents) and facility characteristics (N=7,365)

Fixed Effects	β	OR's	SE	p-value
Nursing home segregation (intercept)	-0.1266	0.88	4.32	0.003
Payer Status				
Percent Medicaid Residents	0.05	1.05	0.01	0.001
Percent Medicare Residents	0.02	1.02	0.02	0.27
Ownership				
Not for-profit	-0.20	0.82	0.26	0.45
For-profit (reference)				
Chain-Affiliation				
No	-0.02	0.98	0.21	0.93
Yes (reference)				
Total Beds	0.003	1.00	0.001	0.01
Occupancy Rates	0.0082	1.01	0.91	0.37

Table 4-19. 2-Level generalized hierarchical linear model predicting the association between racial composition (proportion of Hispanic residents) and County/MSA Characteristics (N=7,365)

Fixed Effects	β	OR's	SE	p-value
Hispanic-White Nursing Home Segregation	-0.15	0.86	0.02	0.001
Payer Status (county)				
Percent Medicaid	0.0818	1.09	2.23	0.001
Percent Medicare	0.0934	1.10	3.15	0.003
For-profit (county)	-0.0058	0.994	0.79	0.46
Chain-Affiliation	0.0037	1.00	0.87	0.67
Occupancy Rates	-0.0039	0.996	4.01	0.92
Competition				
HHI	-0.0216	0.979	1.30	0.10
Excess Capacity	0.005	1.01	0.03	0.85
Residential Segregation				
Hispanic-White Segregation	0.10	1.11	0.02	0.001
Random effects				
Intercept,	1.75	5.75	0.51	

Table 4-20. 3-Level generalized hierarchical linear model predicting the association between use of physical restraints and resident characteristics (N= 2,544,065)

Fixed Effects	β	OR's	SE	p-value
Physical restraint use (intercept)	2.93	18.72	0.84	0.001
Gender				
Female	0.06	1.06	0.004	<0.001
Male (reference)				
Race/Ethnicity				
Black	0.02	1.02	0.006	0.002
Hispanic	0.03	1.03	0.01	0.01
White (reference)				
Age				
65 (reference)				
66-75	-0.11	0.90	0.009	<0.001
76-85	-0.11	0.90	0.008	<0.001
>85	-0.10	0.90	0.007	<0.001

Table 4-21. 3-Level generalized hierarchical linear model predicting the association between use of physical restraints and facility characteristics (N= 2,544,065)

Fixed Effects	β	OR's	SE	p-value
Payer Status				
Percent Medicaid	0.0056	1.01	0.20	0.77
Percent Medicare	0.0071	1.01	0.34	0.04
Total Beds	-0.001	0.999	0.00	0.29
Occupancy	-0.0062	0.994	0.29	0.03
Ownership				
Not for-profit	0.29	1.34	0.08	<0.001
For-profit (reference)				
Chain				
No	0.26	1.30	0.07	<0.001
Yes (reference)				
Nursing Home Segregation				
Percent Black	-0.04	0.96	0.02	0.01
Percent Hispanic	-0.04	0.96	0.01	0.39

Table 4-22. 3-Level generalized hierarchical linear model predicting the association between use of physical restraints and County/MSA characteristics (N= 2,544,065)

Fixed Effects	β	OR's	SE	p-value
Payer Status				
Percent Medicaid	-0.0011	0.998	0.44	0.78
Percent Medicare	0.0147	1.01	0.64	0.02
Ownership	0.0053	1.01	0.19	0.01
Chain-Affiliation	-0.0066	0.993	0.17	<0.001
Occupancy Rates	-0.0202	0.980	0.88	0.02
Competition				
HHI	0.0012	1.00	0.21	0.55
Excess Capacity	0.006	1.01	0.007	0.40
Nursing Home Segregation				
Black-White Nursing Home Segregation	-0.0427	0.958	0.29	<0.001
Hispanic-White Nursing Home Segregation	-0.0051	0.995	0.29	0.02
Residential Segregation				
Black-White Residential Segregation	0.01	1.01	0.003	<0.001
Hispanic-White Residential Segregation	0.004	1.00	0.003	0.13

Table 4-23. 3-Level generalized hierarchical linear model predicting the association between presents of pressure ulcers and resident characteristics (N= 2,532,823)

Fixed Effects	β	OR's	SE	p-value
Pressure ulcer present (intercept)	-2.98	0.05	0.18	<0.001
Gender				
Female	-0.32	0.73	0.01	<0.001
Male (reference)				
Race/Ethnicity				
Black	0.01	1.01	0.01	<0.001
Hispanic	-0.09	0.91	0.01	<0.001
White (reference)				
Age				
65 (reference)				
66-75	-0.08	0.92	0.01	<0.001
76-85	-0.15	0.86	0.01	<0.001
>85	-0.25	0.78	0.01	<0.001

Model risk-adjusted for coma, bed mobility, transfer, weight loss, and bedfast

Table 4-24. 3-Level generalized hierarchical linear model predicting the association between prevalence of pressure ulcers and facility characteristics (N= 2,532,823)

Fixed Effects	β	OR's	SE	p-value
Payer Status				
Percent Medicaid	0.0013	1.00	0.04	0.002
Percent Medicare	0.0085	1.01	0.08	<0.001
Total Beds	0.00	1.00	0.00	<0.001
Occupancy	-0.0049	0.995	0.06	<0.001
Ownership				
Not for-profit	-0.01	0.990	0.02	0.74
For-profit (reference)				
Chain				
No	0.03	1.03	0.01	0.05
Yes (reference)				
Nursing Home Segregation				
Percent Black	-0.00017	1.00	0	0.96
Percent Hispanic	-0.002	1.00	0.01	0.75

Model risk-adjusted for coma, bed mobility, transfer, weight loss, and bedfast

Table 4-25. 3-Level generalized hierarchical linear model predicting the association between prevalence of pressure ulcers and County/MSA characteristics (N= 2,532,823)

Fixed Effects	β	OR's	SE	p-value
Payer Status				
Percent Medicaid	0.0007	1.00	0.09	0.46
Percent Medicare	0.0005	1.00	0.13	0.69
Ownership	-0.0009	0.999	0.04	0.03
Chain-Affiliation	-0.0016	0.998	0.04	<0.001
Occupancy Rates	0.0053	1.01	0.18	0.004
Competition				
HHI	-0.00001	0.999	0.04	0.99
Excess Capacity	0.002	1.00	0.001	0.20
Nursing Home Segregation				
Black-White Nursing Home Segregation	0.0011	1.00	0.06	0.05
Hispanic-White Nursing Home Segregation	0.0013	1.00	0.04	0.004
Residential Segregation				
Black-White Residential Segregation	0.001	1.00	0.00	0.02
Hispanic-White Residential Segregation	0.002	1.00	0.00	0.01

Model risk-adjusted for coma, bed mobility, transfer, weight loss, and bedfast

Table 4-26. Covariance parameters for physical restraint use

Covariance Parameters	Estimates	SE
Facility level variance (level-2)	3.46	0.11
County/MSA level variance (level-3)	2.72	

Table 4-27. Covariance parameters for pressure ulcers present

Covariance Parameters	Estimates	SE
Facility level variance (level-2)	0.11	0.005
County/MSA level variance (level-3)	0.10	

Table 4-28. Significant associations between Black-White and Hispanic-White nursing home segregation and County/MSA characteristics

Variables	Black-White Nursing Home Segregation	Hispanic-White Nursing Home Segregation
Payer Status		
Percent Medicaid		
Percent Medicare	0.991*	
For-profit		
Chain-Affiliation		0.997*
Occupancy Rates		
Competition		
HHI	0.996*	
Excess Capacity		0.990*
Hispanic-White Residential Segregation		0.990***
Black-White Residential Segregation	1.02***	

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

Table 4-29. Significant association between proportion of Black and Hispanic residents in relation to facility level characteristics

Variables	Proportion of Black Residents	Proportion of Hispanic Residents
Payer Status		
Percent Medicaid	1.07***	1.05***
Percent Medicare	1.05***	
Ownership		
Not for-profit	0.79*	
For-profit (reference)		
Chain-Affiliation		
No		
Yes (reference)		
Total Beds	1.003***	1.003**
Occupancy Rates		

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

Table 4-30. Significant associations between proportion of Black and Hispanic residents in relation to County/MSA level characteristics

Variables	Proportion of Black Residents	Proportion of Hispanic Residents
Nursing Home Segregation		
Black-White Nursing Home Segregation	0.97***	
Hispanic-White Nursing Home Segregation		0.86***
Payer Status		
Percent Medicaid	1.04***	1.09**
Percent Medicare	1.04***	1.10*
For-Profit	0.99**	
Chain-Affiliation		
Occupancy Rates		
Competition		
HHI	0.982***	
Excess Capacity	1.03**	
Residential Segregation		
Black-White Residential Segregation	1.05***	
Hispanic-White Residential Segregation		1.11***

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

Table 4-31. Significant associations between use of physical restraints and presence of pressure ulcers relative to resident characteristics

Variables	Use of Physical Restraints	Presence of Pressure Ulcers
Gender		
Female	1.06***	0.73***
Male (reference)		
Race/Ethnicity		
Black	1.02**	1.01***
Hispanic	1.03**	0.91***
White (reference)		
Age		
65 (reference)		
66-75	0.90***	0.92***
76-85	0.90***	0.86***
>85	0.90***	0.78***

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

Table 4-32. Significant associations between use of physical restraints and presence of pressure ulcers relative to facility characteristics

	Use of Physical Restraints	Presence of Pressure Ulcers
Predictor Variables		
Payer Status		
Percent Medicaid		1.001*
Percent Medicare	1.01*	1.01***
Total Beds		1.001***
Occupancy Rate	0.994*	0.995***
Ownership		
Not for-profit	1.34***	
For-profit (reference)		
Chain		
No	1.30***	1.03*
Yes (reference)		
Nursing Home Segregation		
Percent Black	0.96**	
Percent Hispanic		

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

Table 4-33. Significant associations between use of physical restraints and presence of pressure ulcers relative to County/MSA characteristics

	Use of Physical Restraints	Presence of Pressure Ulcers
Predictor Variables		
Payer Status		
Percent Medicaid		
Percent Medicare	1.01*	
Ownership	1.01**	0.999*
Chain-Affiliation	0.990***	1.00***
Occupancy Rates	0.98*	1.01**
Competition		
HHI		
Excess Capacity		
Nursing Home Segregation		
Black-White Nursing Home Segregation	0.96***	1.00*
Hispanic-White Nursing Home Segregation	0.99*	1.00**
Residential Segregation		
Black-White Residential Segregation	1.01***	1.001*
Hispanic-White Residential Segregation		1.002**

Odds Ratios presented
p<0.05*;p<0.01**;p<0.001***

CHAPTER 5
DISCUSSION

The purpose of this study was twofold 1) to examine how facility and county/MSA factors contribute to nursing home segregation and 2) to understand how resident, facility, and county/MSA factors are associated with quality outcomes. While overt forms of racial/ethnic segregation have been banned in the United States since the repeal of the "separate but equal clause" in 1964, implicit forms of segregation have continued to plague our society and our healthcare system. Findings from this study provided evidence that nursing home segregation continues to occur throughout the nursing home industry. The average Black-White nursing home dissimilarity index was 0.54 and the average Hispanic-White nursing home dissimilarity index was 0.58. Although, individual preference may contribute to minorities being overrepresented in certain nursing homes, the inequities in care received by minorities found in this study and other studies demonstrate the need to understand the underlying causes of nursing home segregation.

The overall findings of this study, suggest organizational structure and external resources were contributing factors to nursing home segregation. Residential segregation was also associated with nursing home segregation. Residents' race/ethnicity, nursing home segregation, and racial composition of nursing home residents were associated with quality of care in nursing homes.

Black-White Dissimilarity Index

Findings from this study indicate nursing homes associated with higher Black-White segregation had lower occupancy rates, fewer proportions of Medicare residents, were in more competitive market, and were located in areas with higher Black-White

residential segregation. Nursing homes in resource constrained environments may face financial challenges that allow Black-White nursing home segregation to persist in the nursing home industry.

Nursing homes with lower occupancy rates may face resource constraints due to their inability to fill beds; as such, these facilities may develop strategies to survive their environment. Prior literature indicates, minority residents are overrepresented in nursing homes with lower occupancy rates(Smith et al., 2004, Smith et al., 2008, Angelelli, Grabowski, and Mor, 2006), which indicates homes with low occupancy rates are willing to provide access to minority consumers. However due to resource limitations, these homes may face serious challenges in providing high quality care to consumers with complex medical needs.

Nursing homes located in environments that are in more competitive markets may face financial pressure to expand access to nursing homes residents. Similar to nursing homes with lower occupancy rates, nursing homes in more competitive markets may be willing to accept minority consumers to lessen the financial strain. However, if nursing homes in more competitive markets are expanding access because of lower financial performance, it may be difficult for these nursing homes to provide high quality care to consumers due to insufficient resources. On the other hand, more competitive markets may create an environment where nursing homes are more selective in their choice of consumers.. Nursing homes may select more private pay residents, in attempts to reduce financial constraints, and improve resources and services provided to consumers as a way to attract a certain type of costumer in a competitive market. The latter suggestion seems less likely, because findings from this study indicate nursing

homes in more competitive markets were associated with having higher proportion of Hispanic and Black nursing home residents.

Nursing homes located in counties with lower proportion of Medicare residents were associated with greater Black-White nursing home segregation. A possible explanation for this finding is nursing homes, similar to other organizations, need external resources to survive. As such, facilities will draw on resources located in their communities. Nursing homes located in counties with fewer proportions of Medicare residents may be located in counties with higher proportion of Medicaid or high proportion of private pay consumers. Homes located in counties with higher proportion of Medicaid consumers, may have financial challenges due to lower the reimbursement of Medicaid relative to other payers (i.e. Medicare and private pay). Medicaid-reliant nursing homes have been associated with having higher proportion of minority residents (Mor et al., 2004), which can perpetrate Black-White nursing home segregation.

Contrary to the suggestion mentioned above, homes in counties with lower proportion of Medicare residents may represent counties with higher proportion of private pay residents. Nursing homes with higher proportion of private residents may have a residents' racial composition that is predominately White residents, since White residents rely more on private pay reimbursement for nursing home services relative to Black nursing home residents. These homes may have financial freedom due to their higher reliance on private pay reimbursement. As such, they may develop strategies that allow them to maintain this status, which may include limiting access to certain consumers. Both explanations have some merit, because nursing homes located in counties with higher proportion of Medicare and Medicaid residents were associated

with having a higher proportion of Hispanic and Black residents, indicating nursing homes in counties with lower proportion of Medicare and Medicaid residents may have a higher proportion of White residents.

Similar to prior literature, this study found that Black nursing home residents reside in homes that are located in their own communities (Reeds and Andes, 2001; Fennell, Miller, and Mor, 2000). Nursing homes located in areas with high Black-White residential segregation were associated with greater Black-White nursing home segregation. Consequently, nursing homes may provide services to consumers who are located in their communities. Consumers may also select to receive nursing home care from homes located in their own communities, allowing consumer to stay connected to family and community members.

Hispanic-White Dissimilarity Index

Findings from this study suggest nursing homes with higher Hispanic-White nursing home segregation were located in more integrated residential areas (lower Hispanic-White residential segregation). Prior literature indicates that Hispanic residents utilize nursing homes at lower rates, compared to other races (Fennell, 2010; Kemper,1992; Wallace, Levy-Storms, and Ferguson, 1995). As such, in residential areas that are more integrated, White individuals may utilize nursing home services more than Hispanic individuals contributing to nursing home segregation.

Nursing homes located in counties with lower proportion of chain-affiliated homes were associated with higher Hispanic-White nursing home segregation. Chain-affiliated nursing homes can be described as “as a collaboration of components that link together to produce similar goods and services in various markets” (Banaszak-Holl, Mitchell, Baum, and Berta, 2006). Counties with lower proportion of chain-affiliated nursing

homes may be at a resource disadvantage relative to counties with higher proportion of chain-affiliated nursing homes. Therefore, nursing homes located in counties with lower proportion of chain-affiliated nursing homes may be less restrictive in their selection of residents, increasing access to nursing home services. However, increase access is to nursing homes that may potentially face resource constraints.

Lower excess capacity, lower number of empty beds per facility on average, was associated with higher Hispanic-White nursing home segregation. Nursing homes in counties with lower excess capacity may have less of an issue filling empty beds and may have better financial performance. Consequently, nursing homes in counties with lower excess capacity may have the ability to dictate the type of residents they select to reside in their facility, which can contribute to higher Hispanic-White nursing home segregation. Finding from this study supports this explanation, as nursing homes with higher proportion of Hispanic residents were associated with homes with higher excess capacity. This finding indicates homes with lower excess capacity were associated with having lower proportion of Hispanic residents, although this finding was not significant.

External resources of nursing homes contribute to nursing home segregation. While, the dissimilarity index allows investigators to determine the “evenness” between two racial groups among facilities in MSA’s, it does not allow investigators to determine if segregation is due to higher proportion of Black residents, Hispanic residents, or White residents. Therefore, this study extended its analysis to examine nursing home segregation at the facility level, by exploring factors that contribute to higher proportions of Black and Hispanic nursing home residents.

Proportion of Black Residents

Facility characteristics. Nursing homes with higher proportion of Black residents had higher proportion of Medicare and Medicaid residents, indicating a higher reliance on publicly funded programs. While prior literature has described the relationship between Medicaid and the racial composition of Black nursing home residents, less is known about the relationship between Medicare and the proportion of Black residents in nursing homes. A recent study by Cai et al., (2010) also found nursing homes with higher proportion of Black residents were associated with having a greater proportion of Medicare residents. One possible explanation for this finding is that long-term care Medicare patients may be sicker residents. Medicare offers reimbursement for nursing homes services when individuals have been referred to a nursing home after a qualifying hospital stay. Medicare typically pays for short-term nursing home care; Medicare covers full reimbursement of services for up to 20 days, after the 20th day individuals are subject to pay a high co-pay. Medicare covers nursing home care for as much as 100 days. Residents who are not able to rehabilitate within the 100 day time frame may be at risk of becoming long-term care residents, with the possibility of relying on Medicaid for long-term care once an individual has met the financial requirement. Nursing homes in resource-constrained environments may be willing to allow sicker Medicare patients into their facilities, to receive reimbursement from private-pay and Medicare sources for a certain period.

Prior literature suggest that not for-profit nursing homes were more segregated due to their preference to provide services to certain residents (Smith et al., 2007), and their ability to attract private-pay consumers (Christensen & Arnold, 2005). Findings from this study indicate that Black nursing home residents were found to be

overrepresented in for-profit nursing homes, which suggest Black nursing home residents are able to gain access to for-profit nursing homes. However, prior research indicates for-profit nursing homes provided lower quality of care to residents relative to for-profit nursing homes (Mor et al., 2004; Hillmer et al. 2005). Quality of care between for-profit and not for-profit nursing homes will be discussed later in the chapter.

County/MSA characteristics. Less segregated nursing homes were associated with higher proportion of Black nursing home residents. This finding indicates that as nursing homes move toward integration there is an increase in the proportion of Black residents. Higher residential segregation was associated with a greater proportion of Black nursing home residents, suggesting that higher segregated neighborhoods contribute to higher nursing home segregation. This finding is similar to other studies that suggest nursing home patterns mimic residential patterns (Reeds and Andes, Smith et al., 2007; Fennell, Miller, & Mor, 2000), indicating individuals may elect to receive care in nursing homes that are located in their communities.

Black nursing homes residents were disproportionately served in nursing homes that were located in counties with higher proportion of Medicare and Medicaid residents, in nursing homes located in competitive markets, and in nursing homes that had high numbers of empty beds on average. These findings suggest Black nursing home residents are receiving care in resource constrained nursing homes. As such, Black residents do have access to nursing home facilities; however, they appear to have access to resource constrained nursing homes, which can limit access to high quality care.

Proportion of Hispanic residents

Nursing homes that serve higher proportion of Hispanic residents were associated with lower Hispanic-White nursing home segregation. This finding indicates nursing homes that house higher proportion of Hispanic residents were associated with being more integrated. Hispanic nursing home residents were overrepresented in nursing homes that were located in areas with higher Hispanic-White residential segregation. Similar to Black nursing home residents, Hispanic nursing home residents also appear to follow residential patterns.

Payer status at the facility and county level had an important role in contributing to Hispanic residents being disproportionately served in certain nursing homes. Nursing homes located in counties with higher proportion of Medicaid and Medicare residents may have lower proportions of private-pay residents. Nursing homes may face financial constraints due to their heavy reliance on publicly funded programs. As such, nursing homes may develop strategies to increase the number of publicly funded residents to compensate for having a lower proportion of private-pay residents in order to reduce financial strain. While, Hispanic residents are gaining access to these facilities, Medicaid-reliant nursing homes have been associated with poor quality (Mor et al., 2004). Similar to Black nursing homes residents, Hispanic residents are gaining access to nursing homes that may be resource deprived due to their heavy reliance on publicly fund reimbursement. However, unlike Black nursing home residents, other organizational and external factors were not associated with influencing the racial composition of Hispanic residents in nursing homes. This suggests that Black and Hispanic nursing home residents are residing in different nursing homes.

Physical restraints

Resident characteristics. Similar to recent literature, this study found that Hispanic residents had greater odds of being physically restrained compared to White residents (AHRQ, 2009; Fennell, 2010). This study also found, Black nursing home residents were at a greater risk of being physically restrained relative to White nursing home residents. This finding differs from the National Healthcare Disparities Report (AHRQ) which suggested, Black nursing home residents were less likely to be physically restrained compared to other races (Whites, Hispanics, Asians, and American Indians); however this report only adjusted for certain resident level factors in models.

Facility characteristics. Nursing homes with lower proportion of Black residents were associated with greater odds of residents being physically restrained. This finding was similar to Miller et al., (2006) who found residents who resided in nursing home that served high proportion of Black residents were less likely to be physically restrained, but residents had a greater odd of receiving antipsychotic drugs. This finding suggest differences in physical restraint use are not because certain nursing homes house higher proportion of Black residents, but supports the finding above that individual Black residents are at higher risk of being physical restrained. Black nursing homes resident have been found to have lower activities of daily living (ADL's) and lower instrumental activities of daily living (IADL) function (Akamigbo & Wolinsky, 2007) compared to White residents, as such some facilities may develop an organizational "culture" where physical restraint use becomes the norm to deal with residents with complex care needs. The higher use of physical restraints among Black nursing home residents can

also be attributed to the fact that Black residents are residing in resource challenged nursing homes, which can limit high quality care.

Facilities with higher proportion of Medicare residents were associated with greater odds of physical restraint use. This finding can also be attributed to a cultural norm where residents with complex needs may be at higher risk for use of physical restraints. As mentioned previously, long-term care Medicare residents may be sicker than the “typical” short-term care Medicare residents, since there need for nursing home services extends the typical short-term stay (10-20 days) in a nursing home.

Residents housed in nursing homes with lower occupancy rates were at a higher risk of being physically restrained. Residents who resided in nursing homes that were not affiliated with chains were also at a greater risk of being physically restrained. These findings indicate that resource constraints among nursing homes can contribute to poor quality of care for residents.

Residents in not for-profit nursing homes were also at a greater risk of being physical restrained. Systematic reviews have provided evidence suggesting not for-profit nursing homes deliver higher quality of care for most outcomes relative to for-profit nursing homes (Hilmer et al., 2005; Comondore et al., 2009). However, a meta-analysis indicated for-profit nursing homes demonstrated better quality of care for physical restraint use and number of deficiencies compared to not for-profit nursing homes, although findings were not statistically significant (Comondore et al., 2009). While differences in quality of care have been observed between for-profit and not for-profit nursing homes, less is known about factors that contribute to differences in quality of care among for-profit and not for-profit homes.

County/MSA characteristics. Less segregated nursing homes were associated with higher use of physical restraints among residents. This findings suggests that as homes become more integrated not only are Black and Hispanic residents at risk for higher use of physical restraints, but all residents in these facilities are at a higher risk of being physically restrained. Nursing homes located in areas with higher Black-White residential segregation were significantly associated with greater odds of physical restraint being used among residents. As such, community resources may influence resources that are available to nursing homes, which can contribute to nursing homes ability to provide high quality care to residents. Homes located in areas with higher Hispanic-White residential segregation were also significantly associated with higher odds of physical restraints being used, but this factor appears to have minimal impact on use of physical restraints among residents.

Nursing homes in counties with higher proportion of Medicare residents were associated with greater physical restraint use, which is similar to the facility level finding in this study. Aforementioned, nursing homes located in counties with higher proportion of long-term care Medicare residents, may encounter a higher proportion of residents with complex needs.

Nursing homes located in counties with higher proportion of for-profit nursing homes were associated with greater odds of physical restraints use, which differs from what was found at the facility level. Nursing homes located in counties with higher proportion of for-profit facilities may be competing for the some of the same residents in those counties. Therefore, nursing homes in counties with higher proportion of for-profit facilities may be more willing to provide services to residents with more complex needs

to lessen resource constraints, which unfortunately may lead to overuse of physical restraints.

Nursing homes with lower occupancy rates were associated with residents being physically restrained. Nursing homes located in counties with lower proportion of chain-affiliated nursing homes were also associated with higher use of physical restraints, which suggests chain-affiliated nursing homes ability to “bundle” resources may lessen the use of physical restraints among residents. These findings also contribute to the theory that resource constraints may contribute to poor quality of care in nursing homes for residents.

Pressure ulcer

Resident characteristics. Black nursing homes residents were at a greater risk of having pressure ulcer presents compared to White residents. Prior studies have found that Black nursing home residents have a higher prevalence of pressure ulcers compared to White nursing home residents (Howard and Taylor, 2009; AHRQ National Healthcare Disparities Report, 2009; Rosen et al., 2006). Although Black nursing home residents were at a higher risk of having pressure ulcers present, Hispanic residents were at a lower risk of having pressure ulcers present relative to White residents. Previous literature indicated, Hispanic residents were more likely to have pressure ulcers present compared to White residents (Gerado et al., 2009, National Healthcare Disparities Report, 2009). Gerado et al., (2009) suggested Hispanic residents were associated with having a higher prevalence of pressure ulcers when only controlling for resident level factors. The National Healthcare Disparities Report (2009) models also only risk-adjusted for resident level factors, which may contribute to results of higher presence of pressure ulcers among Hispanic residents.

The differences in the presence of pressure ulcers between Black and Hispanic nursing home residents in this study may be due to the fact that the two groups reside in different nursing homes. Fennell et al. (2010) demonstrated, Hispanic and Black nursing homes residents do not reside in the same nursing homes. One possible explanation for this finding is that both groups prefer to reside facilities located in their own communities. However, this may be more difficult for Hispanic nursing home residents due to the limited number of beds found in Hispanic communities (Reed and Andes, 2001), which may cause this group to be more mobile in their selection of nursing homes.

Facility and County/MSA. Nursing homes residents' racial composition did not have an effect on the presence of pressure ulcers among residents; This finding is contrary to what other studies have found, nursing homes that disproportionately serve minority resident have been associated with residents being at greater risk of having pressure ulcers present (Gerardo, Teno, and Mor, 2009; Cai, Mukamel, Temkin-Greener, 2010). Differences in the independent variables used for risk-adjusting may contribute to variation in the findings between this study and other studies. Black-White and Hispanic-White nursing home segregation had a minimal effect on the presence of pressure ulcers among residents. These findings suggest that individual race/ethnicity may be the contributing factor for racial/ethnic disparities in nursing homes.

Residents housed in nursing homes with higher proportion of Medicare residents were at a higher risk of having pressure ulcers present. This finding relates back to previous discussion about long-term Medicare residents having more complex needs, which may lead to poorer quality of care for residents. Chain-affiliated nursing homes

were associated with greater odds of having residents with pressure ulcers. While chain-affiliated nursing homes may be associated with greater resources due to their affiliations, fragmentation among components may prevent these facilities from providing efficient and effective care. Nursing homes with lower occupancy rates were associated with residents being in greater risk of having pressure ulcers present.

Policy Implications

Racial/ethnic healthcare disparities are multi-facet and complex in nature; as such, it will take initiatives that are multilevel to mitigate/eliminate disparities. As indicated from the intraclass coefficient the differences attributed to physical restraint use among residents can be equally divided between resident, facility, and county/MSA characteristics. While resident level characteristics (94%), contributed to a majority of difference associated with the prevalence of pressure ulcers among nursing home residents. However, facility and county/MSA factors each accounted for 3% of the difference associated with the presence of pressure ulcers among residents.

Subsidize payments for nursing homes with high proportion of minority residents. Findings from this study indicated that resident's race/ethnicity and nursing home segregation contribute to racial/ethnic disparities in nursing home quality. This study also found that minority residents were overrepresented in resource-constrained nursing homes. Nursing homes that housed higher proportion of Black (Smith et al. 2007, Cai, Mukamel, & Temkin-Greener, 2010; and Hispanic (Fennell et al., 2010; Gerardo, Teno, & Mor, 2009) residents have been associated with having lower financial viability due to their heavy reliance on Medicaid. Medicaid-reliant nursing homes may have difficulty obtaining resources from other sources. Chisholm et al. (2010) found, nursing homes with high proportion of Black residents had statistically

significant lower other revenue (revenue obtained from donations and endowments) relative to nursing homes with no Black residents, after controlling for facility and market characteristics. Nursing homes that serve higher proportion of minority residents may not have extra financial resources to account for the lower reimbursement of Medicaid, which can equate to lower quality of care for residents who reside in these homes. Similar to previous studies, findings from this study indicate that higher proportion of Medicaid residents was associated with lower quality of care.

Subsidies allocated to homes with higher proportion of minority residents may allow facilities the resources needed to partake in strategies that will improve quality of care for residents (i.e. increase staff, innovation). However, this solution cannot be considered a long-term fix to this issue, as our society is growing older and more diverse Medicaid and Medicare will face greater financial challenges. The current financial strains placed on states and the federal government will make it difficult for subsides to become a permanent part of the reimbursement system for homes with higher proportion of minorities.

Pay-for-performance. Similar to other studies, this study has found that facility characteristics contribute to poor quality of care. As such, pay-for-performance initiatives may help to mitigate racial/ethnic healthcare disparities. Pay-for-performance programs are designed to motivate quality improvement by rewarding providers for delivering high-quality care (Ferman, 2004). Pay-for-performance is based on the assumption that provided with appropriate incentives providers will invest in ways to provide effective quality of care. Pay-for-performance initiatives have been study more in the healthcare sectors than nursing homes. Literature reviews conducted from the

healthcare sector on the relationship between pay-for-performance and quality has provided mixed results (Rosenthal et al., 2004; Rosenthal et al., 2005; Peterson et al., 2006).

While pay-for-performance may be a possible solution to improve quality in the nursing home setting, there are possible unintended consequences with these initiatives. Pay-for-performance initiatives could possibly limit access to nursing homes services for minority consumers, in turn widening racial/ethnic disparities due to limited access for minority patients. Nursing home administrators may select healthier consumers in order to achieve quality improvement marks, making it more difficult for minority residents to gain access to nursing homes. In addition, nursing homes that are already performing well may be at an advantage of reaching quality marks and reap the benefits of pay-for-performance relative to low-performing nursing homes that serve minority residents. While, pay-for-performance may improve quality, mechanisms need to be put in place to prevent limiting access to consumers with complex needs.

Person-centered care. Initiatives focused on facilities will work toward the goal of mitigating racial/ethnic nursing home disparities; however, resident level initiatives will also contribute to mitigating racial/ethnic disparities in nursing home. As indicated from the findings of the intraclass coefficient, resident level characteristics accounted for 94% and 35% of differences in the prevalence of pressure ulcers and use of physical restraint among residents, respectively.

Person-centered care has been associated with a “cultural-change” movement in nursing homes. The person-centered movement began in the early 1980’s and has continued to grow over time. The goal of person-centered care is to individualize care

for residents, making facilities have a more home like feel to improve quality of life and quality of care (Koren, 2010). Green Houses created a demonstration project that used freestanding small group homes as treatment groups and current facilities as the control groups to examine the difference in quality of care and quality of life between the two types of nursing homes. Findings showed residents in the small group reported better quality of life and had equal or better clinical outcomes (Koren, 2010).

Person-centered approach focuses on providing a more holistic view of needs for nursing home residents to improve the quality of life and quality of care. The focus is not only on providing high quality of care to residents, but also on overall high quality of life for residents. Proponents of person-centered care continue to emphasis that clinical outcomes are important, but that clinical outcomes are only one component of quality of life (Konetzka & Werner, 2009). As such, this approach could be helpful to mitigate racial/ethnic disparities in quality of care provided to residents, because the focus is not only on the quality of care provided to residents but also on providing care that creates the best quality of life possible for residents.

Public reporting. In 2002, Center for Medicare and Medicaid Services (CMS) released Nursing Home Compare, a web-based guide providing information on 19 quality measures of chronic and post-acute care in Medicare or Medicaid certified nursing homes (CMS, 2002). Public reporting may be a mechanism to promote quality competition among nursing homes, by providing consumers with information in order to make informed decisions. Zinn et al., (2010) found public reporting did cause low-performing facilities to make investments to improve quality of care relative to high-

performing facilities when in competitive markets. However, less is known about how consumers use Nursing Home Compare during the selection of nursing homes.

While Nursing Home Compare may provide pertinent quality information about nursing homes, nursing home selection can be influenced by factors such as geography, referrals, and availability of beds. This study found that nursing homes with higher proportion of Black and Hispanic residents were located in residential areas with higher Black-White and Hispanic-White residential segregation. As such, minority consumers appear to select nursing homes located in their communities.

Nursing Home Compare is a web-based guide, which assumes individuals will have access to computers and individuals will have the skills needed navigate through the website. These assumptions can create barriers for older consumers who are attempting to identify high quality nursing homes. Consequently, it is important to understand the use of Nursing Home Compare among consumers when selecting nursing homes, as an intervention may be needed to educate older consumes and family members on the website and how to use the website. Public reporting could potentially lead to decrease access for minority consumers to certain nursing homes, because facilities may become more selective in the type of residents they accept in order to ensure a good quality report.

Community-based interventions. As previously, stated minority residents disproportionately rely on Medicaid funding for nursing home services; as such, they are overrepresented in Medicaid-reliant nursing homes. Findings from this study indicate minority residents are overrepresented in nursing homes that are located in areas with higher residential segregation. Residential segregation can be viewed as a structural

component that makes barriers for resources, which can lead to concentrated poverty and restriction of socioeconomic status in segregated neighborhoods (Masey,1990). These two factors may contribute to minority residents' heavy reliance on Medicaid for nursing home services. Consequently, initiatives need to be developed that focus on improving the socioeconomic status of minority neighborhoods, which can include but are not limited to education initiatives, job initiatives, and health initiatives.

The policies described above will not eliminate nursing home segregation, but work to ensure that minorities have access to high-quality nursing homes. While prior studies have indicated that segregation does occur in nursing homes, it still remains unclear as to what are the causes of nursing home segregation. Although this study attempts to provide some insight on factors associated with nursing home segregation, this study is limited to factors found in secondary data sets. Lack of information as to how consumers select nursing homes remains an important question to answer, in order to understand how nursing home segregation persist in the nursing home industry. Individuals' may prefer to reside in nursing homes that are racially/ethnically diverse, which would create nursing home segregation. Therefore, it is not clear if nursing home segregation occurs due to organizational and environmental factors or due to residents' preferences. As such, the focuses of initiatives discussed above are on mitigating/eliminating racial/ethnic disparities in quality that may arise due to nursing home segregation.

Conclusion

Laws have been enacted to racially integrate the healthcare system since the 1960's; nevertheless, racial/ethnic disparities continue to plague our healthcare system

(AHRQ National Heatlthcare Disparities Report, 2007, & 2008). This study demonstrated that segregation and racial/ethnic disparities continue to persist in the nursing home industry, with segregated nursing homes facing serious resource constraints. As the nursing home industry continues to provide services to some of the most vulnerable populations with multiple care needs, it is expected that high quality care would be the standard of care for residents. However, resource constraints appear to limit the quality of care received to residents.

Future Research

This study found that an estimated 14% of long-term care residents were Medicare residents. Kaiser recently released a new report, Medicare spending and use of medical services for beneficiaries in nursing homes and other long-term care facilities, describing long-term Medicare residents as being costly and in poorer health. Consequently, more research should be conducted to understand long-term Medicare residents in the nursing home setting. Findings from this study indicate resident characteristics contribute considerably to nursing home quality; future research should also focus on understanding components of patient-centered care that may improve quality of care for residents. Future research should also focus on how nursing home culture may influence the implementation of patient-centered care initiatives.

Strengths and Limitations

There are several potential limitations that need to be considered regarding the proposed research. A limitation that is inevitable with all cross-sectional studies is the inability to infer causality. Nearly all of the research in the field of nursing home racial composition and disparities in quality of care are cross-sectional.

Measurement error is always a threat to observational studies, particularly those that rely on self-report. While data collected from the MDS survey is not self-reported, nurses in nursing homes complete the MDS assessment on residents. Consequently, use of MDS data have been associated with systematic differences of assessing patients in nursing homes which can have an effect on the reliability of the measurement (Mor, 2005; Mor et al., 2003). However, when nurses are properly trained at completing this assessment, the tool resembles the “gold standard” (Mor et al., 2003). Similar issues can be attributed to the OSCAR data, as issues with data accuracy may arise. This data set was developed for Medicare-Medicaid nursing home reimbursement; there may be an incentive of “gaming” to increase reimbursement (Iezzoni, 2003).

The use of the dissimilarity index when the number of minority members is small relative to the number of areal units may create the index to be high even when the groups are evenly distributed throughout the area. However, the dissimilarity index has been utilized in numerous studies in the education literature to measure the level of school and classroom segregation within an area. In addition, factors that have not being discussed in this paper may be associated with nursing home segregation and nursing home quality.

Despite some limitations, this proposed study offers many strengths over previous studies of this kind. This study will examine the role of residents’ race, nursing home and residential segregation in relation to quality of care, while controlling for other key predictors. This study will use an actual measure of segregation, while incorporating residents’ racial composition as a facility level measure of nursing home segregation.

To our knowledge, only descriptive studies have been conducted to examine an actual measure of segregation in the nursing home literature.

Unlike previous studies that have aggregated the resident level outcomes from MDS to the facility level, this study will keep the data at the individual level. Studies that aggregate individual level data to the facility level are at risk for atomistic fallacy, which creates erroneous inferences about groups from individual-level data (Luke, 2004). Another key strength of this study is the depth of the variables that will be incorporated into the model.

The multilevel models will allow investigators to account for the hierarchical nature of the data; studies that do not account the hierarchical nature of the data are at risk for bias estimates because they are not properly modeled. Multilevel models also allow for risk-adjustment of quality measures. Currently, most studies in the nursing home literature risk adjust quality outcome measures by exclusion, stratification, or a regression model. While there are benefits to these modeling, they also have their limitations. Exclusion and stratification are more prone to measurement error when risk categories are small or when concentrations of residents that are high or low risk are in certain facilities (Arling et al., 2007). Regression models do not take into account the hierarchical nature of the data. Arling et al., 2007 found that multilevel model results were considerably different for nursing home quality measure rates when compared with current methods, which may have occurred because other models failed to take into account estimation error and have limited risk adjustment. This proposed study also intends to use multilevel models to understand causal pathways that may lead to

racial/ethnic disparities in the nursing home industry by calculating the intraclass coefficient.

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BIOGRAPHICAL SKETCH

Latarsha Chisholm completed her PhD at the University of Florida in Health Services Research, Management, and Policy program. She is a first-year post-doctoral Health Services Research fellow at the University of North Carolina, Chapel Hill. Her research interests included long-term care, disparities, and quality and outcomes. As an undergraduate, she attended the University of Florida and received a B.S. in Psychology. In 2005, she received a M.S.W., in Social Work, from the University of South Florida. She has worked as a research assistant on several projects that focused on mammography screening, perceptions of discrimination in the healthcare setting, disparities in nursing home care, and healthcare adoption of palliative care programs. Her primary research interests are on organizational and contextual determinants that influence outcomes, quality, and access of care among vulnerable population, particularly racial/ethnic minorities, elderly, and women. She continues to work on projects focused on improving quality of care for individuals.