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DOES IT PAY TO MAKE THE GRADE?
THE ASSOCIATION BETWEEN QUALITY AND FINANCIAL PERFORMANCE IN
NURSING HOMES

BY

Stefanie L. Corbett

A doctoral project submitted to the faculty of the Medical University of
South Carolina in partial fulfillment of the requirements for the degree
Doctor of Health Administration
in the College of Health Professions


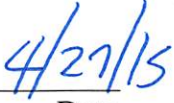
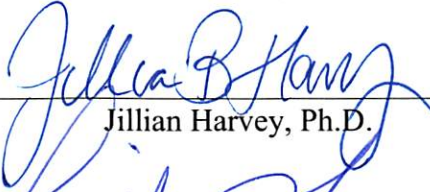





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Approved By:

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Degree of Doctor of Health Administration

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Chairperson: Walter Jones, Ph.D.
Committee: Jillian Harvey, Ph.D.
Timothy Lowe, Ph.D.

This study sought to answer the question, “Is there an association between quality rating performance on Nursing Home Compare (NHC) and financial performance in nursing homes?” A quantitative, non-experimental study involving archival data was conducted using data from Medicare Cost Reports and Nursing Home Compare. The sample included CMS-certified, freestanding skilled nursing facilities in the United States that participated in NHC from 2009-2011 and submitted Medicare Cost Reports from 2010-2012. There were 14,015 nursing homes in 2010; 14,139 nursing homes in 2011; and 14,265 nursing homes included in 2012. Data was analyzed with generalized linear models using the Statistical Package for the Social Sciences 22 (SPSS). The results of this study indicated that high quality was correlated to lower operating expenses, higher occupancy (over the latter two years of the study), private payor census and higher Medicare census. This study did not find that high quality was associated with higher operating profit margins. Despite the limitations of this study, the results provide important implications for nursing home operators and policymakers.

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Introduction

Quality Concerns in Nursing Homes

Poor quality of care in nursing homes has been a concern in the United States for decades (Institute of Medicine, 1986; Wunderlich & Kohler, 2000). Findings of a study conducted by the Institute of Medicine (IOM) in 1986 revealed that nursing home residents were receiving inadequate care, and experiencing abuse and neglect. With a number of suggested and later adopted recommendations for reform, the IOM's study led to the passage of the Nursing Home Reform Act of 1987 as part of the Omnibus Budget Reconciliation Act (OBRA). Regulatory controls, including resident assessments, data collection, a Medicare/Medicaid certification process, and unannounced surveys, were mandated to monitor compliance with the OBRA requirements (Institute of Medicine, 1986). A subsequent report by the IOM in 2000 revealed that while there had been some improvement, quality of care concerns still existed (Wunderlich & Kohler, 2000).

Evolution of Nursing Home Report Cards and Nursing Home Compare

In October 1998, the Health Care Financing Administration (later renamed the Centers for Medicare and Medicaid Services) introduced Nursing Home Compare (www.medicare.gov/NursingHomeCompare), an online nursing home report card. For the first time, reporting of nursing home quality information on NHC became mandatory for all 15,000+ nursing homes participating in Medicare and Medicaid (Grabowski & Town, 2011). The goal of the website was to control market forces to encourage poorly performing homes to improve quality or to face penalties, including closure of the facility to future admissions (US General Accounting Office, 2002).

Although it was not widely known or utilized by the public, NHC provided information on basic quality and facility characteristics. Initially, the quality component was limited to reports of health-related deficiencies. Facility characteristics included number of beds, type of ownership and location. Over the next two decades, there were several expansions of the data posted on NHC and enhancements to the formatting and user interface (Grabowski & Town, 2011).

Table 1 details the evolution of nursing home report cards and NHC. In June 2000, nurse staffing and nurse aide information were added to NHC. In November 2002, the national launch of the Nursing Home Quality Initiative (NHQI) further expanded the original report cards to include long- and short-stay quality measures (QM's) to NHC. The QM's were derived from resident-level assessment data from the Minimum Data Set (MDS) 2.0. The MDS is a physical, psychological and psychosocial functioning assessment and care-planning tool that is used to collect uniform information on all residents in Medicare- or Medicaid-certified nursing homes. These assessments are self-reported by nursing homes and transmitted electronically to CMS through state databases (Harris & Clauser, 2002). In January 2004 the list of QM's was overhauled, followed by an additional update in November 2004 (Grabowski & Town, 2011).

Table 1: Evolution of Nursing Home Report Cards

Date	Nursing Home Compare Progression	Web Site Content Changes
October 1998	Introduction of NHC	Facility characteristics Health-related deficiencies
June 2000	Staffing measures added	Nurse Staffing Nurse Aide Information
April 2002	Nursing Home Quality Initiative (NHQI) piloted in six states	Quality Measures: <ul style="list-style-type: none"> • Activities of Daily Living • Delirium • Weight Loss • Infections • Walking • Pain • Physical Restraints • Pressure Ulcers
November 2002	National launch of NHQI, NHC made public	1 Quality Measure eliminated: <ul style="list-style-type: none"> • Weight Loss
January 2004	Overhaul of Quality Measures used in NHC	List of Quality Measures: <ul style="list-style-type: none"> • Activities of Daily Living • Bed/Chair-Bound • Catheters • Delirium • Depression/Anxiety • Incontinence • Mobility • Pain (long-stay) • Pain (short-stay) • Physical Restraints • Pressure Ulcers (high risk) • Pressure Ulcers (low risk) • Urinary Tract Infections • Weight Loss

Nursing Home Compare: Five Star Quality Rating System

In December 2008, the Centers for Medicare and Medicaid Services (CMS) enhanced the NHC website with the addition of the Five-Star Quality Rating System. The primary purpose of the enhancement was to provide residents and their families with an easy way to understand assessment of nursing home quality and provide them with relevant information to distinguish between high and low performing nursing homes (Abt Associates Inc., 2014). Increased usefulness and utilization were anticipated after

improvements to the website, which offered consumers the ability to search and sort on meaningful characteristics, to make better comparisons between nursing homes, to utilize Google maps for directions, and to optimize the printing of information from the website (CMS, 2008).

Each nursing home's performance is rated on four measures of quality: 1) health inspections survey results; 2) staffing levels; 3) a set of QM's derived from the MDS; and 4) the overall quality rating, generated as a composite of the other three ratings (Abt Associates Inc., 2014). For each of the four report card ratings, the key for performance ratings is between 1 to 5 stars, where 1 star indicates poor performance and 5 stars indicate highest performance (CMS, 2008). Table 2 explains the star rating further.

Table 2 Nursing Home Compare Five-Star Quality Rating System

Number of Stars	Quality Comparison
★	Much below average
★★	Below average
★★★	Average
★★★★	Above average
★★★★★	Much above average

Health Inspections Rating. The health inspections rating is based on the number, scope and severity of deficiencies a nursing home received during the three most recent annual health inspection surveys, any complaint investigations within the recent 36 months of the rating date and the number of visits required to restore compliance after deficiencies were discovered. The rating is derived using a point system where points are assigned to each observed health deficiencies and more points are assigned to more serious, widespread deficiencies. Updated monthly, the rating reflects the relative performance of nursing homes within a state. Only the top 10% of nursing homes in each

state receive a five-star rating for health inspections (Abt Associates Inc., 2014; CMS, 2008).

Staffing Rating. At the request of Congress, a study was completed by the Department of Health and Human Services (HHS) on nurse staffing. It was found that 97% of nursing homes provided inadequate daily nurse staffing, and nursing homes needed at least 4.1 nursing hours per resident to provide quality care (CMS, 2001). As a result of this study, nurse staffing levels were integrated into the Five-Star Quality Rating System on NHC in 2008, approximately 7 years later. The staffing rating is based on the number of registered nurse hours and total nursing hours (including registered nurses, licensed practical nurses, licensed vocational nurses and certified nurse aides) per resident day. To receive five stars for the staffing rating, a nursing home must meet the minimum nurse staff level of 4.1 hours per resident per day (Kaiser, 2013). The staffing rating compares staffing levels with freestanding nursing homes across the nation and is adjusted for resident case-mix using MDS data (i.e. resident care needs). The staffing rating is usually updated annually on NHC (Abt Associates Inc., 2014; CMS, 2008).

Quality Measures Rating. As the enhanced quality component of NHC report cards, the quality measures (QM) rating was updated to include nine total quality indicators/measures from the MDS in June 2012: seven long-stay measures and two short-stay measures, detailed specifically in Table 3.

Table 3 Short- and Long-Stay Quality Measures in the Five-Star Quality Rating System

Short- or Long- Stay	Quality Measures
Short-Stay Quality Measures	Delirium Pain
Long-Stay Quality Measures	ADL's Catheters Mobility Pain Pressure Ulcers (high risk) Pressure Ulcers (low risk) Urinary Tract Infections

The QM rating is derived by a point system where each measure is assigned 20 to 100 points, based on nursing home performance. All nursing homes are grouped into quintiles based on the distribution of the QM's. For all QM's except for the physical restraints and short-stay pressure ulcers, those nursing homes in the bottom quintile are assigned 20 points and those in the highest performing nursing homes are assigned 100 points. The physical restraint and short-stay pressure ulcer QM's are assigned points differently, because they have low prevalence in nursing homes. For the restraint QM, nursing homes can achieve 100 points for the highest performance (zero percent rates). The remaining nursing homes are divided into two groups based on performance, where the better performers are assigned 60 points and the poorer performers are assigned 20 points. For the short-stay pressure ulcer QM, nursing homes can achieve 100 points for the highest performance (zero percent rates). The remaining nursing homes are divided into three groups based on performance, and 75, 50, or 20 points are assigned according to where each nursing home falls in the distribution. The quintiles used for scoring are generated from the national distribution of nursing homes for all of the QM's except for the activities of daily living measure, for which the quintile is set for each state using the state distribution to account for differences in state Medicaid policies that appear to

impact this measure. Each of the nine QM's is given equal weight, and the summation of all QM's is used to generate a total score for each nursing home between 220 and 1100 points. Cut points then used to assign one to five stars based on the distribution of total scores for each nursing home.

The QM rating is usually updated quarterly on NHC, although the QM rating was held constant from March 2011 to July 2012 after the transition of MDS 2.0 to MDS 3.0 in October 2010 (CMS, 2008). The upgrade of MDS 2.0 to MDS 3.0 improved the reliability, accuracy and usefulness of the assessment tool by including direct resident interviews and addressing concerns about the structure and length of the tool (Saliba & Buchanan, 2008).

Overall Quality Rating. The overall quality rating is computed using the star ratings of the other three domains: health inspections, staffing and quality measures. The methodology for calculating the overall quality rating does not assign individual weights to the ratings, but the health inspection rating is the most heavily weighted and typically the most critical element as it is indicative of ongoing quality problems, if present (Abt Associates Inc., 2014). Table 4 explains the methodology used for calculating the overall quality rating. Depending on a nursing home's performance on the staffing and QM domains, the overall quality rating may be up to two stars higher or lower than a facility's health inspections rating. The overall quality rating is updated monthly on NHC (CMS, 2008).

Table 4: Methodology for Calculating the Overall Quality Rating in the Five-Star Quality Rating System on Nursing Home Compare

Steps	Computation
1	Start with Health Inspections rating (1 to 5 stars)
2	Add 1 star if Staffing rating is 4 or 5 stars Subtract 1 star if Staffing rating is 1
3	Add 1 star if Quality Measures rating is 5 stars Subtract 1 star if Quality Measures rating is 1
4	If Health Inspections rating is 1 star, Overall Quality rating cannot be more than 2 stars
5	If provider is a Special Focus Facility, Overall Quality rating cannot be more than 3 stars

Affordable Care Act and Nursing Home Compare

The Affordable Care Act (ACA) is the first comprehensive act of legislation since the Nursing Home Reform Act to expand quality of care-related requirements and improve federal and state oversight and enforcement of nursing home regulations. The ACA includes the Nursing Home Transparency and Improvement Act of 2009 that was passed to improve nursing home transparency and accountability by eliminating barriers in the regulation of Medicare and Medicaid-certified nursing homes. To strengthen regulators' ability to hold providers accountable for compliance with federal requirements, provisions were passed with stricter requirements for ownership and financial relationship disclosure, mandatory accuracy in nurse staffing reports, and expanding the publicly available information on NHC (Kaiser, 2013).

Most ACA-driven improvements to NHC and the Five-Star Quality Rating System were implemented in April 2011, but the website was redesigned in July 2012. The ACA led to the following requirements:

1. Reporting of auditable staffing data showing daily hours of direct care and staff turnover/tenure

2. A standardized voluntary complaint form and education for consumers wanting to make a complaint
3. A summary of the outcomes of complaint surveys and information on crimes committed by facilities, employees, and/or affiliates and corresponding civil monetary penalties
4. Links to state websites with complete survey and investigation reports (CMS Form-2567), plans of correction, and education for consumers on interpreting the findings
5. Distinguish Special Focus Facilities (SFF) on NHC for facilities with a history of substantially failing to comply with CMS quality of care requirements

Utilization of Nursing Home Compare by Consumers and Providers

CMS intended to increase the usefulness of the CMS Nursing Home Compare website to consumers, family members, and the general public (CMS, 2008). Data expansions and website enhancements have led to increased utilization of NHC over the years (Grabowski & Town, 2011; Office of Inspector General, 2004). Before the media campaign and launch of quality measures on NHC as part of the NHQI in 2002, NHC averaged fewer than 100,000 visits per month. In November 2002, NHC averaged about 400,000 visits (Office of Inspector General, 2004). In December 2008, after the implementation of the Five-Star Quality Rating System, NHC averaged 1.3 million page views per month (CMS, 2008).

There have been few studies to determine whether the increased traffic on NHC is due to increased utilization by hospital case managers that make referrals for hospital

patients needing nursing home placement or residents or their family members when choosing a nursing home. A study published in 2004 found that 38% of hospital discharge planners used the Nursing Home Compare website as part of their discharge planning (BearingPoint, 2004). In 2009, a study was completed with a small sample of 4,754 family members to determine whether consumers utilized NHC and understood the results. It was found that 31% of consumers used the Internet to choose a nursing home. Of those in the sample, 12% used NHC and indicated a good understanding of the website's content (Castle, 2009).

Heightened awareness and utilization are also evident amongst providers. CMS sponsored a survey of nursing homes in the NHQI pilot states and found that 88% of facilities had familiarity with NHC (KPMG Consulting, 2003). In a similar survey across four states, it was found that 90% of the administrators had visited NHC (Castle, 2005). In a study published in 2007, a sample of nursing home administrators were interviewed regarding their initial reaction to the publication of nursing home report cards. Of the 724 administrators included in the study, 69% reported reviewing their quality scores regularly and many had taken specific actions to improve quality (Mukamel, Spector, Zinn, Huang, Weimer & Dozier, 2007).

Public report cards may be utilized more by consumers when selecting a provider in the nursing home setting than consumers looking for a physician, health plan or hospital (Werner, Stuart & Polsky, 2010). A 2008 poll from the Henry J. Kaiser Family Foundation found that 30% of Americans reviewed quality information to compare health plans, hospitals or doctor. Of the 30% that reviewed the quality information, only 14% reported utilizing it (Health Policy Brief, 2012). This may be due to the fact that nursing

home decisions are usually made under considerable time limits and pressure, such as during an inpatient stay in a hospital. While it may not be feasible for hospital patients or distressed family members to tour facilities or speak with nursing home staff, they can explore the Internet for quality information and comparisons (Castle, Diesel, & Ferguson-Rome, 2010).

Nursing Home Compare as a Policy

The ultimate policy goal of publicly reported quality information is to improve quality of care (Grabowski & Town, 2011). NHC aims to improve quality of care in two ways: by increasing consumer demand for high-quality care; and incentivizing providers to compete on quality of care. By utilizing NHC when choosing a nursing home, consumers will have information to guide their selection of one with high-quality ratings. This may result in increased consumer demand for high-quality care and motivate providers to compete for high performance ratings and differentiate themselves from competitors (Werner, Stuart & Polsky, 2010). “Thus, in theory, [NHC] might be an effective policy tool to promote high-quality care” (Park, Konetzka & Werner, 2011).

Contribution

This study sought to answer the question, “Is there an association between quality rating performance on Nursing Home Compare and financial performance in nursing homes?” The central research question was tested using the following hypothesis tests:

H₁: Nursing homes with higher quality ratings will report higher net resident revenues than those with lower quality ratings.

H₂: Nursing homes with higher quality ratings will report lower total operating expenses than those with lower quality ratings.

H₃: Nursing homes with higher quality ratings will report higher operating profit margins than those with lower quality ratings.

H₄: Nursing homes with higher quality ratings will report higher occupancy than those with lower quality ratings.

H₅: Nursing homes with higher quality ratings will report higher private payor census than those with lower quality ratings.

H₆: Nursing homes with higher quality ratings will report higher Medicare census than those with lower quality ratings.

The population for this study included all CMS-certified, freestanding skilled nursing facilities that consistently participated in NHC from 2009-2010 and submitted Medicare Cost Reports from 2010-2012.

The findings of this study provide a solid critique of the effectiveness of NHC as a policy tool in driving quality and safety as a function of local market share. The long-term effectiveness and sustainability of NHC as a policy tool to improve the quality and safety of care will depend on ongoing efforts by nursing home operators to achieve and maintain high quality of care in the face of diminishing resources. Sustaining a quality improvement program can be costly for nursing homes that are already challenged financially through slim operating margins. With evidence that high-quality ratings also yield improvements in financial performance and market share, operators will have additional incentive to continue to invest in quality improvement programs.

To further the research that currently exists on NHC and financial performance, this study explored trends in NHC performance, including nursing homes' financial performance since the introduction of the Five-Star Quality Rating System in 2008.

While there are several studies dating back to the inception of NHC that support the effectiveness of the report card as a policy tool that drives quality of care, it is currently unclear if NHC yields provider incentives. Several studies have reported contrasting findings on whether NHC and improved quality of care have led to increases in competition, occupancy, market share and/or improved financial performance.

The literature on this topic is primarily limited to early studies focusing on data from the first 2-4 years after the implementation of NHC. Few studies use data from the last decade and the majority are meta-analyses comparing nursing home market share and/or occupancy rate pre- and post-NHC implementation which precluded adjustment for known confounding factors (e.g., regional variations in staffing and local competition for private pay residents). While some studies have included financial performance as an outcome, no current study has sought to empirically evaluate Nursing Home Compare data and financial performance using all available data. This study is unique in that it includes all Nursing Home Compare data since the implementation of the Five-Star Quality Rating System as well as nursing home financial performance data while adjusting for potential confounders. In examining the overall quality rating, this analysis includes a more comprehensive definition of quality than previous studies. The overall quality rating consists of facility-level, risk-adjusted structural quality indicators (nursing home staffing), process quality indicators (health inspections and select quality measures), and outcomes quality indicators (select quality measures).

Literature Review

The relationship between quality of care and financial performance in nursing homes is not obvious (Encinosa & Bernard, 2005). It is important to explore this

relationship because financial trouble may disrupt resident care or lead to nursing home closure. Nursing home closures may jeopardize access and availability of nursing home services to residents (Castle, 2005). The literature is limited and mixed on the quality-financial performance relationship. In order to provide a thorough literature review on the relationship between quality and financial performance, this review examines trends in nursing home quality, revenues, costs, profit, market share, occupancy and payor mix under public reporting. This review draws from relevant peer-reviewed articles and popular nursing home advocacy and consulting organizations. Standard search strategies were used involving the querying of two online databases, MEDLINE and OVID, using keywords for articles since the implementation of NHC in 2002. The references from relevant articles were also reviewed.

Quality

Nursing home quality report cards were launched as an initiative to improve the quality of care in nursing homes. The intent was to make quality information accessible to prospective residents and increase the demand for quality, then in turn provide an incentive for nursing home operators to invest in quality improvement.

According to Mukamel et al. (2008), there are three potential outcomes of nursing home report cards:

- 1) changing consumers' choice - a demand response;
- 2) [incentivizing] providers to improve quality – a supply response; and
- 3) improving overall quality levels – an equilibrium result.

Several studies have been published analyzing trends in quality of care since the publication of nursing home report cards on Nursing Home Compare (NHC). While the

literature is mixed, but the majority of the studies show that public reporting has led to improved quality.

Zinn et. al (2005) found positive trends in quality improvement after nursing home report cards were made public in 2002. Nine of ten published quality measures (QM's) had improved significantly, but only three of the QM (pain control, use of physical restraints and rates of delirium) trends toward improvement were meaningful. In a similar study, Castle, Engberg, and Liu (2007) compared QM's in 2003 to those in 2004 (post-NHC) and found that eight of fourteen QM's showed improvements in quality. However, the changes found from year to year were less than 1% for thirteen of the fourteen QM's. Both studies were limited in that they only examined post-NHC data, rather than pre- and post-NHC data, which did not make it possible to attribute the results to NHC.

In 2008, Mukamel et al. overcame that limitation using primary and secondary data from before and after NHC (2001-2003). It was concluded that NHC had an impact on some clinical quality measures, particularly among nursing homes that had reported initiating quality improvement in response to NHC. Results were based on five QM's for a sample of post-acute care residents only. Of the five QM's examined, two (restraint use and pain control) showed improvement following NHC's publication in 2002. One limitation of this study was the fact that risk adjustment of QM's on NHC was limited. Also, without a concurrent control group, it was difficult to attribute the findings to NHC.

Published a year after Mukamel et al.'s study, Werner et al. (2009) used data from 1999-2005 and also found that quality of care improved at nursing homes on NHC for some QM's. Although the findings aligned with prior empirical work, the methods

improved upon prior studies with the use of extensive controls for nursing home resident selection. Small nursing homes that were not required to report to NHC were used as a contemporaneous control, propensity score matching was used to ensure the similarity of the residents being compared, and only post-acute care residents were included in the sample. Post-acute care residents were analyzed as they tend to have higher turnover rates and are usually younger and less cognitively impaired, which makes it more likely to find an effect from report cards and easier to control for case mix severity. There were three reported and one unreported QM examined. Two of the three reported QM's showed statistically significant improvement (pain and walking) with small magnitudes of change. The fourth unreported QM, rehospitalizations, did not show a significant improvement and, in some cases, worsened. Grabowski and Town published a similar study in 2011 using pre and post-NHC data, as well as a control group, but revealed conflicting results. Using the 6 pilot states with staggering NHQI introduction dates as the control group relative to other nursing homes in the US, no statistical evidence was found supporting the claim that NHC impacted overall quality of care.

The American Health Care Association (AHCA) publishes an annual quality report with data compiled from all of its approximately 8,690 member facilities that care for approximately one million people. AHCA is the largest association of long-term and post-acute care providers in the United States and has a long-standing history of advocating for quality care and services for frail, elderly and disabled citizens. In 2012, AHCA reported that nursing home quality of care had improved nationwide in twelve of the fifteen QM's reported on NHC from 2008-2012. The most significant improvements

were seen in post-acute care residents with 29% improvement in pressure ulcers and 12% improvement in pain (AHCA Quality Report, 2012).

In addition to QM's, AHCA also examines annual trends in quality of staffing and health inspections in nursing homes. The quality of staffing in nursing homes steadily increased in the amount of direct care nursing hours per resident for all nursing staff (RN's, LPN's, LVN's, and CNA's) from 2009 to 2013. The number of facilities with four or five stars in the staffing component of the Five-Star Quality Rating System steadily increased over the five years, from 38.3% in 2009 to 51.3% in 2013. Likewise, all of the measures for health inspections and regulatory compliance showed improvement from 2009-2013. There was a steady decline in the average number of deficiencies cited and an overall downward trend for facilities cited with substandard quality of care or immediate jeopardy. The proportion of facilities with deficiency-free surveys increased over the five-year period, as well as those with five stars in overall quality. The percentage of facilities that received a rating of five stars in overall quality steadily increased from 11.8% in 2009 to 19.6% in 2013 (AHCA Quality Report, 2013).

Quality, Revenues and Expenses

Nursing homes achieve high financial performance through their ability to generate revenues and their ability to control expenses. With Medicare/Medicaid reimbursement cuts and increased competition due to the growing emergence of assisted living facilities and home health agencies, nursing homes are challenged to find strategies for increasing revenue. Under NHC, nursing homes may strive to achieve high-quality services as a product differentiation strategy to increase revenues, by way of attracting more prospective nursing home residents and attracting prospective nursing home

residents that are willing to pay higher prices for better care. The relationship between nursing home quality and revenues is uncertain, and the literature is mixed and limited. Weech-Maldonado and colleagues (2003) did not find a significant association between nursing home quality of care (defined by staffing and select QM's scores) and revenues. However, Park, Konetzka and Werner (2011) found that high-quality nursing homes (defined as nursing homes with all QM scores above the median) experienced larger increases in revenues compared to low-quality nursing homes under NHC.

There have been numerous studies published on the relationship between nursing home quality and expenses. Quality management philosophy suggests that quality may be associated with lower costs, defining quality as a measure of an organization's ability to produce a service without error the first time. Healthcare organizations can achieve higher quality (fewer errors) and reduced waste (lower costs) if preventive steps can be identified in the production process (Binns, 1991). Weech-Maldonado and colleagues (2004) have noted the reduction of the incidence of pressure ulcers as an example under the quality management philosophy. To explain, nursing homes that implement clinical protocols and processes to prevent pressure ulcers can effectively reduce the incidence of pressure ulcers and therefore reduce costs due to staffing and supplies.

The literature on the relationship between nursing home costs and quality of care is mixed. Some studies support the idea that nursing home costs are a measure of the financial commitment to improving quality of care (Ramsay, Saintford & Zimmerman, 1995). However, the majority of the studies support the quality management philosophy that high quality in nursing homes is significantly associated with lower expenses

(Mukamel & Spector, 2000; Weech-Maldonado, Mor & Oluwole, 2004; Hicks et. al, 2004; Park, Konetzka & Werner, 2011).

The mixed findings in the literature may be due to methodological variations across studies, including different definitions/measurements of quality (i.e. structural, process and outcomes measures). Weech-Maldonado, Mor and Oluwole (2004) found that nursing homes with better outcomes and process quality experience lower expenses, while those with better structural quality (staffing) experience higher costs. It is expected that nursing homes with higher RN staffing would experience higher costs, but the result would be improved process and, ultimately, better outcomes.

Quality, Market Share and Occupancy

There is scant evidence that consumers have driven demand or market changes by choosing high-quality nursing homes. Nursing home demand is multifaceted and may be influenced by quality, health status, out-of-pocket expenses and family dynamics (Norton, 2000). A change in market share as a result of public reporting lends support to the use of public reporting to improve quality of care (Werner, Stuart & Polsky, 2010). If consumers respond to NHC by utilizing it's quality ratings data to choose high-quality nursing homes, then providers may be motivated to improve quality as a strategy to maintain or increase market share. Several studies were published after the launch of NHC to determine the relationship between NHC performance and nursing home market share. Overall, the studies revealed that NHC had little or no effect on market share. Some studies have concluded that nursing homes faced with greater competition in their markets tended to improve quality more than those in less competitive markets.

Werner, Stuart and Polsky (2010) examined MDS data for three publicly reported QM's from 2003-2005 and found that market share changed after the launch of NHC. A similar study published by Grabowski and Town (2011) utilized data from the MDS and OSCAR reports from 1999-2005 (before and after the launch of NHC), and it was concluded that NHC had very little impact on market share for low and high quality nursing homes. However, nursing homes in more competitive markets increased QM performance relative to nursing homes with greater market power after the launch of NHC. Unlike the pre/post study designs most commonly used, Grabowski and Town (2011) tested the effects of NHC using a control group likely unaffected by NHC that consisted of the six NHQI pilot states with differential timing for NHC introduction. This study was limited to the quality of services provided to long-stay residents at nursing homes. A later study by Werner and colleagues (2010) overcame this limitation by focusing only on post-acute care residents to control for market share changes that may otherwise be driven by difference in price and/or insurance acceptance and had mixed findings. Using MDS, OSCAR and the MedPAR file data from 2000-2003 (before and after the launch of NHC), it was found that there was a positive and significant relationship between quality and market share. Residents were more likely to choose high-quality facilities, but the magnitude of the effect was small.

However limited, the literature is mixed on whether the impact of NHC has driven changes in nursing home occupancy. Stevenson (2006) compared the occupancy rate of nursing homes with better vs. worse quality (measured by deficiencies and staffing) in a pre-/post-NHC comparison study. He found that the effect of NHC on nursing home occupancy rates was minimal between 1996-2002, although some estimates of effect

were statistically significant and positive. Castle, Engberg, and Liu (2007) found that NHC was more likely to impact quality improvement in nursing homes with the lowest occupancy rates, although the association was found to be weak.

In the nursing home industry, the competition between markets may differ significantly and significantly impact nursing home market share and occupancy. Some markets may have only one or two nursing homes, and may experience high demand where notably high occupancy and waiting lists are observed. In 2008, Castle, Liu and Engberg improved upon prior research by studying a longer time period from 2004-2006, analyzing a total of 15 post-acute and long-term QM's, and using more refined statistical methods, including controlling for regression to the mean. Consistent with their previous findings, they concluded that there was an association between nursing home quality and occupancy rates, especially for those with the lowest occupancy rates. Expanding upon their previous findings, they found that the greatest improvements in quality occurred in the most competitive markets.

Overall occupancy rates have declined in the United States in the last 25 years due to the growth of alternatives to nursing home care, including the growth of assisted living facilities, as well as home- and community-based services (Grabowski, 2008). In 2013, AHCA reported that between 2006-2013, with an average of 31 nursing homes per year, the overall occupancy rate has declined from 89% in 2007 to 86% in 2013. In order for nursing homes to stay afloat financially, they must attract and maintain private pay and Medicare residents.

Quality and Payor Mix

When analyzing financial performance, it is important to explore the proportion of private pay residents in overall occupancy for several reasons. First, the demand for nursing home care is associated with private pay census (Castle, 2005). Secondly, private pay resident reimbursement is much greater than Medicaid, Medicare and long-term care insurance reimbursement. According to the MetLife Market Institute (2012), the average private pay rate for a private room in a nursing home was \$248 daily or \$90,520 annually, and for a semi-private room, \$222 daily or \$81,030 annually.

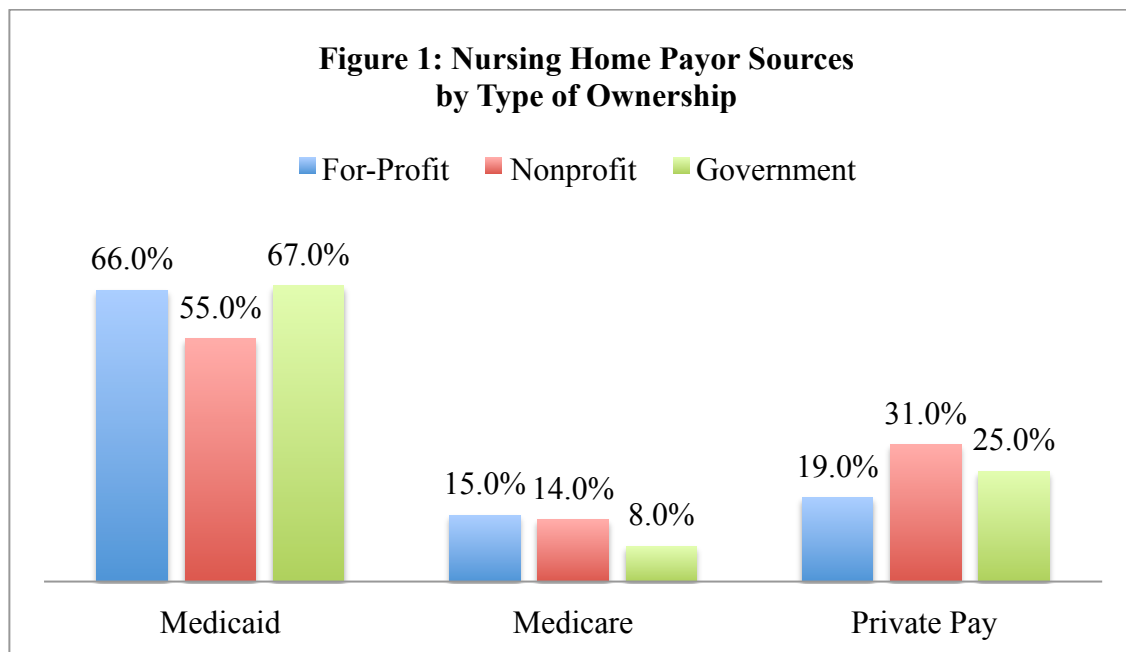
To increase revenues, nursing homes strategize to attract more private pay residents. Attracting a high proportion of private pay residents can prove to be highly lucrative and fruitful in efforts to achieve increase overall financial performance (Weech-Maldonado, Neff & Mor, 2003). There have been few studies to examine the relationship between nursing homes quality and private pay market share and the results are mixed. Weech-Maldonado, Neff & Mor (2003) found a positive but insignificant relationship between quality of care (defined by process and outcomes measures) and private pay market share in nursing homes. In contrast, Castle (2005) found that high-quality (defined by high QM scores) nursing homes experienced higher private pay census. It was also found that nursing homes could increase their private pay census by increasing quality.

Medicare is the second highest reimbursement in nursing homes. Medicare is provided to people age 65 and older, and provides only short-term, post-acute care coverage for up to 100 days of skilled nursing care (as long as the resident shows continued improvement from services). To qualify for Medicare coverage, one must have had a 3-night inpatient hospital stay and require daily skilled nursing care. Medicaid, health care coverage for people under the age of 65 who have disabilities and people 65

and older with low income, is the lowest reimbursement of all nursing home payors. In 2012, the average Medicaid payment rates were \$22.34 per resident per day less than the average nursing home's cost to provide services (AHCA Quality Report, 2012).

There are significant differences in payor mix among for-profit, nonprofit and government nursing homes. As illustrated in Figure 1, Medicaid is the most common form of reimbursement in nursing homes in all three types of ownership, representing more than half of the population in each. Government nursing homes have the highest percentage of Medicaid residents. Nonprofit nursing homes lead the industry in private payor residents. For-profit nursing homes have the highest percentage of Medicare residents and the lowest percentage of private payor residents (AHCA Quality Report, 2013).

Park, Konetzka and Werner (2011) found that nursing home that achieved high quality, as well as those that showed improvement after the launch of NHC reported increases in occupancy and Medicare days.



Quality and Profit

The literature is limited on the quality and profit financial performance relationship in nursing homes, and even more limited on how the relationship between financial performance and quality differed before and after NHC was launched. Weech-Maldonado, Neff and Mor (2003) examined data for nursing homes in the five states that participated in the Health Care Financing Administration's (HCFA) Multi-State Case Mix and Quality Demonstration in 1996 and found that high-quality (measured by QM's scores) nursing homes were associated with higher operating profit margins. Later in 2003, Weech-Maldonado, Neff and Mor expanded upon their previous research to determine the association between quality (including additional QM's and staffing) and operating profit margins. The findings of this study supported their previous findings.

Park and Werner (2010) furthered the findings in previous studies by using an extensive study period and more robust results from a ten-year panel data set that spanned before and after the launch of NHC. They found a modest association between quality (QM performance) and total profit margin. Parker, Konetzka and Werner (2011) found a positive but insignificant association between high-quality nursing homes (defined as all QM scores above the median) and higher total profit margins under NHC. The variations in the findings in these studies may have been due to the use of total profit margin as a measure of financial performance, rather the more commonly used operating profit margin.

Summary

The literature on the relationship between quality of care and financial performance has shown varied results. The inconsistent findings may be due to

methodological variations across the studies. The gaps in the literature may also be due to different definitions and measures of quality. Some studies used different structural, process and/or outcome measures to assess quality. Likewise, some studies used different measures for financial performance such as costs, revenues, total profit margin and/or operating profit margin. While resident-level demographic information may influence quality and should be risk-adjusted, some studies used case-mix (i.e., facility-level) data or did not include any adjustment for variations in patient acuity. The time periods of the studies also varied ranging from the inclusion of pre-/post-NHC data to an exclusive focus on post-NHC data.

Methodology

Overview

Nursing Home Compare (NHC) aims to improve quality of care in two ways: by increasing consumer demand for high-quality care; and incentivizing providers to compete on quality of care. By utilizing NHC when choosing a nursing home, consumers have access to information to guide their selection of a high-quality facility. This may result in increased consumer demand for high-quality care and motivate providers to compete for high performance ratings and differentiate themselves from competitors (Werner, Stuart, & Polsky, 2010).

This study sought to answer the question, “Is there an association between quality rating performance on Nursing Home Compare and financial performance in nursing homes?” The central research question was tested using the following hypothesis tests:

H₁: Nursing homes with higher quality ratings will report higher net resident revenues than those with lower quality ratings.

H₂: Nursing homes with higher quality ratings will report lower total operating expenses than those with lower quality ratings.

H₃: Nursing homes with higher quality ratings will report higher operating profit margins than those with lower quality ratings.

H₄: Nursing homes with higher quality ratings will report higher occupancy than those with lower quality ratings.

H₅: Nursing homes with higher quality ratings will report higher private payor census than those with lower quality ratings.

H₆: Nursing homes with higher quality ratings will report higher Medicare census than those with lower quality ratings.

Research Design

The study used a quantitative, non-experimental design. The data were drawn from CMS financial and NHC reports. Using archival data from an approved CMS data vendor was appropriate to analyze financial performance over several years. It was not possible to control the assignment of which nursing homes were under the Five-Star Quality Rating System because CMS requires all Medicare-certified nursing homes to participate in NHC. It was also not possible to conduct a prospective longitudinal study where nursing homes would be randomly assigned to experimental and control groups. Overall, the use of archival, quantitative data appeared to be the most feasible design. Financial performance data from 2010-2012 served as the base study period under the assumption that financial performance improvement resulting from NHC performance is more demonstrable after a one-year lag.

Data

The data for this study came from Medicare Cost Reports (<http://www.cms.gov/Research-Statistics-Data-and-Systems/Downloadable-Public-Use-Files/Cost-Reports/Cost-Reports-by-Fiscal-Year.html>) and NHC (<http://www.medicare.gov/nursinghomecompare>) data sets.

As all Medicare- and Medicaid-certified nursing homes are required to participate in NHC, financial performance in nursing homes was measured using Medicare Cost Reports. All Medicare-certified nursing homes are required to file cost reports annually in order to receive reimbursement for services provided to Medicare residents. Medicare Cost Reports contain unique provider numbers for each nursing home, information on facility characteristics, data on costs and charges by center (in total and for Medicare) and financial statement data. Although the Medicare Cost Reports are probably imperfect indicators of financial performance (Kane & Mangus, 2001), they are widely accepted as the primary source of financial data on Medicare-certified institutions (Bazzoli et al., 2007).

Nursing home quality was measured using the Five-Star Quality Rating System data sets. The NHC website includes a rating between one and five stars for each nursing home. Nursing homes with five stars are considered to have the highest quality and those with one star are considered to have the poorest quality. There is an overall quality rating for each nursing home that is a composite of three distinct ratings: 1) health inspections; 2) staffing; and 3) quality measures. NHC ratings are risk-adjusted based on resident case-mix to account for differences in the types of residents in facilities that may otherwise bias the staffing or quality measures ratings (CMS, 2008). Although the strengths and limitations of these measures continue to be debated, because these are

widely available and used for indexing the quality of a nursing home, for the purposes of this study, the reliability and validity of the quality ratings are not being evaluated.

Rather, the relationship between the publicly reported quality ratings and financial performance is being evaluated. The overall quality rating is used to determine quality in terms of all measures that are publicly reported after the launch of the Five-Star Quality Rating System on NHC.

Variables

Quality. To measure nursing home quality, the overall quality ratings reported in the Five-Star Quality Rating System on Nursing Home Compare were used from 2009-2011. Being that overall quality is a rolling rating that is updated monthly, those ratings most closely dated to the month of the cost report end date in the Medicare Cost Report were used for the analysis.

Financial Performance. Financial performance data was obtained from Medicare Cost Reports from 2010-2012. Three standard measures of financial performance were used: 1) net resident revenues; 2) total operating expenses; and 3) operating profit margin. In addition to the three standard financial performance measures used, this analysis also includes average occupancy, private payor census and Medicare census from Medicare Cost Reports between 2010-2012. Each of these variables was also obtained from Medicare Cost Reports. Table 5 shows the rationale for choosing each of the dependent variables, as well as the corresponding calculations.

Control Variables. Type of ownership, chain status, geographic divisions, staffing, and inflation were controlled. Type of ownership was obtained from Medicare Cost Reports and measured as for-profit or nonprofit status. Higher costs have been found

in nonprofit nursing homes (Rosko et. al, 1995). Also, differences in payor mix have been found between for-profit and nonprofit nursing homes. For-profit nursing homes have been found to have 13% more Medicaid residents and 2.4% more Medicare residents than nonprofit nursing homes. Nonprofit nursing homes are more likely to provide services to more private pay patients, approximately 8% more than for-profit nursing homes (AHCA Quality Report, 2012).

Chain status was obtained from Medicare Cost Reports and used to control for differences in nursing homes that are owned by chains and those that are not. Nursing homes that are part of chains may benefit from greater economies of scale, which are expected to result in lower cost and greater resources that can result in better management, staffing, education and technology.

Data was obtained from the United States Census Bureau (https://www.census.gov/geo/reference/gtc/gtc_census_divreg.html) to determine which of the nine census divisions (subcategories of the four census regions) each nursing home was assigned, based on geographic location. Census divisions are groupings of states and the District of Columbia that were used in this study to control for differing results between geographic locations which may be due to differences in population, the demand for nursing homes and competition. The nine census divisions are: 1) New England; 2) Middle Atlantic; 3) East North Central; 4) West North Central; 5) South Atlantic Division; 6) East South Central; 7) West South Central; 8) Mountain; and 9) Pacific.

Staffing ratings were obtained from NHC and used to account for differences in nurse staffing levels between nursing homes, which could impact costs, profit, efficiency and resident health outcomes.

As cost varies over time due to annual inflation, all cost data were inflation-adjusted using the U.S. Department of Labor Bureau of Labor Statistics Nursing Homes and Adult Day Services Consumer Price Index (CPI) (http://www.bls.gov/cpi/cpi_dr.htm). The inflation coefficient is a measure of the average change over time in healthcare services compared to a reference period. All financial data were normalized to the year 2013.

Table 5: Financial Performance Measures

Variable	Rationale	Calculation
Net Resident Revenues	Net resident revenues tell how much gross revenue is earned from services to nursing home residents.	Net resident revenues are the total revenue earned after the deduction of contractual adjustments, allowances for bad debts and charity care from the gross routine and ancillary services revenue.
Total Operating Expenses	Total operating expenses tells how much nursing homes invest in resident care.	Total operating expenses is the sum of all indirect, direct and ancillary costs associated with resident care
Operating Profit Margin	Operating profit margin is a ratio that tells of a nursing home's efficiency and accounts for net income related to resident care only as a proportion of operating (or net resident) revenues.	The operating profit margin is calculated by dividing net income (total expenses subtracted from total revenues) by net resident revenues.
Occupancy	Occupancy is a measure of increasing or decreasing resident volume.	Occupancy is calculated by dividing the total number of bed days (number of actual inpatient days billed annually) by the number of bed days available (maximum number of inpatient days that may be billed annually) per the Medicare certification
Private Payor Censur	As private payor reimbursement is much greater than Medicare and Medicaid reimbursement, private pay census greatly impacts net resident revenues. It is also a measure of demand for nursing home services.	Private payor census is calculated by dividing the number of "other" resident days (number of actual inpatient days billed annually for private insurance and out-of-pocket paying residents) by the total number of days (number of actual inpatient days billed annually).
Medicare Censur	As Medicare reimbursement is significantly higher than Medicaid reimbursement, Medicare census greatly impacts net resident revenues. Being that it pays the same across all nursing homes, Medicare census is also a measure of demand for nursing home services.	Medicare census is calculated by dividing the number of the Medicare resident days (number of actual inpatient days billed annually for Medicare residents) by the total number of days (number of actual inpatient days billed annually).

Sample

The sample consisted of all Medicare-certified, freestanding nursing homes in the United States. In accord with previous studies, hospital-affiliated nursing homes were

excluded as they tend to have different strategic goals, resident case mixes, marketing strategies, care practices and accounting systems and/or cost structures (Banaszak-Holl, Zinn, & Mor, 1996; Pizer, White, & White, 2002). The initial data set, merged from three sources (NHC, Medicare Cost Reports and United States Census Bureau), included 14,695 Medicare-certified, freestanding nursing homes in the United States. Nursing homes with incomplete data or inconsistent reporting between the years of the study (i.e., an NHC rating in 2009, but no Medicare Cost Report in 2010) were excluded from the study. Excluded cases numbered 4.63% percent of sample for 2010, 3.78% for 2011, and 3.23% for 2012. The final analytical file included 14,015 nursing homes in 2010; 14,139 nursing homes in 2011; and 14,221 nursing homes included in 2012.

Analysis

The purpose of this study was to determine the relationship between NHC performance and financial performance. NHC and financial performance data were obtained and analyzed. The years of the financial performance data (2010-2012) served as the base study period for data analysis. The assumption was that financial performance improvement resulting from NHC performance is more demonstrable after a 1-year lag. Therefore, the overall ratings examined were from 2009-2011.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 22 (King, Rosopa, & Minium, 2010). Because the interpretation of financial data can be difficult if dollars in one year are compared with dollars in another year, the financial data was adjusted using the annual Consumer Price Index. Specifically, a multiplier was used, which adjusted dollars to a common reference year of 2013.

Generalized linear models with a gamma transformation were the most appropriate analytical technique for the highly skewed nature of healthcare financial data. Adjusting for the non-normality of the data, the generalized linear models required the dependent variable to be strictly positive. In cases where nursing homes reported negative values for any of the three financial performance variables (net resident revenues, total operating expenses or operating profit margin), a constant was added that was approximately equal to the minimum value of each variable. If the minimum value for any dependent variable was zero, 0.01 was added. For all models, staffing ratings, type of ownership, chain status, and geographic divisions were used as control variables.

Results

The final dataset contained 14221 nursing homes. The sample included CMS-certified, freestanding skilled nursing facilities in the United States that participated in NHC from 2009-2011 and submitted Medicare Cost Reports from 2010-2012. There were 14,015 nursing homes in 2010; 14,139 nursing homes in 2011; and 14,265 nursing homes included in 2012.

Descriptive Statistics

Table 6 presents descriptive statistics for the independent variable, overall quality rating, as well as a covariate, the staffing rating, by calendar year. The benchmark for both the overall quality rating and the staffing rating is five stars (or a score of 50). Nursing homes have shown consistent improvement in quality, as indicated by the steady increase in the overall quality rating means from 2009-2011. Table 7 provides the descriptive statistics for all dependent variables (net resident revenues, total operating expenses, operating profit margin, occupancy, private payor census and Medicare

census). Table 8 explains the descriptive statistics for the other control variables used (type of ownership, chain status and geographic divisions).

Table 6: Descriptive Statistics for Overall Quality & Staffing Ratings, 2009-2011

	Year	N	Mean	Standard Deviation
Overall Quality Rating	2009	14015	28.529	13.7185
	2010	14139	30.0347	13.54350
	2011	14265	30.4262	13.52541
Staffing Rating	2009	14015	29.2101	15.04134
	2010	14139	30.7037	14.38438
	2011	14265	31.7378	14.53384

Table 7: Descriptive Statistics for Financial Performance Measures, 2010-2012

Variable	Year	N	Mean	Standard Deviation
Net Resident Revenues	2010	14015	12762060.00	58764735.60
	2011	14139	12313094.70	7969963.44
	2012	14265	8989144.33	8589683.45
Total Operating Expenses	2010	14015	9530990.11	8565126.25
	2011	14139	9465418.84	8368939.30
	2012	14265	9341558.65	9265265.86
Operating Profit Margin	2010	14015	21.03%	.71%
	2011	14139	678.31%	46661.78%
	2012	14265	129984.32%	1259.23%
Occupancy	2010	14015	85.72%	261.00%
	2011	14139	90.62%	500.237%
	2012	14265	85.22%	187.27%
Private Pay Census	2010	14015	31.70%	29.10%
	2011	14139	33.52%	31.82%
	2012	14265	31.27%	25.53%
Medicare Census	2010	14015	17.13%	16.10%
	2011	14139	17.78%	17.52%
	2012	14265	15.93%	14.71%

Table 8: Descriptive Statistics for Control Variables, 2010-2012

Variable	Year	Key	N	Percent
Type of Ownership	2010	For-Profit	10668	76.1%
		Nonprofit	2787	19.9%
		Government	560	4.0%
	2011	For-Profit	10750	76.0%
		Nonprofit	2826	20.0%
		Government	563	4.0%
	2012	For-Profit	10843	76.0%
		Nonprofit	2848	20.0%
		Government	574	4%
Chain Status	2010	Chain	9162	65.4%
		Not a Chain	4853	34.6%
	2011	Chain	9234	65.3%
		Not a Chain	4905	34.7%
	2012	Chain	9315	65.4%
		Not a Chain	4950	34.6%
Geographic Divisions	2010	1 New England	890	6.4%
		2 Middle Atlantic	1565	11.2%
		3 East North Central	2881	20.6%
		4 West North Central	1712	12.2%
		5 South Atlantic Division	2178	15.5%
		6 East South Central	1097	7.8%
		7 West South Central	1821	13.0%
		8 Mountain	453	3.2%
		9 Pacific	1418	10.1%
	2011	1 New England	889	6.3%
		2 Middle Atlantic	1569	11.1%
		3 East North Central	2919	20.6%
		4 West North Central	1739	12.3%
		5 South Atlantic Division	2205	15.6%
		6 East South Central	1111	7.9%
		7 West South Central	1820	12.9%
		8 Mountain	464	3.3%
		9 Pacific	1423	10.1%
	2012	1 New England	885	6.2%
		2 Middle Atlantic	1576	11.1%
		3 East North Central	2941	20.7%
		4 West North Central	1747	12.3%
		5 South Atlantic Division	2183	15.3%
		6 East South Central	1118	7.9%
		7 West South Central	1915	13.2%
		8 Mountain	471	3.3%
		9 Pacific	1429	10.0%

Statistical Modeling

For analysis of the quality ratings and financial performance, several models were constructed using SPSS. The initial model contained the net resident revenues as the dependent variable with the overall quality ratings from Nursing Home Compare, type of ownership, chain status, geographic divisions, and staffing as independent variables. The model was evaluated using Hosmer and Lemeshow goodness of fit and Concordance c statistics. Model fit was moderately high indicating important covariates had been included.

Additional models were then constructed using total operating expenses, operating profit margin, average occupancy, average private pay census, and average Medicare census as dependent variables with the same covariates as were included in the net resident revenue model. The following section describes the results of each model test by hypothesis. While adjustment for inflation used 2013 as a reference year, financial performance data from 2010-2012 served as the base study period under the assumption that financial performance improvement resulting from NHC performance is more demonstrable after a one-year lag.

H₁: Nursing homes with higher quality ratings will report higher net resident revenues than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. Also, for each year of the study, each set of variables had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). As indicated in Table 9, the estimated coefficient for quality ratings was found to

be positive and statistically significant ($B = .009, p < .01$) for 2010. Tables 10 and 11 show that the coefficients were not statistically significant for 2011 or 2012. Nursing homes with higher quality ratings were positively associated with higher net resident revenues in 2010, but there was no association found for 2011 or 2012.

Table 9: 2010 Parameter Estimates with Net Resident Revenues as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	16.232	0.0286	16.175	16.288	322383.396	0
[FiscalYearsDaysDum=0]	-0.195	0.0164	-0.228	-0.163	142.007	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.118	0.0217	0.075	0.161	29.43	0
[Division=2.0]	0.55	0.0192	0.513	0.588	819.066	0
[Division=3.0]	0.132	0.0166	0.099	0.164	63.226	0
[Division=4.0]	-0.36	0.0185	-0.396	-0.324	379.112	0
[Division=5.0]	0.134	0.0174	0.1	0.168	59.31	0
[Division=6.0]	-0.036	0.0204	-0.076	0.004	3.15	0.076
[Division=7.0]	-0.271	0.0181	-0.307	-0.236	224.11	0
[Division=8.0]	-0.109	0.0274	-0.162	-0.055	15.769	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.144	0.0096	-0.162	-0.125	225.659	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.046	0.0236	0	0.092	3.806	0.051
[ControlNew=2.00]	-0.044	0.0225	-0.088	0	3.801	0.051
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	0.009	0.0035	0.002	0.016	6.988	0.008
StaffingRating2009	0.004	0.0003	0.004	0.005	155.635	0

Table 10: 2011 Parameter Estimates with Net Resident Revenues as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	16.459	0.0248	16.411	16.508	440509.152	0
[FiscalYearsDaysDum=0]	-0.144	0.014	-0.171	-0.116	105.026	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.074	0.0185	0.038	0.11	16.074	0
[Division=2.0]	0.433	0.0164	0.401	0.465	699.685	0
[Division=3.0]	-0.097	0.0141	-0.125	-0.07	47.468	0
[Division=4.0]	-0.42	0.0156	-0.451	-0.389	723.041	0
[Division=5.0]	0.081	0.0147	0.052	0.109	30.008	0
[Division=6.0]	-0.077	0.0173	-0.111	-0.043	19.786	0
[Division=7.0]	-0.328	0.0154	-0.358	-0.297	451.943	0
[Division=8.0]	-0.136	0.0231	-0.181	-0.091	34.698	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.065	0.0081	-0.081	-0.049	65.206	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.079	0.02	0.04	0.118	15.632	0
[ControlNew=2.00]	-0.095	0.0191	-0.132	-0.057	24.703	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	-0.002	0.0003	-0.002	-0.001	28.436	0
StaffingRating2010	0.001	0.0003	0	0.002	12.043	0.001

Table 11: 2012 Parameter Estimates with Net Resident Revenues as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Lower	Upper	Wald Chi-Square	Sig.
(Intercept)	16.267	0.0331	16.202	16.332	241447.446	0
[FiscalYearsDaysDum=0]	-0.734	0.0184	-0.77	-0.698	1596.667	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.096	0.0245	0.048	0.144	15.34	0
[Division=2.0]	0.522	0.0217	0.479	0.564	578.377	0
[Division=3.0]	-0.138	0.0187	-0.175	-0.102	54.836	0
[Division=4.0]	-0.568	0.0207	-0.608	-0.527	754.256	0
[Division=5.0]	0.098	0.0195	0.059	0.136	25.062	0
[Division=6.0]	-0.133	0.0228	-0.178	-0.088	33.831	0
[Division=7.0]	-0.447	0.0203	-0.486	-0.407	483.599	0
[Division=8.0]	-0.182	0.0304	-0.241	-0.122	35.637	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.08	0.0107	-0.101	-0.059	55.826	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.06	0.0264	0.008	0.112	5.191	0.023
[ControlNew=2.00]	-0.181	0.0252	-0.231	-0.132	51.821	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	-0.002	0.0004	-0.003	-0.001	25.883	0
StaffingRating2011	0.001	0.0004	0	0.002	10.198	0.001

H₂: Nursing homes with higher quality ratings will report lower total operating expenses than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. Also, for each year of the study, each set of variables had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). As indicated in Tables 12-14, the estimated coefficient for quality ratings was

found to be negative and statistically significant ($p < .01$) for each of the three years of the study. Nursing homes with higher quality ratings were associated with lower total operating expenses in 2010-2012.

Table 12: 2010 Parameter Estimates with Total Operating Expenses as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	16.272	0.0469	16.18	16.364	120339.547	0
[FiscalYearsDaysDum=0]	-0.18	0.0267	-0.232	0.128	45.512	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.193	0.0353	0.124	0.262	29.931	0
[Division=2.0]	0.604	0.0313	0.543	0.666	373.442	0
[Division=3.0]	-0.086	0.0271	-0.139	0.033	10.087	0.001
[Division=4.0]	-0.542	0.03	-0.601	0.484	327.33	0
[Division=5.0]	0.174	0.0282	0.119	0.229	38.097	0
[Division=6.0]	-0.052	0.0331	-0.117	0.013	2.445	0.118
[Division=7.0]	-0.401	0.0294	-0.459	0.344	185.882	0
[Division=8.0]	-0.092	0.0444	-0.18	0.005	4.325	0.038
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.065	0.0156	-0.095	0.034	17.29	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.052	0.0384	-0.024	0.127	1.815	0.178
[ControlNew=2.00]	-0.291	0.0365	-0.362	0.219	63.267	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	-0.035	0.0057	-0.046	0.023	36.22	0
StaffingRating2009	0.004	0.0005	0.003	0.005	50.599	0

Table 13: 2011 Parameter Estimates with Total Operating Expenses as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	16.264	0.0445	16.177	16.352	133656.557	0
[FiscalYearsDaysDum=0]	-0.184	0.0252	-0.234	-0.135	53.483	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.116	0.0331	0.051	0.181	12.276	0
[Division=2.0]	0.542	0.0294	0.484	0.6	339.242	0
[Division=3.0]	-0.128	0.0253	-0.178	-0.079	25.761	0
[Division=4.0]	-0.576	0.028	-0.631	-0.521	423.051	0
[Division=5.0]	0.124	0.0264	0.072	0.176	22.126	0
[Division=6.0]	-0.095	0.031	-0.155	-0.034	9.309	0.002
[Division=7.0]	-0.435	0.0277	-0.489	-0.381	247.205	0
[Division=8.0]	-0.099	0.0414	-0.18	-0.018	5.714	0.017
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.051	0.0146	-0.08	-0.023	12.395	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.078	0.0359	0.007	0.148	4.652	0.031
[ControlNew=2.00]	-0.266	0.0343	-0.334	-0.199	60.386	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	-0.002	0.0005	-0.003	-0.001	16.799	0
StaffingRating2010	0.003	0.0005	0.002	0.004	35.507	0

Table 14: 2012 Parameter Estimates with Total Operating Expenses as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	16.289	0.0327	16.224	16.353	248007.184	0
[FiscalYearsDaysDum=0]	-0.739	0.0181	-0.774	-0.704	1665.746	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.131	0.0243	0.084	0.179	29.279	0
[Division=2.0]	0.539	0.0215	0.497	0.581	630.635	0
[Division=3.0]	-0.124	0.0185	-0.16	-0.087	44.563	0
[Division=4.0]	-0.569	0.0205	-0.609	-0.529	774.073	0
[Division=5.0]	0.128	0.0193	0.09	0.166	44.068	0
[Division=6.0]	-0.14	0.0226	-0.184	-0.095	38.142	0
[Division=7.0]	-0.438	0.0201	-0.477	-0.399	476.942	0
[Division=8.0]	-0.131	0.0301	-0.19	-0.071	18.737	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.055	0.0106	-0.076	-0.035	27.513	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.065	0.0261	0.014	0.116	6.25	0.012
[ControlNew=2.00]	-0.275	0.0249	-0.324	-0.227	122.319	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	-0.002	0.0004	-0.003	-0.001	29.541	0
StaffingRating2011	0.003	0.0004	0.002	0.004	66.407	0

H₃: Nursing homes with higher quality ratings will report higher operating profit margins than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. As indicated in Table 16, each set of variables in 2011 had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). Tables 15 and 17 show, however, that only the intercepts had a statistically

significant effect in 2010 and 2012. Table 15 also shows that the estimated coefficient for quality ratings was found to be positive, but not statistically significant for 2010 ($B = .000, p = .525$). For 2011, the coefficients were negative and statistically significant ($B = -.069, p < 0.05$). For 2012, the coefficients were negative and not statistically significant ($B = -2.75E-06, p = .896$). Nursing homes with higher quality ratings were not associated with higher operating profit margins between 2010-2012.

Table 15: 2010 Parameter Estimates with Operating Profit Margin as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Lower	Upper	Wald Chi-Square	Sig.
(Intercept)	3.049	0.0023	3.044	3.053	1781368.157	0
[FiscalYearsDaysDum=0]	-0.002	0.0013	-0.004	0.001	1.743	0.187
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.003	0.0017	-0.006	0.001	2.577	0.108
[Division=2.0]	0.001	0.0015	-0.002	0.004	0.325	0.569
[Division=3.0]	-0.001	0.0013	-0.004	0.001	0.704	0.402
[Division=4.0]	-0.001	0.0015	-0.004	0.002	0.658	0.417
[Division=5.0]	-0.001	0.0014	-0.004	0.002	0.579	0.447
[Division=6.0]	-0.004	0.0016	-0.007	0	5.028	0.025
[Division=7.0]	-0.003	0.0014	-0.006	-1.80E-05	3.891	0.049
[Division=8.0]	-0.004	0.0022	-0.008	0.001	2.634	0.105
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-4.58E-06	0.0008	-0.001	0.001	0	0.995
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	9.61E-05	0.0019	-0.004	0.004	0.003	0.959
[ControlNew=2.00]	0.001	0.0018	-0.002	0.005	0.401	0.527
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	0	0.0003	0	0.001	0.404	0.525
StaffingRating2009	-7.90E-05	2.58E-05	0	-2.85E-05	9.411	0.002

Table 16: 2011 Parameter Estimates with Operating Profit Margin as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	0.931	0.0114	0.909	0.953	6701.995	0
[FiscalYearsDaysDum=0]	1.589	0.0113	1.567	1.611	19739.544	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.747	0.0055	-0.758	-0.736	18292.797	0
[Division=2.0]	0.976	0.0061	0.964	0.988	25957.263	0
[Division=3.0]	0.912	0.0047	0.903	0.921	37157.036	0
[Division=4.0]	0.448	0.0049	0.439	0.458	8270.75	0
[Division=5.0]	0.615	0.0043	0.607	0.624	20147.801	0
[Division=6.0]	0.2	0.0047	0.19	0.209	1789.921	0
[Division=7.0]	11.626	0.1134	11.403	11.848	10502.466	0
[Division=8.0]	-0.099	0.007	-0.112	-0.085	196.284	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	1.947	0.0064	1.935	1.96	92878.146	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	1.143	0.0118	1.12	1.166	9388.079	0
[ControlNew=2.00]	0.116	0.0103	0.096	0.137	128.274	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	-0.069	0.0001	-0.069	-0.069	371102.345	0
StaffingRating2010	0.133	0.0002	0.133	0.134	694145.584	0

Table 17: 2012 Parameter Estimates with Operating Profit Margin as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	11.776	0.0018	11.772	11.779	43991259.23	0
[FiscalYearsDaysDum=0]	-0.001	0.001	-0.003	0.001	0.896	0.344
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	3.90E-05	0.0013	-0.003	0.003	0.001	0.976
[Division=2.0]	0	0.0012	-0.002	0.002	0.021	0.885
[Division=3.0]	0	0.001	-0.002	0.002	0.051	0.821
[Division=4.0]	0	0.0011	-0.002	0.002	0.008	0.928
[Division=5.0]	1.68E-05	0.0011	-0.002	0.002	0	0.987
[Division=6.0]	5.25E-06	0.0012	-0.002	0.002	0	0.997
[Division=7.0]	0	0.0011	-0.002	0.002	0.071	0.79
[Division=8.0]	4.56E-05	0.0016	-0.003	0.003	0.001	0.978
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	0	0.0006	-0.001	0.001	0.343	0.558
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	-0.001	0.0014	-0.003	0.002	0.125	0.724
[ControlNew=2.00]	0	0.0014	-0.003	0.003	0.012	0.912
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	-2.75E-06	2.10E-05	-4.40E-05	3.85E-05	0.017	0.896
StaffingRating2011	4.85E-06	2.02E-05	-3.47E-05	4.44E-05	0.058	0.81

H₄: Nursing homes with higher quality ratings will report higher occupancy than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. Also, in 2012, each set of variables had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). In 2011, the intercept had an insignificant effect in the model. The effect of the overall quality

rating of 2009 was found to be insignificant for occupancy in 2010. As indicated in Table 18, the estimated coefficient for quality ratings was found to be negative and not statistically significant ($B = -.003, p = .203$) for 2010. Table 19 shows that the coefficients were positive and statistically significant for 2011 ($B = .002, p < 0.05$), and Table 20 shows the same for 2012 ($B = .002, p < 0.05$). Nursing homes with higher quality ratings were positively associated with higher occupancy in 2011 and 2012, but there was no association found in 2010.

Table 18: 2010 Parameter Estimates with Occupancy as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	
			Lower	Upper	Wald Chi-Square	Sig.
(Intercept)	-0.215	0.0222	-0.259	-0.172	94.192	0
[FiscalYearsDaysDum=0]	-0.082	0.0125	-0.106	-0.057	42.568	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.068	0.0166	0.035	0.1	16.794	0
[Division=2.0]	0.066	0.0146	0.037	0.095	20.513	0
[Division=3.0]	0.096	0.0127	0.071	0.121	56.996	0
[Division=4.0]	-0.063	0.0141	-0.091	-0.035	20	0
[Division=5.0]	0.063	0.0132	0.037	0.089	22.927	0
[Division=6.0]	0.052	0.0156	0.022	0.083	11.197	0.001
[Division=7.0]	-0.196	0.0138	-0.223	-0.169	202.622	0
[Division=8.0]	-0.09	0.0209	-0.131	-0.049	18.545	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	0.059	0.0073	0.044	0.073	65.408	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.063	0.018	0.028	0.099	12.371	0
[ControlNew=2.00]	0.066	0.0171	0.033	0.1	15.077	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	-0.003	0.0027	-0.009	0.002	1.618	0.203
StaffingRating2009	-0.001	0.0003	-0.001	0	8.157	0.004

Table 19: 2011 Parameter Estimates with Occupancy as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	0.029	0.0297	-0.087	0.029	0.965	0.326
[FiscalYearsDaysDum=0]	0.133	0.0167	-0.165	-0.1	63.057	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.145	0.0219	-0.188	-0.102	43.99	0
[Division=2.0]	0.146	0.019	-0.183	-0.109	59.119	0
[Division=3.0]	0.057	0.0167	-0.09	-0.024	11.621	0.001
[Division=4.0]	-0.33	0.0183	-0.366	-0.294	323.359	0
[Division=5.0]	-0.14	0.0175	-0.174	-0.106	64.276	0
[Division=6.0]	0.155	0.0206	-0.196	-0.115	57.027	0
[Division=7.0]	0.422	0.0183	-0.458	-0.387	534.593	0
[Division=8.0]	0.274	0.0275	-0.327	-0.22	99.115	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	0.174	0.0097	0.155	0.193	321.94	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.331	0.0237	0.284	0.378	194.335	0
[ControlNew=2.00]	0.078	0.0226	0.034	0.122	11.91	0.001
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	0.002	0.0004	0.002	0.003	40.614	0
StaffingRating2010	0.005	0.0003	-0.006	-0.005	251.882	0

Table 20: 2012 Parameter Estimates with Occupancy as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	4.495	0.018	4.46	4.531	62209.284	0
[FiscalYearsDaysDum=0]	-.075	0.01	-0.095	-0.055	55.962	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.065	0.0134	0.038	0.091	23.259	0
[Division=2.0]	0.176	0.0117	0.153	0.199	225.159	0
[Division=3.0]	0.001	0.0102	-0.019	0.021	0.009	0.925
[Division=4.0]	-.057	0.0113	-0.079	-0.035	25.712	0
[Division=5.0]	0.048	0.0107	0.027	0.069	20.327	0
[Division=6.0]	0.099	0.0125	0.074	0.123	62.34	0
[Division=7.0]	-.175	0.011	-0.196	-0.153	249.8	0
[Division=8.0]	-.123	0.0166	-0.156	-0.09	54.675	0
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	0.031	0.0058	0.02	0.043	29.131	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	-.093	0.0144	-0.121	-0.064	41.234	0
[ControlNew=2.00]	-.094	0.0137	-0.121	-0.067	46.891	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	0.002	0.0002	0.002	0.003	112.266	0
StaffingRating2011	-.001	0.0002	-0.002	-0.001	49.817	0

H₅: Nursing homes with higher quality ratings will report higher private payor census than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. In 2012, each set of variables had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). However,

chain status and staffing did not have a statistically significant effect in the model in 2011. In 2010, staffing did not have a significant effect in the model. Tables 21-23 show that the estimated coefficient for quality ratings was found to be positive and statistically significant ($p < 0.05$) for all three years of the study. Nursing homes with higher quality ratings were positively associated with higher private payor census for all three years of the study.

Table 21: 2010 Parameter Estimates with Private Payor Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	-1.365	0.0441	-1.452	-1.279	959.731	0
[FiscalYearsDaysDum=0]	0.227	0.0253	0.177	0.277	80.482	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.035	0.0333	-0.1	0.03	1.108	0.293
[Division=2.0]	0.027	0.0291	-0.03	0.084	0.86	0.354
[Division=3.0]	0.238	0.0256	0.188	0.289	86.578	0
[Division=4.0]	0.382	0.0281	0.327	0.437	185.383	0
[Division=5.0]	0.136	0.0267	0.084	0.188	25.972	0
[Division=6.0]	0.169	0.0313	0.107	0.23	29.023	0
[Division=7.0]	-0.09	0.0277	-0.145	-0.036	10.629	0.001
[Division=8.0]	0.071	0.042	-0.011	0.153	2.846	0.092
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.042	0.0145	-0.071	-0.014	8.566	0.003
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.13	0.0363	0.059	0.201	12.878	0
[ControlNew=2.00]	-0.156	0.0343	-0.223	-0.089	20.741	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	0.052	0.0054	0.042	0.063	94.296	0
StaffingRating2009	0	0.0005	-0.001	0.001	0.562	0.453

Table 22: 2011 Parameter Estimates with Private Payor Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	-1.387	0.0446	-1.475	-1.3	969.192	0
[FiscalYearsDaysDum=0]	0.24	0.0256	0.19	0.291	87.932	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.037	0.0335	-0.102	0.029	1.203	0.273
[Division=2.0]	0.188	0.0295	0.13	0.245	40.39	0
[Division=3.0]	0.304	0.0257	0.254	0.354	139.749	0
[Division=4.0]	0.385	0.0282	0.33	0.44	186.528	0
[Division=5.0]	0.121	0.0268	0.069	0.174	20.549	0
[Division=6.0]	0.184	0.0315	0.123	0.246	34.284	0
[Division=7.0]	-0.046	0.0281	-0.101	0.009	2.701	0.1
[Division=8.0]	0.084	0.0419	0.002	0.166	4.009	0.045
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	0.01	0.0145	-0.019	0.038	0.449	0.503
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.124	0.0364	0.053	0.196	11.615	0.001
[ControlNew=2.00]	-0.144	0.0344	-0.211	-0.077	17.538	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	0.005	0.0005	0.004	0.006	85.421	0
StaffingRating2010	0.001	0.0005	0	0.002	2.293	0.13

Table 23: 2012 Parameter Estimates with Private Payor Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	3.149	0.0472	3.057	3.242	4449.929	0
[FiscalYearsDaysDum=0]	0.199	0.0267	0.147	0.251	55.697	0
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	0.073	0.0355	0.004	0.143	4.25	0.039
[Division=2.0]	0.08	0.0309	0.019	0.14	6.665	0.01
[Division=3.0]	0.338	0.0271	0.285	0.391	155.333	0
[Division=4.0]	0.484	0.0297	0.426	0.542	266.015	0
[Division=5.0]	0.14	0.0284	0.084	0.195	24.316	0
[Division=6.0]	0.206	0.0331	0.141	0.27	38.463	0
[Division=7.0]	0.001	0.0293	-0.057	0.058	0.001	0.978
[Division=8.0]	0.122	0.0441	0.035	0.208	7.589	0.006
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.02	0.0152	-0.05	0.01	1.769	0.183
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.093	0.0383	0.018	0.168	5.902	0.015
[ControlNew=2.00]	-0.217	0.0361	-0.288	-0.146	36.065	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	0.006	0.0006	0.005	0.007	102.417	0
StaffingRating2011	0.001	0.0005	0	0.002	5.714	0.017

H₆: Nursing homes with higher quality ratings will report higher Medicare census than those with lower quality ratings.

The omnibus tests revealed that the corresponding model outperformed the intercept model ($p < 0.05$) for each year between 2010-2012. Also, for each year of the study, each set of variables had a statistically significant effect in the model, including the overall quality rating, staffing, type of ownership, chain status and census divisions ($p < 0.05$). Tables 24-26 shows that the estimated coefficient for quality ratings was found to

be positive and statistically significant ($p < 0.05$) for all three years of the study. Nursing homes with higher quality ratings were positively associated with higher Medicare census between 2010-2012.

Table 24: 2010 Parameter Estimates with Medicare Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	-2.379	0.0373	-2.452	-2.306	4067.275	0
[FiscalYearsDaysDum=0]	-0.067	0.0215	-0.109	-0.025	9.833	0.002
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.177	0.0284	-0.233	-0.122	38.891	0
[Division=2.0]	-0.171	0.0249	-0.22	-0.122	47.118	0
[Division=3.0]	0.079	0.0219	0.036	0.122	13.006	0
[Division=4.0]	-0.311	0.0241	-0.358	-0.263	165.774	0
[Division=5.0]	0.102	0.0227	0.058	0.147	20.351	0
[Division=6.0]	0.024	0.0267	-0.029	0.076	0.777	0.378
[Division=7.0]	0.053	0.0237	0.007	0.1	5.059	0.025
[Division=8.0]	0.019	0.0359	-0.051	0.09	0.295	0.587
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.051	0.0124	-0.076	-0.027	17.136	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.296	0.0311	0.235	0.357	90.99	0
[ControlNew=2.00]	0.426	0.0294	0.368	0.484	209.374	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2009	0.023	0.0046	0.014	0.032	24.637	0
StaffingRating2009	0.007	0.0004	0.006	0.008	251.521	0

Table 25: 2011 Parameter Estimates with Medicare Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	-2.373	0.0381	-2.447	2.298	3880.102	0
[FiscalYearsDaysDum=0]	-0.038	0.0219	-0.081	0.005	3.05	0.081
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.088	0.0289	-0.145	0.031	9.272	0.002
[Division=2.0]	-0.059	0.0253	-0.109	0.009	5.44	0.02
[Division=3.0]	0.075	0.0221	0.032	0.118	11.496	0.001
[Division=4.0]	-0.298	0.0244	-0.346	-0.25	149.075	0
[Division=5.0]	0.129	0.023	0.084	0.175	31.77	0
[Division=6.0]	0.02	0.027	-0.033	0.073	0.54	0.463
[Division=7.0]	0.062	0.0241	0.015	0.109	6.594	0.01
[Division=8.0]	0.11	0.0361	0.039	0.181	9.289	0.002
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.075	0.0125	-0.099	-0.05	35.681	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.268	0.0313	0.207	0.329	73.342	0
[ControlNew=2.00]	0.412	0.0297	0.354	0.47	192.586	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2010	0.004	0.0005	0.003	0.005	58.797	0
StaffingRating2010	0.006	0.0004	0.005	0.007	175.53	0

Table 26: 2012 Parameter Estimates with Medicare Census as Dependent Variable

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test	Sig.
			Lower	Upper	Wald Chi-Square	
(Intercept)	2.1	0.0398	2.022	2.178	2785.727	0
[FiscalYearsDaysDum=0]	-0.058	0.0225	-0.102	-0.014	6.632	0.01
[FiscalYearsDaysDum=1]	0a	.	.	.	.	.
[Division=1.0]	-0.228	0.0302	-0.288	-0.169	57.348	0
[Division=2.0]	-0.178	0.0263	-0.229	-0.126	45.65	0
[Division=3.0]	0.02	0.023	-0.025	0.065	0.759	0.384
[Division=4.0]	-0.41	0.0255	-0.46	-0.36	259.187	0
[Division=5.0]	0.089	0.024	0.042	0.136	13.845	0
[Division=6.0]	-0.048	0.0281	-0.103	0.007	2.962	0.085
[Division=7.0]	-0.005	0.0249	-0.054	0.044	0.035	0.852
[Division=8.0]	0.038	0.0374	-0.036	0.111	1.02	0.312
[Division=9.0]	0a	.	.	.	.	.
[DumChain=0]	-0.049	0.013	-0.074	-0.024	14.259	0
[DumChain=1]	0a	.	.	.	.	.
[ControlNew=1.00]	0.319	0.0324	0.256	0.383	96.9	0
[ControlNew=2.00]	0.431	0.0308	0.371	0.491	196.067	0
[ControlNew=3.00]	0a	.	.	.	.	.
OverallRating2011	0.003	0.0005	0.002	0.004	33.008	0
StaffingRating2011	0.008	0.0005	0.007	0.009	313.566	0

Summary of Support/ Lack of Support of Hypotheses

Table 27 summarizes the results from the regressions that measured the relationship between quality rating performance on NHC and revenues, total operating expenses, operating profit margin, occupancy, Medicare census and private payor census. The information in the table provides evidence that there is an association between quality rating performance on Nursing Home Compare (NHC) and financial performance in nursing homes. The findings of this study revealed that high quality was correlated to

lower operating expenses, higher occupancy (over the latter two years of the study), private payor census and higher Medicare census, as evidenced in previous literature (Weech-Maldonado, Neff & Mor, 2003; Hicks et al., 2004; Castle, 2005; Park, Konetzka & Werner, 2011). This study did not find that high quality was associated with higher operating profit margins, which is not consistent with previous literature (Weech-Maldonado, Neff & Mor, 2003; Park & Werner, 2010; Park, Konetzka & Werner, 2011).

Table 27: Summary of Hypothesis Findings

Hypotheses:	Results:		
	2010	2011	2012
H1: Nursing homes with higher quality ratings will report higher net resident revenues than those with lower quality ratings.	Supported	Not Supported	Not Supported
H2: Nursing homes with higher quality ratings will report lower total operating expenses than those with lower quality ratings.	Supported	Supported	Supported
H3: Nursing homes with higher quality ratings will report higher operating profit margins than those with lower quality ratings.	Not Supported	Not Supported	Not Supported
H4: Nursing homes with higher quality ratings will report higher occupancy than those with lower quality ratings.	Not Supported	Supported	Supported
H5: Nursing homes with higher quality ratings will report higher private payor census than those with lower quality ratings.	Supported	Supported	Supported
H6: Nursing homes with higher quality ratings will report higher Medicare census than those with lower quality ratings.	Supported	Supported	Supported

Discussion

The purpose of this study was to determine the relationship between quality ratings as measured by Nursing Home Compare (NHC) performance and financial performance. It is important to explore this relationship because financial distress may

disrupt resident care or lead to nursing home closure, jeopardizing access to nursing home care and services (Castle, 2005). Sustaining a quality improvement program can be challenging for nursing homes with limited resources. With evidence that there is an association in high-quality ratings on Nursing Home Compare (NHC) and financial performance, operators will have additional incentive to continue to invest in quality improvement programs.

Limitations

This analysis was subject to several limitations. It was assumed that there is a causal pathway between nursing home quality and financial performance, but this is not known for certain. In terms of the counterfactual model for causal inferences (Shadish, Cook, & Campbell, 2002), it is unclear what the impact of the Five-Star Quality Rating System would be on financial performance for the same nursing homes if the system had not been implemented. Although there is financial data in the year prior to implementation, it is plausible that nursing homes would improve on financial performance simply as a function of time (cf. maturation in Shadish et al., 2002). Clearly, having a control group that is similar to the nursing homes used in the present study, but without the Five-Star Quality Rating System, would help to bolster inferences regarding the causal effect of the system on financial performance. Regarding temporal precedence, the assumed causal direction could be reversed (Shadish et al., 2002). That is, it is plausible that nursing homes that perform well financially would tend to achieve higher quality ratings.

It is also unknown whether providers strive to achieve high NHC ratings to improve financial performance. High-quality ratings could be reflective of nursing home

operators cherry-picking residents for admission that would likely have better outcomes and/or deliberately investing in only those quality measures that drive the NHC ratings. NHC ratings may not, therefore, reflect the most comprehensive assessment of quality.

Only freestanding nursing homes included on NHC (Medicare-certified) were examined. Hospital-based nursing homes or those not included on NHC may yield varying results due to differences in payor mix, ownership, staff and resident severity.

The analysis was limited to nursing homes that filed Medicare Cost Reports and those featured on NHC during the study period. The analysis is limited to the 4-year time period between 2009-2012, but a longer time period may be needed to determine if the results for quality ratings and financial performance are robust.

Although the study controlled for results between census divisions, competition at the county or zip codes levels may have had a greater impact on market share and occupancy and, therefore, financial performance.

While the data on NHC are the most widely accepted quality measures, there are other (unmeasured) QM's not addressed by this study that may have a significant effect on financial performance, such as staff turnover, activities programming and resident satisfaction. Nursing home charges for private pay residents vary substantially which may impact resident choice in selecting a provider, but this analysis does not include prices. This study examines whether quality improvement results in financial gains, but it does not explore the influences of resident choice, family or responsible party, hospital discharge planners, insurance status, location/convenience of the nursing home or physician recommendations. These limitations may limit the generalizability of the findings.

Implications for Future Research

The findings of this study open the door for future research, as this is the first documented study to examine the quality-financial performance relationship since the implementation of the Five-Star Quality Rating System on NHC. Some of the results of this study were consistent with previous literature (relationship between high-quality and lower total operating expenses, occupancy, private payor census, and Medicare census), but others were not (no correlation found between high-quality and higher revenues or higher operating profit margin).

This study provided a more comprehensive definition of quality than previous literature by utilizing the overall quality rating from NHC. This rating accounts for process, outcomes, and structural quality by grading performance in health inspections, staffing, and quality measures. However, further research is needed to include other measures of quality that are not included in NHC, including resident satisfaction and staff turnover.

More research is needed to further examine the relationship between nursing home quality and operating profit margins. This study found that high quality was correlated to lower expenses and higher market share, but the correlations between quality and revenues, as well as quality and operating profit margin were not supported. One would assume that higher market share, especially for private payor and Medicare, would lead to greater revenue. Additional research should examine the impact of private payor rates and pricing. Also, further research is needed to determine whether nursing homes that achieve high quality are cherry-picking prospective residents that require less

care or lower-costing care, resulting in lower revenue and higher Medicare or private payor market share.

Future research should explore the causality in the quality-financial performance relationship more in depth for low-quality nursing homes and those that have worsened in quality over time. Slimmer profit margins associated with low quality could further exacerbate the challenges of operating with limited resources and lead to poor outcomes, greater regulatory noncompliance, and increased financial distress in nursing homes. This future research is necessary to determine the financial performance thresholds for low-quality nursing homes that may indicate the likelihood of nursing home closures.

There are currently no longitudinal studies on the relationship between public report cards and financial performance in nursing homes. Longitudinal studies are needed to take a closer look at causality between the quality-financial relationship.

Implications for Nursing Home Operators

This study also provides evidence that nursing home operators that invest in quality improvement can expect a return on investment by way of increased market share, even if incremental levels, and not the highest level, of quality are achieved. Moreover, by analyzing the beta coefficients in the results of this study, it was found that for each star that a nursing home increases in overall quality ratings (and all other variables constant), the expected results are a decrease in total operating expenses by an exponential multiplicative factor of .002, an increase in occupancy by an exponential multiplicative factor of .002, an increase in private payor census by an exponential multiplicative factor of .006, and an increase in Medicare census by an exponential multiplicative factor of .002.

Given the findings of this study on the correlation between quality and private payor census, nursing home operators should consider increasing private payor rates to increase revenue. Prospective private payor residents have been found to shop for higher quality and may be more likely to pay for higher quality.

By achieving higher quality, nursing home operators would attract both private payor and Medicare residents. By attracting more prospective residents, nursing home operators will be privileged with the ability to cherry-pick prospective residents that require less care or those with lower costs of care.

Policy Implications

Despite the limitations of this study, the results provide important implications for policymakers. With the evolution of the policy, nursing homes have shown consistent improvements in quality year after year. It was also found that NHC has been effective as a quality improvement policy that incentivizes high-quality performance. However, the findings also reveal the potential for a negative consequence of the policy where a greater wedge may be driven between high- and low-quality nursing homes. The results of this study find that those with high-quality performance ratings on NHC are, in fact, able to attract more Medicare and private payor residents. Low-quality nursing homes, on the other hand, are more likely to provide care to more Medicaid residents for which they would receive the lowest reimbursement rate for services provided. As a result, low-quality nursing homes would experience greater challenges to be able to afford to maintain adequate resources to provide quality care (i.e. staffing, supplies and equipment). Without the affordability to invest in quality improvement, low-quality nursing homes would have the looming threat of nursing home closure, which may

ultimately lead to furthering disparities by decreasing accessibility to nursing home care. As nursing home report cards continue to evolve, policymakers should be conscientious of these implications to ensure that low-quality nursing homes have the necessary resources to improve quality of care.

This study found that high-quality nursing homes report lower total operating expenses, but no correlation was found between quality and revenues. Future research is needed to examine the latter relationship and the differences in resident acuity between high- and low-quality nursing homes. The peculiarity of results of this study leave room for speculation that NHC as a policy may also yield the negative consequence of leaving the most acute and costly residents for lower quality nursing homes. If this is so, the lowest quality nursing homes may be forced out of business by their higher-achieving competitors, as they would likely not be able to afford to provide care to the indigent. The negative outcomes of NHC as quality improvement tool would include the increased risk of the nation's poorest and most-dependent seniors having to resort to the worst nursing homes for care, or experiencing lack of access to nursing home care due to closure.

Recommendations for Policymakers

The findings of this study indicate that NHC is effective in driving market share. High-quality nursing homes attract and admit more prospective residents with the highest reimbursement (Medicare or private payor). Low-quality nursing homes, on the other hand, have higher populations of residents with inadequate or no healthcare coverage. As a result, low-quality nursing homes face a greater challenge to maintain financial viability and a higher risk of nursing home closure under the policy. A nursing home that is not able to maintain overall census or a healthy payor mix may not be able to make the

continued investment in quality improvement. It is recommended that policymakers develop a means to ensure that the less competitive, low-quality nursing homes have the necessary resources to improve quality of care. To minimize the risk of low-quality nursing homes folding financially and to also minimize the risk of lack of access to nursing home services for the indigent, policymakers should implement a reimbursement rate adjustment for nursing homes that care for a high percentage of indigent residents with inadequate or no healthcare coverage. Also, state health policies should be advanced to mirror the efforts of NHC to subsidize the care of residents that are highly acute and costly with an adjusted reimbursement rate, based on case-mix. To ensure that low-quality nursing homes continue to invest in quality, the rate adjustments should be contingent on performance. Nursing homes should receive performance-based reimbursement if quality outcomes are achieved, based on evidence-based thresholds.

The effectiveness of NHC as a policy is dependent on utilization by consumers to make a selection for a nursing home. Nursing home report cards have evolved over the thirteen years since initial publication to improve user-friendliness and usefulness, but the literature does not show that the web site is fully utilized in the long-term care community. Policymakers should be cognizant of ways to continuously promote and encourage the use of NHC. It is recommended that policymakers incentivize hospitals for collaborating with nursing homes to increase NHC utilization through shared accountability. Hospitals should be encouraged and incentivized for being a key stakeholder involved in not only referring and discharging patients from hospitals to nursing homes, but also making sure that patients (or their responsible parties) are well-informed on NHC quality ratings and data for each of the different nursing homes. For

example, hospital personnel should educate patients on NHC data and refer a patient to nursing homes within a specific geographic area that have high quality ratings. If the accountability is shared between the two healthcare settings, NHC will be more widely utilized, patients will be more informed of report cards and quality ratings, and the competition on quality between nursing homes may continue to increase.

Further policy development should ensue to offer a more comprehensive measure of quality and increased value to consumers. Policymakers should solicit the input/feedback of prospective residents, their responsible parties and case managers/discharge planners to determine what additional measures can be added to NHC to increase value, such as customer satisfaction survey scores and staff retention rates.

Currently nursing home report cards can only be accessed online and in English. Policymakers should increase utilization of NHC by identifying ways to educate seniors who are computer illiterate or lack Internet access, as well as those who speak a language other than Spanish. Nursing home report card information should also be distributed in alternative forms, such as via a routine printed publication.

Conclusions

Since the implementation of nursing home report cards, many nursing home operators have wondered whether high quality nursing homes ratings have better financial performance. Several studies have attempted to examine the direct and indirect incentives for quality improvement investments and achieving or maintaining high quality under nursing home report cards. As discussed in the literature review, the results are mixed. In the interest of contributing to the literature regarding the question, this

study was designed to determine the relationship between quality rating performance on NHC and financial performance in nursing homes.

A thorough review of the literature showed that NHC performance had a significant relationship with higher quality, lower costs and greater profit. However, the literature was inconclusive on the relationship between NHC performance and revenues, occupancy, and Medicare and private payor market share. Using secondary data from Nursing Home Compare and Medicare Cost Reports, this study evaluated the overall quality rating and financial performance of 14,015 – 14,265 nursing homes between 2009-2012 (sample varied per year). Generalized linear models indicated an association high quality rating performance on NHC and financial performance. Specifically, it was found that high-quality ratings were correlated to lower total operating expenses, higher occupancy (for the last two years of the study), higher private payor census, and higher Medicare census.

The findings of this study are significant as the utilization of NHC by prospective nursing home residents continues to increase, and nursing home operators are increasingly investing in quality improvement. Realizing the limitations and the policy implications of the findings of this study makes way for future research of the hypotheses with additional performance variables, such as resident satisfaction, as well as additional controls.

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