



Research Article

Evaluation of the Quality and Efficiency of Nursing Home Services in the United States using the Nursing Home Star Rating System

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Received: December 11, 2025 **Revised:** January 16, 2026 **Accepted:** January 22, 2026 **Published:** January 28, 2026

Abstract

Objective: Grounded in strategic management theory, this study examined the organizational characteristics and financial performance metrics associated with Centers for Medicare & Medicaid Services (CMS) star ratings across four domains: overall rating, staffing, quality measures, and health inspection.

Methods: We analyzed 9,645 nursing homes using the 2023 CMS Medicare cost reports merged with the Nursing Home Care Compare data. Eight binary logistic regression models examined two outcomes per domain: facilities achieving high ratings (4-5 stars) versus lower ratings (1-3 stars), and facilities achieving the highest rating (5 stars) versus all others.

Results: The bad debt ratio was consistently negatively associated with star ratings across all domains, with the strongest effects in staffing ratings (Odds ratio=0.66 for 4-5 stars; odds ratio=0.43 for 5 stars). Government facilities outperformed for-profit and non-profit facilities in staffing ratings. Nonprofit corporations showed higher odds of achieving high-quality measure ratings. Urban locations were positively associated with overall and health inspection ratings but negatively associated with quality measure ratings. Admissions per bed were positively associated with high ratings across all domains.

Conclusion: Strategic management theory provides a framework for understanding variations in nursing home performance. Financial stability has emerged as a foundation for quality outcomes. Ownership structure shaped domain-specific performance patterns reflecting different strategic orientations. Healthcare systems seeking post-acute care (PAC) partners should conduct domain-specific analyses rather than relying solely on composite scores. Policymakers should target interventions for financially distressed facilities and increase the regulatory scrutiny of ownership conversions.

Keywords: United States Nursing homes, Centers for Medicare & Medicaid Services overall star ratings, nursing home quality, nursing home ownership structure

Citation: Harrison JP, Hamadi HY, Zhao J, Harrison D. Evaluation of the Quality and Efficiency of Nursing Home Services in the United States using the Nursing Home Star Rating System. *J Mod Nurs Pract Res*, 2026; 6(1): 2. DOI: 10.53964/jmnpr.2026002.

1 INTRODUCTION

As the longevity of Americans increases and the number of baby boomers reaching retirement grows, the demand for post-acute care (PAC) services will increase. The greatest number of PAC services are nursing homes, making the need for efficiency and quality a priority in these settings. There are about 14,827 Medicaid and/or Medicare-certified nursing homes serving approximately 1.4 million residents^[1]. The healthcare system for PAC in the U.S. comprises a variety of structural settings, including for-profit, non-profit, government-owned, and privately owned. This lack of a consistent structure leads to the question of how structure, location, and size impact quality and overall CMS star ratings.

Nursing homes alone accounted for approximately \$211.3 billion in healthcare expenditures in 2023^[2]. As the need for institutional care grows, ensuring both the quality and efficiency of nursing home services has become a national priority^[3]. Nursing homes serve a dual role, they provide short-term PAC following hospital discharge and long-term custodial care for individuals unable to live independently^[4]. In 2018, one-fifth of hospitalized Medicare beneficiaries were discharged to a skilled nursing facility (SNF), costing Medicare \$28.5 billion^[5]. And, in 2021, Medicare made payments to short-term skilled nursing and rehabilitation services after an inpatient stay for about 1.2 million beneficiaries^[5]. The quality of care in these facilities can be evaluated through different measures, including but not limited to, staffing adequacy, compliance with federal and state guidelines, and performance on clinical quality measures^[6].

Starting in 2008, the Center for Medicare and Medicaid Services (CMS) began publicly publishing data from its five-star quality rating system for nursing homes participating in Medicaid or Medicare. CMS reports on the overall star rating, which is based on three domains: staffing rating, quality measures, and health inspection rating. The program has two main aims. The first is to provide consumers with an easy-to-understand "snapshot" of a nursing home's quality to help them compare facilities and make informed decisions for themselves or their loved ones. The second, this quality transparency incentivizes nursing homes to improve their care, leading to better health outcomes for resident^[7].

Variation in the quality of care provided in nursing homes have been documented in prior research to be linked

to organizational factors. Prior research have found that nursing homes in more competitive areas had a greater odds of improving in some quality measures^[8-10]. Recent research also documented three patterns in rural nursing homes (1) they employed fewer staff, (2) End-of-life care quality was worse and (3) High star ratings were less common^[11-13]. However, prior studies have not examined the moderating effect of the geographic location of nursing homes on their five-star quality rating. It is generally understood that to improve quality, financial resources are needed^[14].

Financial efficiency reflects a nursing home's ability to optimize financial and operational resources while simultaneously maintaining quality of care^[15]. Prior research has examined the impact of cost efficiencies in nursing home via the lens of competition^[2], however, limited research as taken into account quality and to our knowledge no study had examined the financial well-being of nursing homes as it relates the five-star quality rating program and accounting for differences in nursing home characteristics^[16-18]. Thus, this study estimates the financial well-being of nursing homes and investigates its association with five-star quality ratings across its domains.

2 THEORETICAL FRAMEWORK

This study is grounded in strategic management theory, which emphasizes the importance of positioning a healthcare organization relative to its environment to achieve its objectives and ensure its survival. It provides a comprehensive framework for understanding how healthcare organizations position themselves within a dynamic environment to achieve performance objectives^[19]. Nursing homes like other healthcare organizations, develop a strategic plan to be profitable, provide excellent patient care, and better meet community needs. Such a plan is required by the board of directors and is consistent with the organization's mission, vision, and values, and is measured using key performance indicators, such as a five-star rating, to evaluate ongoing performance. Strategic management theory believes that there is no single best way to manage complex healthcare organizations^[20].

Strategic Management Theory is relevant to nursing homes because they operate in a complex continuum of care and face political and stakeholder pressures for increased transparency, cost-effectiveness, and patient-centered outcomes. Therefore, there is a need for nursing homes to set strategic goals to adopt and maintain financial viability and improved quality of care^[21]. The transparent

nature of quality of care through the five-star quality rating system adds an additional need for strategic direction to improve quality and maintain high “five-star” nursing facilities. Strategic management provides an integrated approach to assessing the environment, developing strategies, implementing programs, and evaluating results. Additionally, it helps design organizational structures and processes for future success^[22].

3 MATERIALS AND METHODS

Data from the 2023 Centers for Medicare & Medicaid Services (CMS) Medicare cost reports were merged with CMS Nursing Home Care Compare Quality data using facility provider identification codes. The cost reports contain comprehensive financial and operational information on nursing homes. The Nursing Home Care Compare data contain summary information about each nursing home, including measures of facility structure, nursing staff levels, and star ratings. The information is updated regularly by the CMS and contains the most recent publicly available information regarding nursing home facilities.

3.1 Outcome Variables

This study examined four outcome variables from the CMS star ratings. Each outcome used an ordinal scale ranging from one star (lowest quality) to five stars (highest quality). The overall Rating represents a comprehensive quality assessment that combines multiple performance domains. Staffing Rating measures the adequacy of nursing staff levels relative to the resident needs. The Quality Measure Rating reflects clinical quality indicators, including rehospitalization rates, pressure ulcer prevalence, and medication management. Health inspection ratings capture deficiency citations from state survey agencies. Two binary outcome variables were created for each domain. The first compared facilities with high ratings (4 or 5 stars) to those with lower ratings (1, 2, or 3 stars). The second compared facilities achieving the highest rating (5 stars) with all other facilities (1, 2, 3, or 4 stars).

3.2 Independent Variables

The nursing home organizational characteristics in this study were ownership type (for-profit, nonprofit, or government) and location (urban/rural). The operational characteristics were admissions per bed, number of certified beds, case mix Registered Nurse (RN) staffing hours per resident, and length of stay. For financial performance, the study included current ratios (current assets/current liabilities), cash position (cash and cash equivalents/total assets), days in account receivable ((accounts receivable/average daily revenue)×365), asset turnover (total revenue/total assets), and bad debt ratio ((bad debt expense/total revenue)×100).

3.3 Statistical Approach

The final sample consisted of 9,645 nursing homes in

the United States. Facilities with missing values for key variables or incomplete reporting periods were excluded. Descriptive statistics were calculated using frequencies and percentages for categorical variables and means with standard deviation (SD) for continuous variables. We tested all the variables for multicollinearity. Eight separate logistic regression models were estimated for each binary outcome across the four-star rating domains. We conducted model diagnostics to ensure that all the logistic regression assumptions were met. These included tests for multicollinearity using variance inflation factors (VIFs) <10, examination of influential observations using Cook's distance, and assessment of model fit using the Hosmer-Lemeshow goodness-of-fit test. Model fit was assessed using the pseudo R-squared, Akaike Information Criterion, and Bayesian Information Criterion. Results are reported as odds ratios (ORs) with 95% confidence intervals (CIs). All analyses were performed using Stata 17MP.

4 RESULTS

The final sample comprised 9,645 nursing homes. Table 1 presents descriptive statistics for financial and operational characteristics. Nursing homes demonstrate considerable variability in their financial performance. The mean current ratio was 4.61 (SD=241.55), with values ranging from -593.50 to 23,700.81. The mean cash position was 9.32 (SD=855.08). Days in accounts receivable averaged 162.61 days (SD=1,379.36). Asset turnover averaged 6.23 (SD=38.54). Bad debt ratio averaged 0.01 (SD=0.01) with a maximum of 0.63. Operational characteristics also varied across facilities. Case-mix RN staffing hours per resident day averaged 0.39 (SD=0.10). Admissions per bed averaged 2.87 (SD=2.47). Average length of stay was 159.16 days (SD=292.47). Number of certified beds averaged 113.11 (SD=54.66) ranging from 16 to 816 beds.

Table 2 presents the frequency distributions of the outcome variables and categorical characteristics. For overall star ratings, 2,977 facilities (30.87%) achieved high ratings of 4-5 stars while 6,668 (69.13%) had ratings of 1-3 stars. Only 1,307 (13.55%) achieved the highest 5-star rating. Staffing ratings showed similar patterns, with 2,183 facilities (22.63%) achieving 4-5 stars and only 449 (4.66%) achieving 5 stars. Quality measure ratings were more evenly distributed, with 4,862 facilities (50.41%) achieving 4-5 stars and 2,437 (25.27%) achieving 5 stars. Health inspection ratings showed that 2,791 facilities (28.94%) achieving 4-5 stars and 741 (7.68%) achieved 5 stars.

4.1 Overall Star Rating

Table 3 displays the logistic regression results for overall star ratings. For the 4–5-star outcome, current ratio was associated with achieving high ratings however it had an effect size close to 1 (OR=1.02, 95% CI: 1.01, 1.03). Cash position was also associated with high ratings but had an effect size close to 1 (OR=0.99, 95% CI: 0.99, 1.00). Bad

Table 1. Descriptive Statistics for Financial and Operational Characteristics (N=9,645)

Variable	Mean	SD	Min	Max	N
Current Ratio	4.61	241.55	-593.50	23,700.81	9,645
Cash Position	9.32	855.08	-69.62	83,976.49	9,645
Days in Account Receivable	162.61	1,379.36	-905.59	51,000.30	9,645
Asset Turnover	6.23	38.54	-808.74	2,543.30	9,645
Bad Debt Ratio	0.01	0.01	0.00	0.63	9,645
Case-Mix RN Staffing HPRD	0.39	0.10	0.18	1.92	9,645
Admissions per Bed	2.87	2.47	0.00	37.52	9,645
Average Length of Stay	159.16	292.47	0.98	25,291.00	9,645
Number of Certified Beds	113.11	54.66	16.00	816.00	9,645

Notes: HPRD=Hours Per Resident Day. Current Ratio=current assets / current liabilities; Cash Position=cash and cash equivalents / total assets; Bad Debt Ratio=bad debt expense / total revenue.

Table 2. Frequency Distribution of Outcome Variables and Categorical Characteristics (N=9,645)

Variable	No.	%
Overall Star Rating		
4-5 Stars	2,977	30.87
1-3 Stars	6,668	69.13
5 Stars	1,307	13.55
1-4 Stars	8,338	86.45
Staffing Rating		
4-5 Stars	2,183	22.63
1-3 Stars	7,462	77.37
5 Stars	449	4.66
1-4 Stars	9,196	95.34
Quality Measures Rating		
4-5 Stars	4,862	50.41
1-3 Stars	4,783	49.59
5 Stars	2,437	25.27
1-4 Stars	7,208	74.73
Health Inspection Rating		
4-5 Stars	2,791	28.94
1-3 Stars	6,854	71.06
5 Stars	741	7.68
1-4 Stars	8,904	92.32
Ownership Status		
Government	590	6.12
For profit - Corporation	4,838	50.16
For profit - Individual	433	4.49
For profit - LLC	2,174	22.54
For profit - Partnership	377	3.91
Non-profit - Corporation	1,233	12.78
Nursing Home Location		
Urban	7,033	72.92
Rural	2,612	27.08

Notes: Outcome variables represent binary classifications for logistic regression analysis. 4-5 Stars indicates facilities achieving high ratings; 5 Stars indicates facilities achieving the highest rating. No.=Sample size, %=Percent

Table 3. Logistic Regression Results for Overall Star Rating

	4-5 Star		5 Star	
	OR	95% CI	OR	95% CI
Current Ratio	1.02***	[1.01, 1.03]	1.01*	[1.00, 1.01]
Cash Position	0.99***	[0.99, 1.00]	1.00*	[1.00, 1.00]
Days in Account Receivable	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Bad Debt Ratio	0.81***	[0.77, 0.84]	0.70***	[0.66, 0.76]
Asset Turnover	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Ownership (Ref=Government)				
For profit - Corporation	0.99	[0.82, 1.20]	1.02	[0.79, 1.32]
For profit - Individual	1.40*	[1.06, 1.85]	1.08	[0.73, 1.58]
For profit - LLC	0.89	[0.73, 1.09]	0.91	[0.70, 1.19]
For profit - Partnership	0.96	[0.72, 1.28]	0.89	[0.60, 1.32]
Non-profit - Corporation	0.83	[0.66, 1.03]	0.76	[0.57, 1.02]
Location (Ref=Rural)				
Urban	1.21***	[1.09, 1.35]	1.16*	[1.00, 1.35]
Admissions per Bed	1.15***	[1.12, 1.17]	1.16***	[1.13, 1.19]
SNF Average Length of Stay	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Number of Certified Beds	1.00***	[0.99, 1.00]	0.99***	[0.99, 1.00]
Case-Mix RN Staffing HPRD	0.55*	[0.33, 0.93]	0.40*	[0.19, 0.85]
Observations	9,645		9,645	
Pseudo R-squared	0.045		0.066	

Notes: OR=Odds ratio (exponentiated coefficients); 95% CI=confidence intervals and are in brackets. * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

debt ratio was negatively associated with high overall ratings (OR=0.81, 95% CI: 0.77, 0.84). Nursing homes located in urban settings (OR=1.21, 95% CI: 1.09, 1.35) and those with higher admissions per bed (OR=1.15, 95% CI: 1.12, 1.17) had higher odds of achieving 4–5-star ratings. Lastly, number of certified beds was associated with an effect size close to 1 (OR=1.00, 95% CI: 0.99, 1.00).

For the 5-star outcome, current ratio (OR=1.01, 95% CI: 1.00, 1.01) and cash position (OR=1.00, 95% CI: 1.00, 1.00) were positively associated with achieving 5-star ratings but had an effect size close to 1. Bad debt ratio was negatively associated (OR=0.70, 95% CI: 0.66, 0.76) with achieving 5-star ratings. Urban location (OR=1.16, 95% CI: 1.00, 1.35) and admissions per bed (OR=1.16, 95% CI: 1.13, 1.19) were positively associated with achieving 5-star ratings. Lastly, both number of certified beds (OR=0.99, 95% CI: 0.99, 1.00) and case-mix RN staffing hours per resident (OR=0.40, 95% CI: 0.19, 0.85) were negatively associated with achieving 5-star ratings with effect sizes close to 1.

4.2 Staffing Rating

Table 4 displays the logistic regression results for staffing ratings. For the 4–5-star outcome, days in accounts receivable was associated with achieving high staffing ratings however it had an effect size close to 1 (OR=1.00, 95% CI: 1.00, 1.00). Bad debt ratio was negatively associated with high staffing ratings (OR=0.66, 95% CI:

0.63, 0.70). Compared to government facilities, for-profit individual ownership (OR=0.43, 95% CI: 0.28, 0.66), for-profit limited liability companies (OR=0.65, 95% CI: 0.51, 0.82), for-profit partnerships (OR=0.44, 95% CI: 0.30, 0.63), and non-profit corporations (OR=0.65, 95% CI: 0.50, 0.84) all had lower odds of achieving high staffing ratings. Nursing homes located in urban settings (OR=1.19, 95% CI: 1.04, 1.35) and those with higher admissions per bed (OR=1.22, 95% CI: 1.20, 1.25) had higher odds of achieving 4-5 star staffing ratings. Lastly, number of certified beds (OR=1.00, 95% CI: 1.00, 1.00) was associated with an effect size close to 1, while case-mix RN staffing hours per resident was negatively associated (OR=0.00, 95% CI: 0.00, 0.00) with achieving high staffing ratings.

For the 5-star staffing outcome, current ratio (OR=1.01, 95% CI: 1.00, 1.01) and cash position (OR=1.00, 95% CI: 1.00, 1.00) were positively associated with achieving 5-star staffing ratings but had effect sizes close to 1. Bad debt ratio was negatively associated (OR=0.43, 95% CI: 0.36, 0.51) with achieving 5-star staffing ratings. Compared to government facilities, for-profit limited liability companies (OR=0.46, 95% CI: 0.29, 0.72), for-profit partnerships (OR=0.14, 95% CI: 0.05, 0.38), and non-profit corporations (OR=0.34, 95% CI: 0.21, 0.55) had lower odds of achieving 5-star staffing ratings. Admissions per bed (OR=1.19, 95% CI: 1.15, 1.23) was positively associated with achieving 5-star staffing ratings. Lastly, number of certified beds

Table 4. Logistic Regression Results for Staffing Rating

	4-5 Star		5 Star	
	OR	95% CI	OR	95% CI
Current Ratio	1.00	[1.00, 1.01]	1.01*	[1.00, 1.01]
Cash Position	1.01	[1.00, 1.03]	1.00*	[1.00, 1.00]
Days in Account Receivable	1.00**	[1.00, 1.00]	1.00	[1.00, 1.00]
Bad Debt Ratio	0.66***	[0.63, 0.70]	0.43***	[0.36, 0.51]
Asset Turnover	1.00	[1.00, 1.00]	1.00	[0.99, 1.00]
Ownership (Ref=Government)				
For profit - Corporation	0.97	[0.78, 1.21]	0.75	[0.50, 1.12]
For profit - Individual	0.43***	[0.28, 0.66]	0.53	[0.25, 1.14]
For profit - LLC	0.65***	[0.51, 0.82]	0.46***	[0.29, 0.72]
For profit - Partnership	0.44***	[0.30, 0.63]	0.14***	[0.05, 0.38]
Non-profit - Corporation	0.65***	[0.50, 0.84]	0.34***	[0.21, 0.55]
Location (Ref=Rural)				
Urban	1.19**	[1.04, 1.35]	0.99	[0.78, 1.27]
Admissions per Bed	1.22***	[1.20, 1.25]	1.19***	[1.15, 1.23]
SNF Average Length of Stay	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Number of Certified Beds	1.00***	[1.00, 1.00]	0.99***	[0.99, 1.00]
Case-Mix RN Staffing HPRD	0.00***	[0.00, 0.00]	0.00***	[0.00, 0.00]
Observations	9,645		9,645	
Pseudo R-squared	0.155		0.168	

Notes: OR=Odds ratio (exponentiated coefficients); 95% CI=confidence intervals and are in brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

(OR=0.99, 95% CI: 0.99, 1.00) was negatively associated with an effect size close to 1, while case-mix RN staffing hours per resident was negatively associated (OR=0.00, 95% CI: 0.00, 0.00) with achieving 5-star staffing ratings.

4.3 Quality Measures Rating

Table 5 displays the logistic regression results for quality measures ratings. For the 4–5-star outcome, bad debt ratio was negatively associated with high quality ratings (OR=0.81, 95% CI: 0.78, 0.85). Compared to government facilities, non-profit corporations had higher odds of achieving high quality ratings (OR=1.36, 95% CI: 1.11, 1.68). Nursing homes located in urban settings had lower odds of achieving 4–5-star quality ratings (OR=0.71, 95% CI: 0.64, 0.78), while those with higher admissions per bed (OR=1.20, 95% CI: 1.17, 1.23) had higher odds. Lastly, case-mix RN staffing hours per resident was positively associated (OR=4.24, 95% CI: 2.60, 6.89) with achieving high quality ratings.

For the 5-star quality outcome, current ratio (OR=1.01, 95% CI: 1.00, 1.01), cash position (OR=1.00, 95% CI: 1.00, 1.00), and days in accounts receivable (OR=1.00, 95% CI: 1.00, 1.00) were positively associated with achieving 5-star quality ratings but had effect sizes close to 1. Bad debt ratio was negatively associated (OR=0.79, 95% CI: 0.75, 0.83) with achieving 5-star quality ratings. Compared to government facilities, non-profit corporations had higher odds of achieving 5-star quality ratings (OR=1.46, 95% CI:

1.17, 1.83). Nursing homes located in urban settings had lower odds of achieving 5-star quality ratings (OR=0.63, 95% CI: 0.56, 0.72), while those with higher admissions per bed (OR=1.11, 95% CI: 1.08, 1.13) had higher odds. SNF average length of stay was also positively associated but had an effect size close to 1 (OR=1.00, 95% CI: 1.00, 1.00). Lastly, case-mix RN staffing hours per resident was positively associated (OR=3.26, 95% CI: 1.99, 5.35) with achieving 5-star quality ratings.

4.5 Health Inspection Rating

Table 6 displays the logistic regression results for health inspection ratings. For the 4–5 star outcome, current ratio (OR=1.01, 95% CI: 1.01, 1.02) and cash position (OR=1.00, 95% CI: 0.99, 1.00) were associated with achieving high health inspection ratings however both had effect sizes close to 1. Bad debt ratio was negatively associated with high health inspection ratings (OR=0.89, 95% CI: 0.86, 0.93). Nursing homes located in urban settings (OR=1.42, 95% CI: 1.28, 1.58) and those with higher admissions per bed (OR=1.08, 95% CI: 1.06, 1.11) had higher odds of achieving 4–5-star health inspection ratings. Lastly, number of certified beds was negatively associated with an effect size close to 1 (OR=0.99, 95% CI: 0.99, 1.00).

For the 5-star health inspection outcome, bad debt ratio was negatively associated (OR=0.81, 95% CI: 0.75, 0.88) with achieving 5-star health inspection ratings. Nursing homes located in urban settings (OR=1.76, 95% CI: 1.48,

Table 5. Logistic Regression Results for Quality Measures Rating

	4-5 Star		5 Star	
	OR	95% CI	OR	95% CI
Current Ratio	1.00	[0.99, 1.00]	1.01*	[1.00, 1.01]
Cash Position	1.02*	[1.00, 1.04]	1.00*	[1.00, 1.00]
Days in Account Receivable	1.00	[1.00, 1.00]	1.00*	[1.00, 1.00]
Bad Debt Ratio	0.81***	[0.78, 0.85]	0.79***	[0.75, 0.83]
Asset Turnover	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Ownership (Ref=Government)				
For profit - Corporation	0.94	[0.79, 1.13]	0.99	[0.80, 1.21]
For profit - Individual	1.41*	[1.08, 1.84]	1.24	[0.93, 1.65]
For profit - LLC	0.96	[0.79, 1.16]	0.92	[0.74, 1.14]
For profit - Partnership	0.90	[0.69, 1.18]	0.79	[0.57, 1.09]
Non-profit - Corporation	1.36**	[1.11, 1.68]	1.46***	[1.17, 1.83]
Location (Ref=Rural)				
Urban	0.71***	[0.64, 0.78]	0.63***	[0.56, 0.72]
Admissions per Bed	1.20***	[1.17, 1.23]	1.11***	[1.08, 1.13]
SNF Average Length of Stay	1.00	[1.00, 1.00]	1.00***	[1.00, 1.00]
Number of Certified Beds	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Case-Mix RN Staffing HPRD	4.24***	[2.60, 6.89]	3.26***	[1.99, 5.35]
Observations	9,645		9,645	
Pseudo R-squared	0.064		0.057	

Notes: OR=Odds ratio (exponentiated coefficients); 95% CI=confidence intervals and are in brackets. * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table 6. Logistic Regression Results for Health Inspection Rating

	4-5 Star		5 Star	
	OR	95% CI	OR	95% CI
Current Ratio	1.01**	[1.01, 1.02]	1.01*	[1.00, 1.02]
Cash Position	1.00**	[0.99, 1.00]	0.99	[0.98, 1.01]
Days in Account Receivable	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Bad Debt Ratio	0.89***	[0.86, 0.93]	0.81***	[0.75, 0.88]
Asset Turnover	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Ownership (Ref=Government)				
For profit - Corporation	1.00	[0.82, 1.21]	1.00	[0.72, 1.37]
For profit - Individual	1.06	[0.80, 1.42]	1.04	[0.64, 1.70]
For profit - LLC	0.93	[0.76, 1.14]	0.93	[0.67, 1.30]
For profit - Partnership	1.13	[0.85, 1.51]	0.89	[0.54, 1.47]
Non-profit - Corporation	0.86	[0.69, 1.08]	0.85	[0.59, 1.23]
Location (Ref=Rural)				
Urban	1.42***	[1.28, 1.58]	1.76***	[1.48, 2.09]
Admissions per Bed	1.08***	[1.06, 1.11]	1.09***	[1.06, 1.12]
SNF Average Length of Stay	1.00	[1.00, 1.00]	1.00	[1.00, 1.00]
Number of Certified Beds	0.99***	[0.99, 1.00]	0.99***	[0.99, 1.00]
Case-Mix RN Staffing HPRD	1.00	[0.61, 1.65]	1.33	[0.58, 3.01]
Observations	9,645		9,645	
Pseudo R-squared	0.032		0.042	

Notes: OR=Odds ratio (exponentiated coefficients); 95% CI=confidence intervals and are in brackets. * $p<0.05$, ** $p<0.01$, *** $p<0.001$.

2.09) and those with higher admissions per bed (OR=1.09, 95% CI: 1.06, 1.12) had higher odds of achieving 5-star health inspection ratings. Lastly, number of certified beds was negatively associated with an effect size close to 1 (OR=0.99, 95% CI: 0.99, 1.00).

Across all models, bad debt ratio emerged as a consistent negative predictor of high star ratings across all four domains, with the largest effect observed in staffing ratings. Admissions per bed showed consistent positive associations across all domains. Urban location was positively associated with overall, staffing, and health inspection ratings but negatively associated with quality measures ratings. Number of certified beds showed negative associations with overall, staffing, and health inspection ratings, though all effect sizes were close to 1. Ownership effects varied by domain. Government facilities outperformed for-profit and non-profit facilities in staffing ratings. Nonprofit corporations showed higher odds of achieving high-quality measure ratings. Case-mix RN staffing hours per resident showed divergent effects: negatively associated with overall and staffing ratings but positively associated with quality measures.

5 DISCUSSION

This study examined how nursing home organizational characteristics and financial performance are associated with overall CMS star ratings and the three domains of staffing, quality measures, and health inspection ratings. Strategic management theory provides a framework for interpreting these findings. The theory emphasizes that healthcare organizations must position themselves relative to their environment to achieve objectives and ensure survival^[19,21]. Our findings demonstrate that nursing homes achieving high star ratings exhibit distinct patterns of resource allocation and organizational structure consistent with strategic positioning for competitive advantage.

5.1 Financial Performance as a Predictor of Quality Outcomes

Strategic management theory holds that organizations must align financial resources with operational goals to achieve performance objectives. The most consistent finding across all models was the negative association between bad debt ratio and star ratings. Facilities with higher proportions of uncollectible revenue demonstrated lower odds of achieving high ratings across all four domains, with the largest effects observed in staffing ratings. For achieving 4-5 star staffing ratings, the odds ratio for bad debt ratio was 0.66, and for 5-star staffing ratings, the effect was even more pronounced at an OR of 0.43. This finding supports the strategic management premise that financial viability is foundational to quality performance. Organizations cannot invest in staffing, training, or quality improvement initiatives when revenue collection is compromised. Our finding aligns with research by Harrington (2025)^[23], who

documented that nursing home financial status directly influences spending on direct care and staffing levels. Facilities experiencing financial distress often reduce registered nurse staffing as a cost-cutting measure, which subsequently affects quality outcomes^[24].

Current ratio and cash position showed positive associations with star ratings, though effect sizes were close to 1. These liquidity measures represent strategic reserves that enable facilities to maintain quality standards during revenue fluctuations. These findings suggest that facilities with stronger short-term solvency maintain higher quality standards, consistent with prior research demonstrating the relationship between financial stability and quality of care^[16]. Grabowski (2023)^[25] concluded that nursing home financial transparency is essential for understanding quality outcomes, as facilities may use related-party transactions and complex ownership structures to obscure true financial performance.

5.2 Urban-Rural Differences in Quality Performance

Strategic management theory also recognizes that organizations must adapt their strategies to environmental conditions. There is no single best way to manage complex healthcare organizations^[20]. Urban location emerged as a significant predictor of star ratings, though the direction of association varied by domain. Urban facilities demonstrated higher odds of achieving high overall ratings and health inspection ratings. However, urban location was negatively associated with quality measures ratings for 4-5 stars and 5 stars.

These divergent findings partially align with prior research documenting urban-rural disparities in nursing home care and show how environmental context sharpens strategic priorities. Bowblis, et al. (2013)^[11] found that rural nursing homes have higher rates of facility-acquired contractures, with approximately half of the disparity explained by differences in facility characteristics. Quigley (2021)^[26] conducted a literature review finding that rural facilities typically have fewer beds, lower staffing levels, and are less likely to offer specialized services. Our finding that urban facilities perform better on health inspections may reflect greater regulatory scrutiny in metropolitan areas, while rural facilities' advantage in quality measures may reflect differences in patient populations and case mix^[12,26]. Recent research documented that urban nursing homes had significantly higher operating margins compared to rural facilities, which may contribute to their ability to meet inspection standards^[27].

5.3 Ownership Structure and Domain-Specific Performance

Strategic management theory posits that organizational structure influences strategic decision-making and resource allocation. Ownership effects varied considerably by

star rating domain, highlighting how different ownership models pursue distinct strategic objectives. For staffing ratings, government facilities outperformed for-profit and non-profit ownership types. Compared to government facilities, for-profit individual ownership (OR=0.43), for-profit limited liability companies (OR=0.65), for-profit partnerships (OR=0.44), and non-profit corporations (OR=0.65) all showed lower odds of achieving high staffing ratings. For 5-star staffing outcomes, for-profit partnerships demonstrated dramatically lower odds (OR=0.14).

These patterns reflect different strategic priorities embedded in ownership structures. Government facilities operate under public accountability mandates that prioritize staffing adequacy. For-profit entities face pressure to maximize returns, which may lead to staffing reductions as a cost management strategy. Comondore (2009)^[28] found in a systematic review and meta-analysis that not-for-profit nursing homes generally delivered higher quality care with more staffing and fewer deficiencies. Harris Meyer (2024)^[29] reported that for-profit groups now control over 70% of nursing homes nationally, suggesting market-wide strategic shifts toward profit-oriented models. Ryskina, et al. (2018)^[14] found that nursing home ownership changes were associated with decreases in 5-star ratings, driven primarily by lower staffing ratings. Lu and Lu (2021)^[24] documented that nursing homes converting from nonprofit to for-profit status experienced quality declines due to aggressive cost-cutting. These findings support strategic management theory's contention that organizational structure constrains strategic choices. Finally, Nonprofit corporations showed higher odds of achieving high-quality measure ratings. This finding suggests that non-profit facilities pursue strategic differentiation through clinical quality rather than cost minimization. Their mission-driven orientation allows investment in quality improvement initiatives that may not generate immediate financial returns but enhance long-term competitive positioning through reputation and referral networks.

5.4 Operational Characteristics and Star Ratings

When we examined admissions per bed, we found that it emerged as a consistent positive predictor across all star rating domains. Strategic management theory emphasizes that organizations must develop operational capabilities aligned with strategic objectives. Higher admissions per bed was associated with increased odds of achieving high ratings for overall, staffing, quality measures, and health inspection ratings. This finding aligns with Grabowski and Mor (2020)^[30] analysis that the economics of nursing home care depends on admitting short-term Medicare beneficiaries to cross-subsidize the care of long-term Medicaid residents. Facilities with higher admissions per bed likely have a more favorable payer mix and greater financial resources to invest in quality improvement. This also aligns with our finding that the number of certified beds was negative associations with star ratings, though

effect sizes were close to 1. This finding is consistent with research suggesting that larger facilities encounter greater challenges in maintaining quality standards^[31]. Furthermore, strategic management theory suggests that larger organizations require more sophisticated management systems and face greater difficulty achieving alignment between structure and strategy.

Lastly, we found that case-mix RN staffing hours per resident had a divergent effect across domains. It was negatively associated with achieving high overall and staffing ratings but positively associated with quality measures ratings. These divergent findings may reflect the methodology used to calculate staffing ratings, which adjusts for case mix, versus quality measures that may directly benefit from higher RN staffing levels. This is consistent with evidence from hospital settings, where Lasater (2021)^[32] demonstrated that improved nurse staffing ratios were associated with better patient outcomes and reduced mortality. From a strategic management perspective, facilities must balance investment in nursing staff against the rating methodology's treatment of case-mix adjustments.

5.6 Limitations

Several limitations warrant consideration when utilizing these findings. First, the cross-sectional design prevents causal inference about the relationships between organizational characteristics and star ratings. Facilities with higher star ratings may attract more resources, creating reverse causality. Second, the Medicare cost report data used for financial variables are self-reported and may contain measurement error. The Government Accountability Office has noted concerns about the accuracy and completeness of nursing home cost reports^[33]. Third, the star rating system itself has limitations, including state-level variation in health inspection scoring that can make comparisons across states difficult^[34]. Finally, unmeasured confounders such as local market conditions, state regulatory environments, and patient preferences may influence both organizational characteristics and quality outcomes.

6 POLICY IMPLICATIONS

Our findings have several policy implications. First, the consistent negative association between bad debt ratio and star ratings across all domains suggests that financial stability is foundational to quality improvement. Policymakers should consider targeted interventions for financially distressed facilities, particularly those serving predominantly Medicaid populations. Harrington, et al. (2025)^[23] documented that nursing homes spent only 27% of net revenues on nursing care, suggesting opportunities for policies requiring minimum spending on direct care. Several states, including New York and New Jersey, have implemented legislation requiring a percentage of revenues to be spent on direct care services.

Second, the differential performance by ownership type, particularly for staffing ratings, supports increased regulatory scrutiny of ownership conversions. The CMS implemented new ownership disclosure requirements in 2023, requiring identification of all private equity and real estate investment trust investors^[7]. Our findings suggest that such transparency efforts are warranted given the relationship between ownership structure and quality outcomes.

Third, the urban-rural disparities observed in our study underscore the need for targeted policies supporting rural nursing homes. Rural facilities may require enhanced Medicaid reimbursement or other financial support to achieve quality parity with urban counterparts. Several studies have highlighted the importance of addressing rural health disparities, including supporting telehealth expansion and workforce programs in rural communities^[11,13,26,27].

7 STRATEGIC IMPLICATIONS FOR PRACTICE

Strategic management theory provides an integrated approach to assessing the environment, developing strategy, implementing programs, and evaluating results^[22]. Our findings suggest several strategic implications for nursing home administrators. First, financial stability must be established as a strategic priority. The consistent negative association between bad debt ratio and star ratings across all domains indicates that revenue cycle management is foundational to quality improvement. Facilities should develop strategic initiatives to improve collections, diversify payer mix, and maintain adequate liquidity reserves.

Second, ownership structure constrains strategic options. Government facilities demonstrate staffing advantages that private facilities may not replicate without policy intervention. Non-profit facilities show quality measures advantages that suggest mission alignment can differentiate facilities in competitive markets. For-profit facilities must recognize that aggressive cost management may undermine star ratings and long-term market position.

Third, environmental context shapes optimal strategy. Urban facilities should prioritize health inspection compliance given regulatory scrutiny in metropolitan markets. Rural facilities may find strategic advantage in quality measures performance that differentiates them from urban competitors. The variation in effects by domain supports strategic management theory's contention that there is no single best way to manage complex healthcare organizations.

Fourth, operational strategies should target admissions optimization. Higher admissions per bed consistently predicted high star ratings, suggesting that facilities should develop referral relationships and marketing strategies that increase patient volume. This operational focus generates

financial resources and signals organizational capacity to payers and referral sources.

8 CONCLUSIONS

This study demonstrates that strategic management theory provides a useful framework for understanding nursing home quality performance. Organizations that align financial resources with operational structures and adapt strategies to environmental conditions achieve superior outcomes across multiple quality domains. Strategic management theory views patients as consumers who can switch providers when dissatisfied. The transparency of the CMS five-star rating system enables this consumer choice and creates competitive pressure for quality improvement. Nursing homes with strong performance can leverage star ratings to build referral networks with hospitals and physicians. Healthcare systems seeking improved continuity of care should evaluate partnership opportunities with financially stable nursing homes as post-acute providers. The variation in star rating components suggests stakeholders require domain-specific analysis rather than relying solely on composite scores when selecting facilities or planning strategic interventions. Future research should examine longitudinal relationships between strategic choices and quality outcomes to establish causal pathways implied by strategic management theory.

Acknowledgements

We appreciate the support provided by the University of North Florida and the availability of publicly accessible data from the CMS, which made this research possible.

Conflicts of Interest

The authors declared no conflict of interest.

Data Availability

The data that support the findings of this study are available in the Centers for Medicare and Medicaid Services data repository. These data were derived from the following resources available in the public domain: <https://data.cms.gov/provider-data/search?theme=Nursing%20homes%20including%20rehab%20services>

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Author Contribution

Hanadi Y. Hamadi and Jeffrey P. Harrison were responsible for the conceptualization, Hanadi Hamadi and Jingren Zhao were responsible for the methodology, and Jeffrey

P. Harrison and Debra Harrison were responsible for the conclusions, discussion, and editing.

Abbreviation List

CI, Confidence Interval

CMS, Centers for Medicare & Medicaid Services

PAC, Post-Acute Care

RN, Registered Nurse

SD, Standard Deviation

SNF, Skilled Nursing Facility

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