Technical Report: Analysis of Trends in Nursing Home Quality and Cost

Evaluation of the NF Payment Reform Legislation

2021 Report to the Legislature

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Executive Summary

Purpose

The purpose of this report is to present relevant trends in nursing facility utilization, cost, and quality trends in the years just prior to and after the Value Based Reimbursement legislation (VBR) took effect (January 1, 2016). This is done both to provide references for general trends and through statistical models to test for differences across subgroups and for changes in cost and quality trends associated with the VBR implementation.

Methods

The bulk of the report takes to the form of data tables and trend plots, both at the population level and at the subgroup level. All 340 Skilled nursing facilities with data from 2013-2019 cost years are included in all analysis. Key cost measures are the care-related and other operating costs. Key quality measures include aggregate scores for clinical quality, quality of life, Minnesota Department of Health inspection scores, staff retention rates, community discharge rates, and hospitalization rates. Cross-sectional regression models are fit for the 2018 data (most recent audited data) to test for differences across subgroups and growth models are fit across the entire data range to test for changes in trend associated with VBR implementation.

Results

Observations are made throughout the report, but a few are pulled here for convenience. A longer summary list is available on page 116.

- After controlling for other factors, growth models indicate the implementation of VBR is associated with greater spending on care-related ($19.43 PRD) and other operating costs ($11.16 PRD), improved quality indicator scores (1.62), lower quality of life scores (-0.37), and improved community discharge rates in the 31-90 period (2%).

- Since 2015, Medicaid revenue has increased as a total share of facility revenue, replacing about 4% of Medicare revenue in total revenue. The strongest predictor of care-related spending under VBR is care related spending just prior to VBR implementation.

- There appears to be a substituting of RN hours for LPN hours, as well as increasing use of CNAs. Overall, total RN, LPN, and CNA hours PRD increased by 1% since 2015.

- After accounting for other factors, a greater proportion of minority resident days was associated with lower QOL and MDH scores, worse CD30, CD90, and HOSP LRP rates. Spending on care-related and other operating costs appears to have grown more slowly for these facilities, community discharge rates appear to have declined, and 30 day hospitalization rates appear to have risen during the VBR period.

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The following report displays trend data from select cost report and quality measures over the seven year period 2013-2019 for the 340 Minnesota skilled nursing facilities with complete data for all seven years. Quality data are matched to the annual period of the cost reports (4th quarter of the prior year through the 3rd quarter of the listed year). Annual means are given in the tables overall and by subgroups, means and medians as well as select percent changes are also displayed in trend plots and bar charts. Some relevant description and select findings will be highlighted in the text, but tables are meant to serve as a general reference.

I. Overall Trends in nursing facility utilization, expenditures, and quality

This section displays overall trends in nursing facility utilization, facility expenditures, and quality measures in the years prior to the implementation of VBR and the years following. Cost data through 2018 have been fully audited, 2019 cost data was partially audited prior to use in this report.

A. Nursing Facility Utilization

Table *1* displays annual means for various nursing home utilization measures including total resident days, percentage of resident days by payer source, occupancy rate, and acuity as measured by RUG case mix score. Over the period there is a general decline in resident days (12% drop) and occupancy rates (5% drop). The drop in Acuity and Occupancy are visualized in Figure *1* and Figure 2 respectively.

Table 1. Nursing Home Utilization

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Facilities	340	340	340	340	340	340	340
Total Resident Days	27,124	26,663	25,990	25,256	24,720	24,455	23,769
Medicaid RUG Days	56%	55%	52%	52%	51%	51%	50%
Medicare RUG Days	9%	9%	9%	9%	9%	9%	7%
Private Pay RUG Days	26%	26%	25%	23%	22%	21%	19%
Other RUG Days	9%	9%	9%	9%	9%	10%	11%
Occupancy	89%	89%	87%	86%	85%	85%	85%
Annual Occupancy Change	-0.7%	-0.2%	-1.4%	-1.7%	-0.8%	0.1%	-0.4%
Acuity (RUG Case-Mix Score)	1.020	1.017	1.014	1.012	1.010	1.010	1.003

Figure 1. Mean Acuity by Cost Year

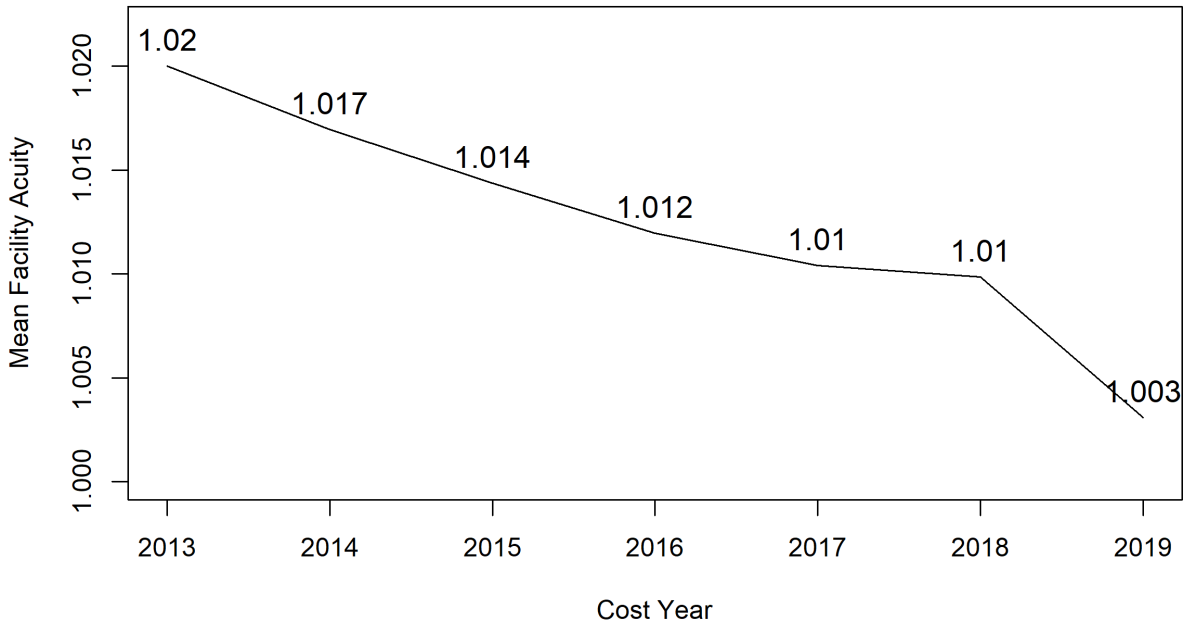
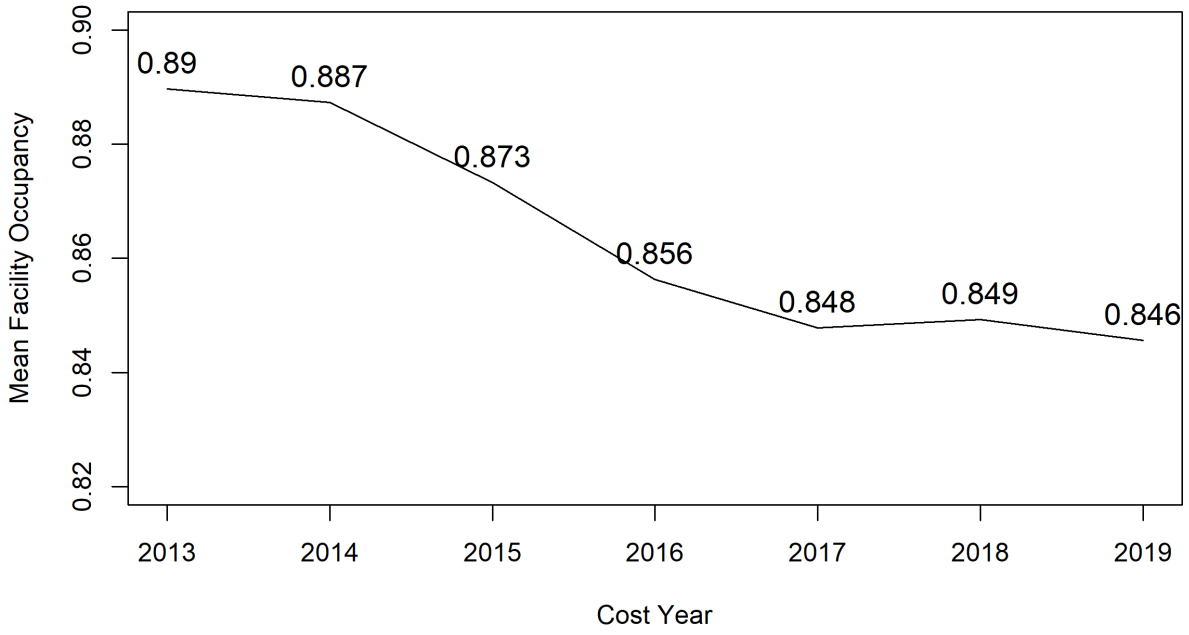


Figure 2: Mean Occupancy



B. Facility Revenue

Table 2 displays annual means related to facility revenue including total revenue in thousands of dollars and percentage of revenue by payer source (Medicaid, Medicare, Private Pay/Other). Despite the decline in total resident days and occupancy rates, total revenue has risen by 23%

over the period (not adjusted for inflation). With implementation of the Value Based Reimbursement policy in 2016, revenue from Medicaid increased by 4% of total revenue with a corresponding drop in Medicare revenue. Private Pay/Other revenue has remained fairly stable as a percentage of total revenue. Figure *3* displays the policy impact on revenue growth by payer source and Figure *4* the median revenue per resident day by payer source. Figure *5* shows annual median total revenue and Figure *6* median annual total revenue change, both plots by payer source.

Table 2. Revenue Sources

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Facilities	340	340	340	340	340	340	340
Total Revenue (K)	5,614	5,732	5,684	6,247	6,436	6,749	6,900
Medicare Revenue %	16%	16%	16%	14%	14%	14%	11%
Medicaid Revenue %	48%	48%	47%	50%	50%	51%	52%
Private Pay or Other Revenue %	36%	37%	37%	36%	36%	35%	37%

Figure 3: Median Revenue Change per Resident Day

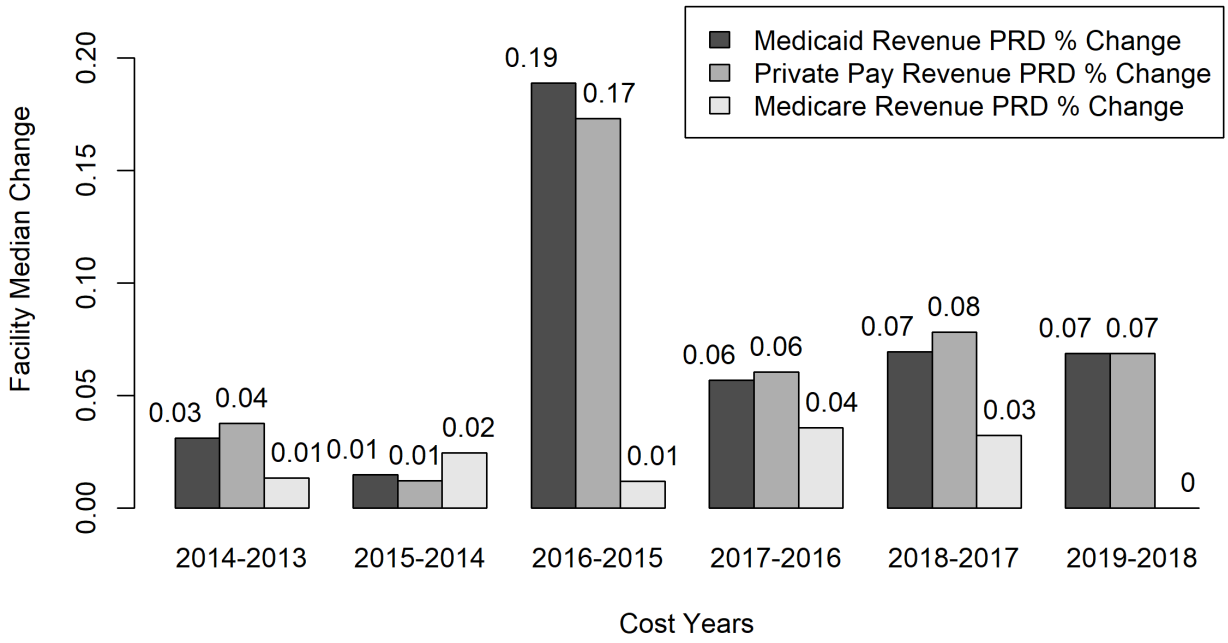


Figure 4: Median Revenue per Resident Day

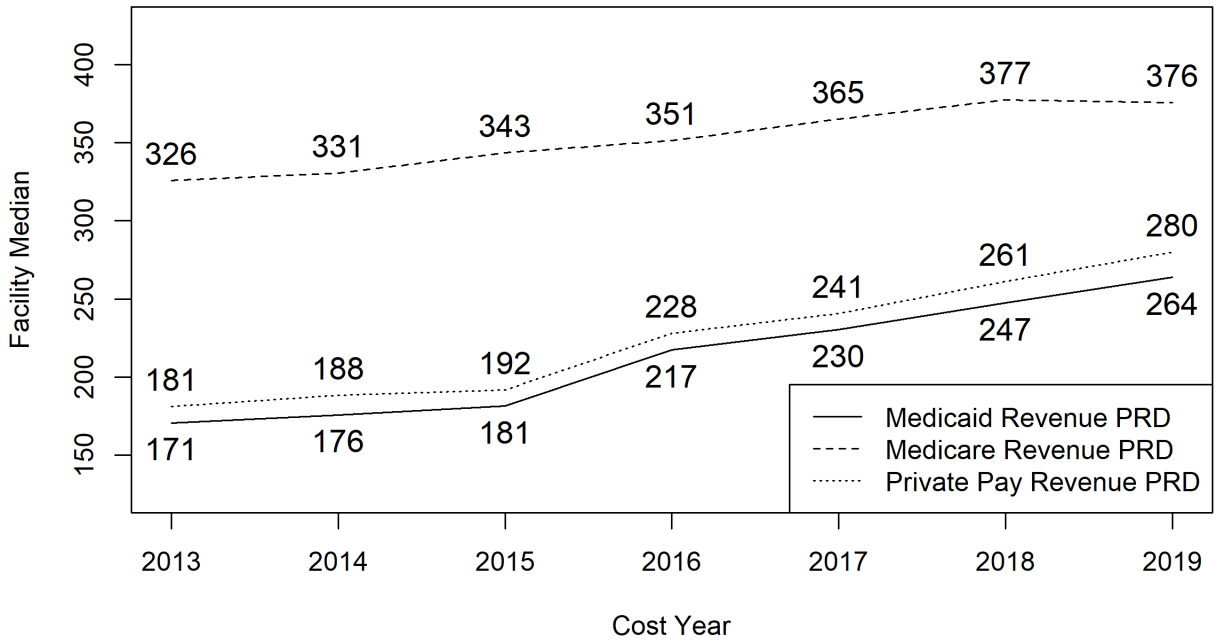


Figure 5: Median Annual Revenue

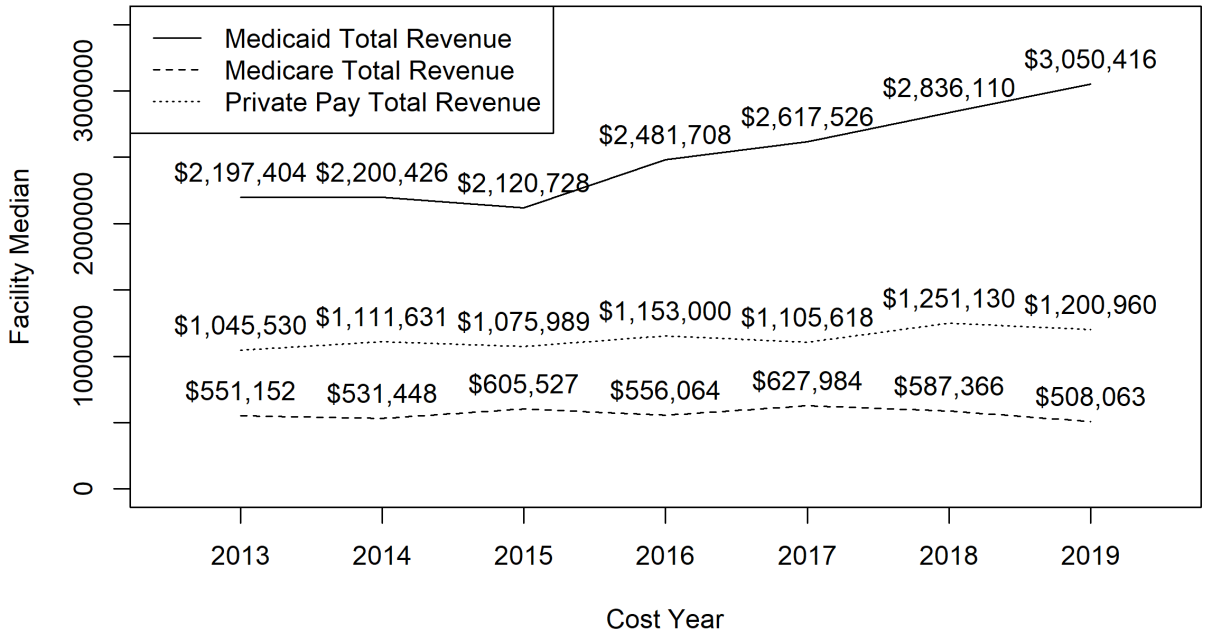
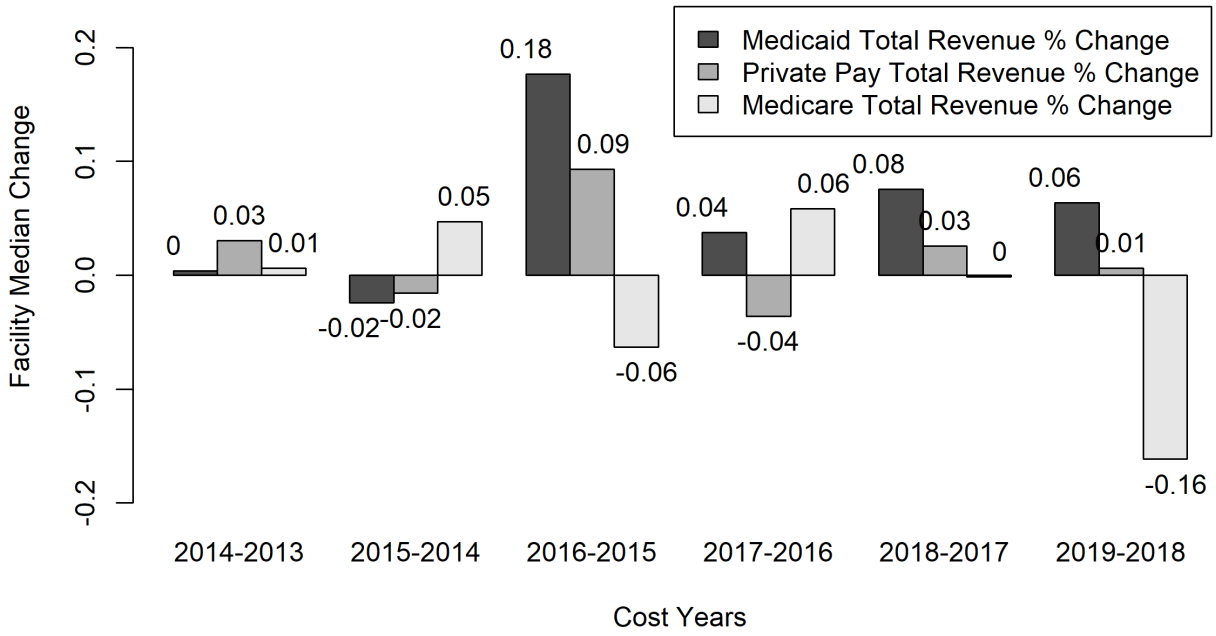


Figure 6: Annual Revenue Change



C. Care Related Costs

Table 3 displays care-related costs for overall categories such as direct care and other care related costs, various salary and benefit line items from the cost report. Unless noted as standardized (adjusted for acuity), all measures are annual means on a per resident day basis. Care related costs have risen by 36% (unadjusted for acuity or inflation) over the period, which driven primarily by an increase in direct care spending (40% jump). Figure *7* displays the annual percent change in median care related spending. The figure highlights the large jump that occurred from 2015 to 2016, coinciding with the VBR policy implementation, and shows that growth in subsequent years, although lower than the initial jump, remains higher than cost growth prior to the policy change. A large portion of the increase in direct care spending was driven by increase spending on direct care salaries as most positions saw an increase of over 30% on a per resident day basis. Notably RNs and Nurse Administrators saw a 54% increase. Figure *8* displays the facility median salaries per resident days for RNs, LPNs, and CNAs. Note that these figures alone do not indicate pay raises as these increases could also be attributed to increases in staffing levels, figures for which are found in Table *6*. Figure *10* directly displays the salary increase (salary per hour) for Nursing Administrators, RNs, LPNs, CNAs, and TMAs and Figure *11* displays the same for social worker and activities staff. Of the four benefit items in Table 3, Medical Insurance (109%) and Scholarships (384%) saw the largest increases over the period. Figure *9* displays the line plot of the facility median benefit items per resident day.

Table *4* gives the annual mean costs per resident day for select non-salary care related costs, such as supplies, staffing through the pool, training and consulting fees, and raw food. Notably, the amount of money spent on staffing through the pool has risen by a factor of 8-12 for all three nursing roles.

Table 3. Care Related Costs per Resident Day (PRD) by Cost Year

Cost Year	2013	2014	2015	2016	2017	2018	2019
Care-related Cost PRD (Standardized)	109.45	111.08	113.99	127.38	134.24	140.68	149.21
Direct Care Cost PRD (Standardized)	87.81	89.41	92.06	103.75	110.11	115.62	123.00
Other Care-Related Cost PRD (Standardized)	21.65	21.67	21.93	23.63	24.13	25.05	26.21
Care-related Cost PRD	111.10	112.65	115.46	128.71	135.33	141.53	149.57
Direct Care Cost PRD	89.28	90.82	93.40	104.96	111.14	116.48	123.44
Other Care-Related Cost PRD	21.83	21.83	22.07	23.75	24.19	25.05	26.13
Direct Care Salary	72.42	74.82	77.39	87.11	93.21	96.81	101.42
Nurse Admin Salary PRD	7.58	8.14	8.15	9.47	10.28	10.95	11.68
RN Salary PRD	14.69	15.56	16.50	17.69	19.30	20.63	22.64
LPN Salary PRD	15.61	15.78	16.11	17.79	18.16	18.16	18.40
CNA Salary PRD	30.93	31.71	32.57	36.89	39.63	40.87	42.23
TMA Salary PRD	3.12	3.16	3.53	4.66	5.19	5.50	5.76
DC Staff Trainer Salary PRD	0.49	0.48	0.54	0.60	0.66	0.70	0.71
Other Care-related Salary PRD	9.87	10.13	10.68	11.77	12.24	12.63	13.28
Medical Record Salary PRD	2.68	2.75	2.87	3.22	3.36	3.39	3.54

Cost Year	2013	2014	2015	2016	2017	2018	2019
Social Worker Salary PRD	2.57	2.66	2.86	3.13	3.31	3.49	3.65
Activities Staff Salary PRD	3.89	3.98	4.22	4.64	4.96	5.10	5.39
Other Direct Care Salary PRD	0.67	0.71	0.72	0.74	0.58	0.62	0.69
Health Insurance PRD	6.90	8.87	9.21	10.76	11.95	12.88	14.40
Dental Insurance PRD	0.17	0.19	0.24	0.27	0.25	0.20	0.21
Pension/Profit Share PRD	1.08	1.13	1.17	1.37	1.42	1.47	1.63
Scholarship PRD	0.21	0.19	0.28	0.66	0.93	0.97	1.01

Table 4. Non-Salary Care Related Costs per Resident Day (PRD) by Cost Year

Cost Year	2013	2014	2015	2016	2017	2018	2019
Nursing Supplies and Non-Prescription Drugs PRD	4.85	4.86	4.58	4.38	4.02	4.17	4.72
Pharmacy Expense PRD	0.00	0.01	0.00	0.00	0.00	0.00	0.00
RN Pool PRD	0.08	0.13	0.22	0.38	0.59	0.71	1.03
LPN Pool PRD	0.14	0.20	0.40	0.76	0.72	1.18	1.43
CNA Pool PRD	0.23	0.33	0.61	1.07	1.00	1.65	2.33
TMA Pool PRD	0.00	0.00	0.00	0.01	0.01	0.00	0.00
Non-Salary Training Costs PRD	0.35	0.37	0.47	0.35	0.25	0.28	0.41
Other Direct Care Consultants PRD	0.19	0.21	0.34	0.43	0.33	0.31	0.31
Activities & Social Service Supplies PRD	0.48	0.48	0.49	0.44	0.50	0.51	0.66
Therapy Supplies PRD	0.02	0.01	0.00	0.01	0.00	0.00	0.00
Nursing Consultants PRD	0.90	1.08	1.38	1.65	1.75	1.88	1.88
Contracted Therapy Expenses PRD	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Nursing, Activities, and Social Services Expense PRD	1.14	0.82	0.25	0.23	0.07	0.14	0.10

Cost Year	2013	2014	2015	2016	2017	2018	2019
Raw Food Expense PRD	8.27	8.44	7.90	7.84	7.82	8.08	8.37

Figure 7: Care Related and Other Operating Cost Change per Resident Day

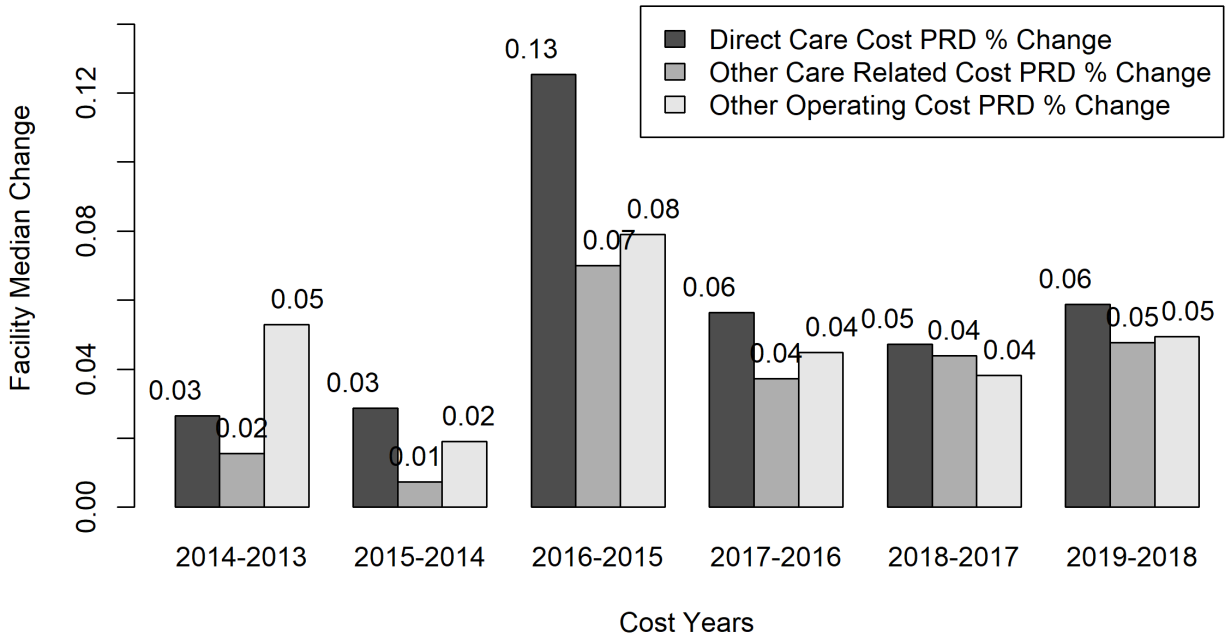


Figure 8: Nursing Salary Costs per Resident Day

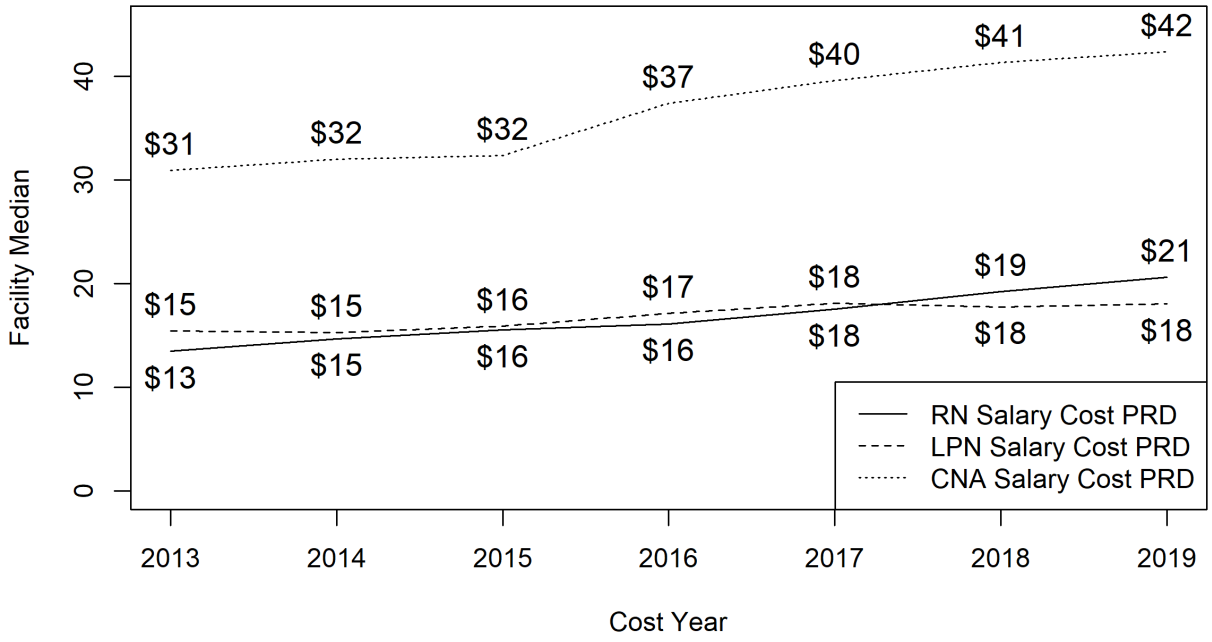


Figure 9: Benefit Costs per Resident Day

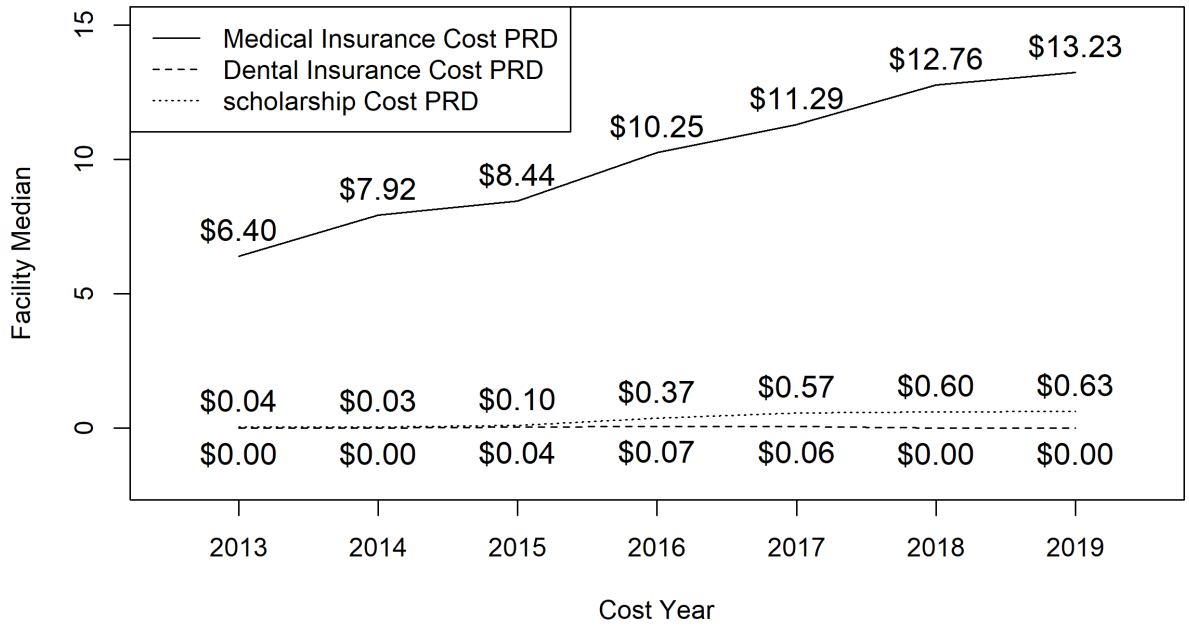


Figure 10: Direct Care Hourly Salaries

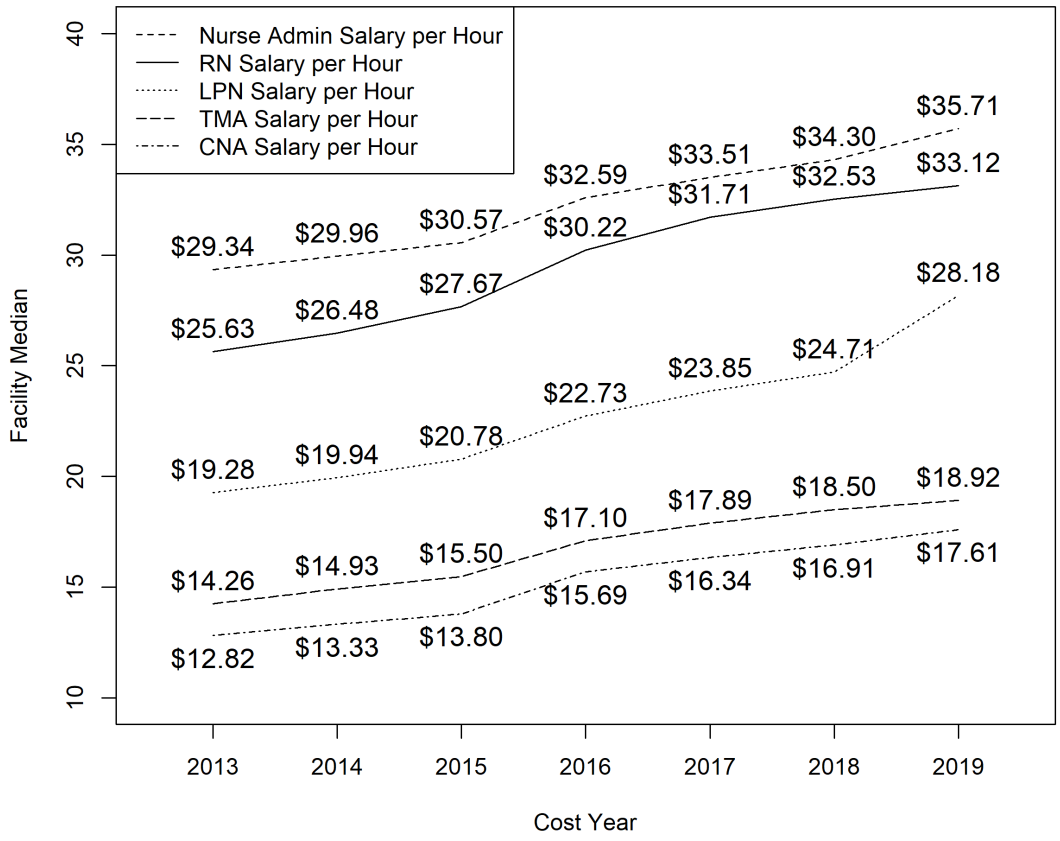
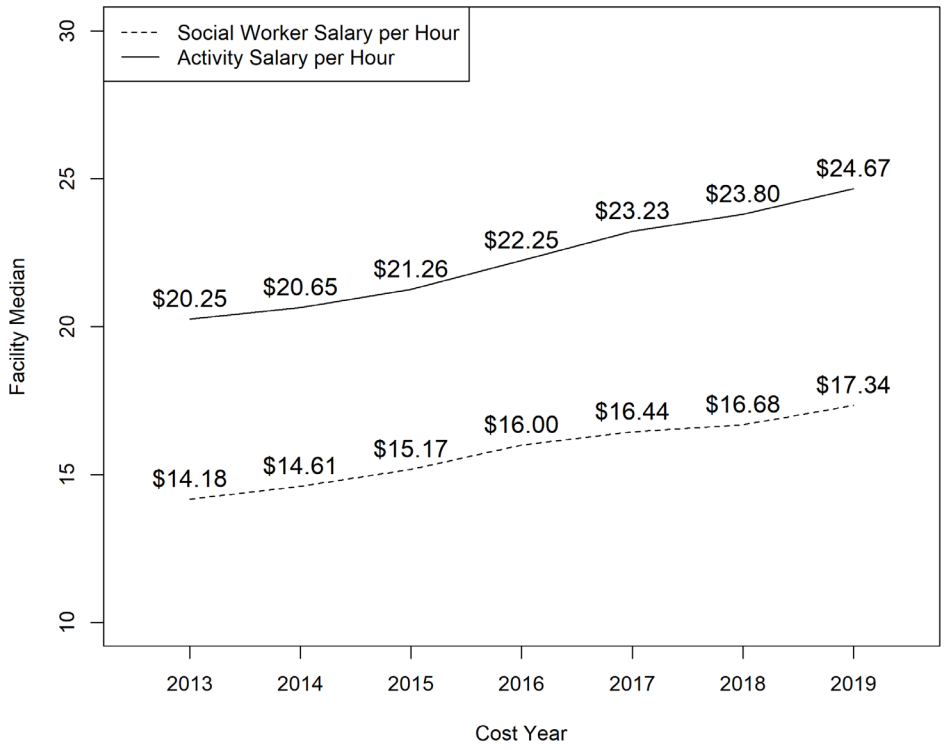


Figure 11: Other Care Related Hourly Salaries



D. Other Care Related Costs

Table *5* displays the annual mean costs per resident day for other operating costs as well as the major sub-categories of dietary, laundry, housekeeping, plant and maintenance, and administrative costs, along with the line item of administrative management fees. Other operating costs saw a 7% jump in 2016 and have risen fairly steadily with 4-5% annual increases since that time. Since 2015, the lowest increase in spending per resident day has come from laundry costs (10%) and the highest from administrative costs (29%). Administrative management fees have risen in line with the overall administrative costs at 30% since 2015.

Table 5. Other Operating Costs

Year	2013	2014	2015	2016	2017	2018	2019
Other Operating Cost PRD	67.16	70.64	72.13	77.39	81.13	84.65	89.22
Dietary Costs PRD	13.59	13.81	13.71	14.68	15.08	15.87	16.70
Laundry Costs PRD	3.36	3.41	3.54	3.74	3.80	3.82	3.90
Housekeeping Costs PRD	5.91	6.02	6.27	6.67	6.93	7.07	7.36
Plant & Maintenance Costs PRD	11.27	12.13	12.76	13.43	13.93	14.30	14.98
Administrative Costs PRD	26.84	28.85	28.98	31.60	33.70	35.07	37.37

Year	2013	2014	2015	2016	2017	2018	2019
Admin Management Fees PRD	6.19	6.42	6.86	7.28	7.68	8.52	8.92

E. Nurse and Other Care Related Staffing Measures

Table *6* displays staffing measures for nursing and other care related staff, including hours per resident day, staffing mix, and retention. RN hours per resident day saw a 15% increase since 2015 while LPN hours saw a corresponding 15% decrease. Overall licensed hours have decreased by 2% per resident day since 2015. The 3% increase in CNA hours PRD since 2015 was sufficient to raise total RN, LPN, and CNA hours by 1% since VBR implementation. Annual retention rates (an individual who began the year employed with a facility, ended the year employed with that facility) were declining prior to VBR implementation and generally made some, but not all of that ground back in the subsequent years. Notably, Nurse Administrator and CNA retention rates remain lower than in 2013. Figure *12* displays the relatively flat growth in hours per resident day by nursing position and Figure *13* shows the somewhat volatile nature of retention rates by position.

Table 6. Nurse and Other Care-Related Staffing

Cost Year	2013	2014	2015	2016	2017	2018	2019
RN Hours PRD	0.55	0.57	0.59	0.57	0.60	0.63	0.67
LPN Hours PRD	0.79	0.78	0.76	0.76	0.75	0.73	0.65
Licensed Hours PRD	1.35	1.35	1.35	1.33	1.35	1.35	1.32
Nursing Assistant Hours PRD	2.38	2.37	2.34	2.36	2.42	2.42	2.40
Total RN, LPN, and CNA Hours PRD	3.73	3.72	3.69	3.70	3.77	3.77	3.73
Total Direct Care Staff Hours PRD	4.65	4.64	4.64	4.74	4.85	4.88	4.93
% RN of total nursing Hours PRD	15%	12%	13%	12%	12%	13%	14%
% Licensed (RN & LPN) of Total Nursing HPRD	36%	36%	37%	36%	36%	36%	36%
Retention: Nursing Administrator	82%	79%	75%	74%	75%	77%	76%
Retention: RN	70%	67%	64%	67%	68%	71%	70%
Retention: LPN	74%	74%	72%	73%	73%	75%	73%
Retention: CNA	65%	63%	62%	64%	63%	64%	61%
Retention: TMA	49%	48%	50%	52%	54%	54%	52%
Retention: Social Worker	75%	77%	74%	75%	73%	74%	74%
Retention: Activities	79%	76%	79%	77%	77%	77%	75%
Retention: Mental Health Worker	0.3%	0.0%	0.0%	0.0%	0.3%	0.3%	0.3%

Figure 12: Nursing Hours PRD by Cost Year

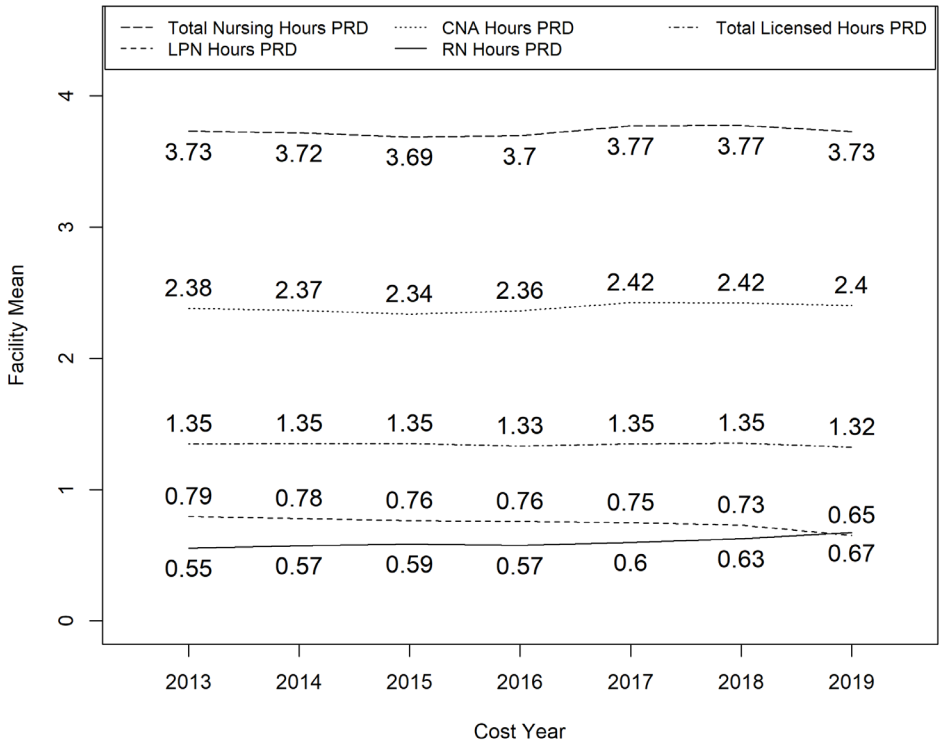
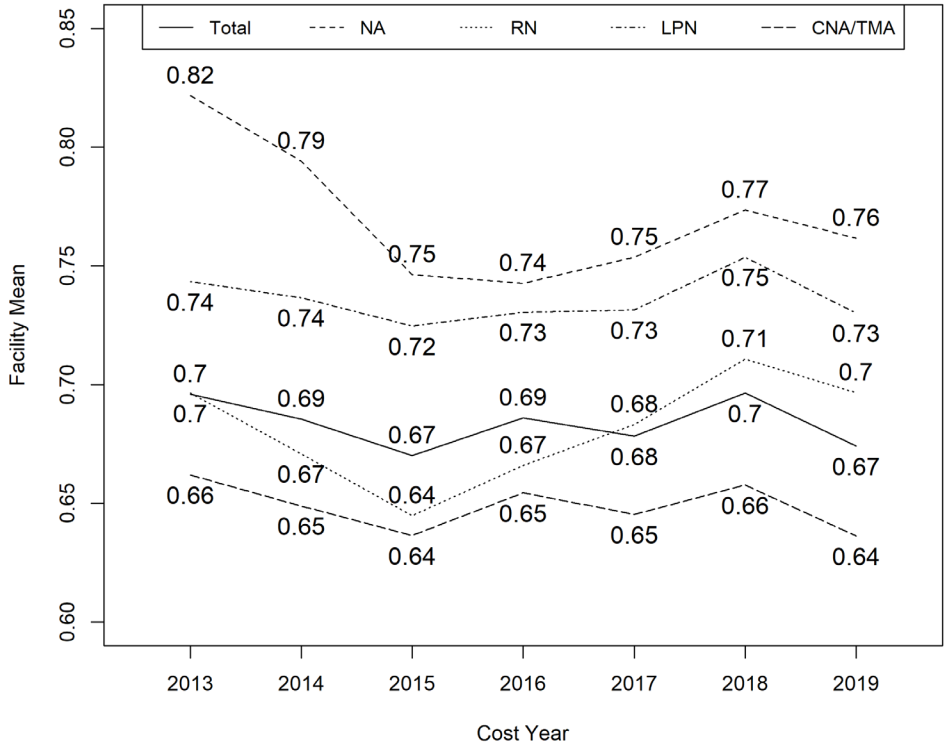


Figure 13: Staff Retention



F. Quality Measures

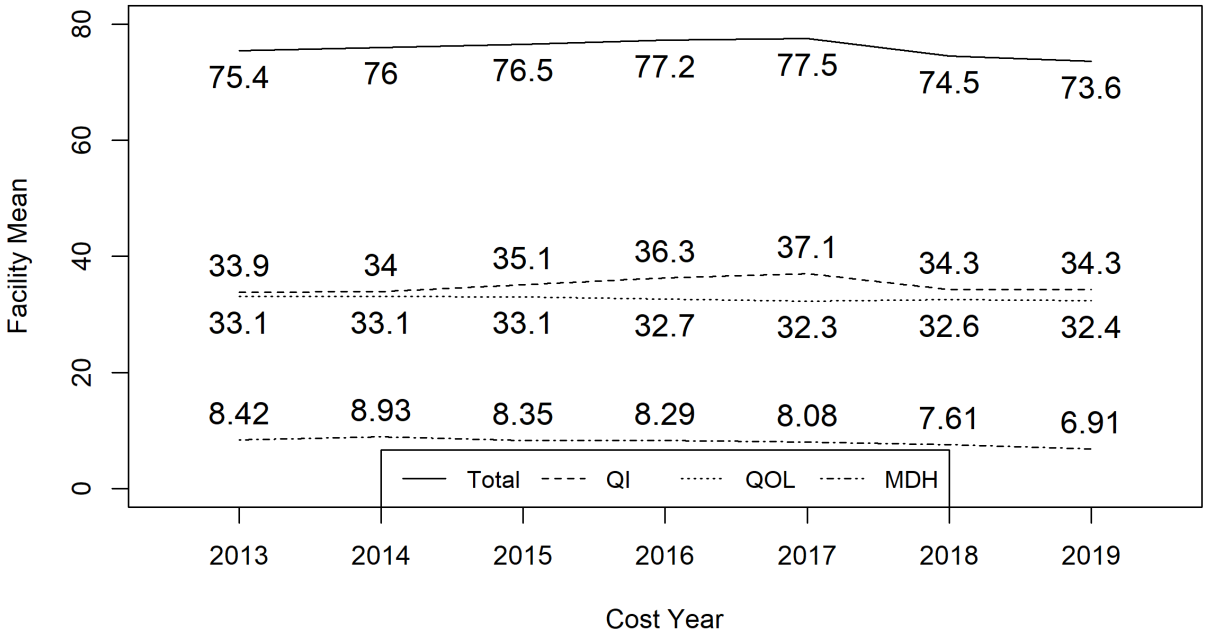
Table 7 displays the annual mean quality scores and measures, including quality indicator scores (out of 50 points), quality of life scores (out of 40 points), Minnesota Department of Heath scores (out of 10 points), overall direct care retention rates, acuity adjusted community discharge rates (3-30 and 31-90 day), acuity adjusted hospitalization rates (3-30 day), unadjusted hospitalization rates per 1000 resident days (31+ days). The table also contains several variables from the CASPER (Certification and Survey Provider Enhanced Reports) data files including unadjusted and acuity adjusted staffing hours by position, as well as several measures related to inspections (overall score, incident, complaint, and fine count, and mean fine amount). The notable dip inspection scores (17% drop since 2015) coincides with changes in the MDH inspection procedure, otherwise quality scores have remained fairly flat since 2015 (Figure *14*), with the exception of unadjusted hospitalization rates per 1000 residents (31+ days post admission) which saw a 10% increase in the annual mean. The Casper file gives slightly different hours per resident days than the cost report files, but the pattern remains similar. The number of incidents, complaints, fines, and amount of fines as given in the CASPER file have increased substantially since 2015.

Table 7. Quality Measures

Year	2013	2014	2015	2016	2017	2018	2019
Quality Indicator Quality Score	33.9	34.0	35.1	36.3	37.1	34.3	34.3
MDH Inspection Quality Score	8.4	8.9	8.3	8.3	8.1	7.6	6.9
Quality of Life Quality Score	33.1	33.1	33.1	32.7	32.3	32.6	32.4
Retention Rate	70%	69%	67%	69%	68%	70%	.
Community Discharge Rate (30 Day)	34.7%	34.2%	33.3%	35.1%	33.7%	34.7%	34.4%
Community Discharge Rate (30-90 Day)	32.5%	33.0%	33.2%	33.2%	33.9%	33.0%	32.7%
Hospitalization Rate (30 Day)	11.9%	12.1%	12.1%	12.0%	12.5%	12.4%	12.3%
Hospitalization Rate Low Risk Period per 1000 Resident Days	1.36	1.28	1.41	1.40	1.49	1.53	1.55
CNA Hours PRD	2.46	2.45	2.41	2.43	2.52	2.45	2.43
LPN Hours PRD	0.75	0.75	0.73	0.73	0.71	0.68	0.66
RN Hours PRD	0.76	0.79	0.80	0.82	0.84	0.82	0.83
Licensed Hours PRD (RN+LPN)	1.51	1.53	1.53	1.55	1.55	1.50	1.49
Total Nurse Hours PRD (RN+LPN+CNA)	3.97	3.98	3.94	3.98	4.07	3.95	3.92
Physical Therapy Hours PRD	13.96	0.07	0.08	0.08	0.08	0.08	0.07

Year	2013	2014	2015	2016	2017	2018	2019
CNA Adjusted Hours PRD	2.46	2.45	2.43	2.45	2.53	2.48	2.47
LPN Adjusted Hours PRD	1.02	1.02	1.01	0.99	0.97	0.84	0.73
RN Adjusted Hours PRD	0.61	0.63	0.64	0.66	0.68	0.81	0.98
Total Health Inspection Score	44.1	42.6	41.8	41.9	43.0	42.1	46.7
Facility Reported Incidents	0.14	0.12	0.11	0.12	0.17	0.33	0.70
Substantiated Complaints	0.25	0.28	0.38	0.51	0.73	0.88	1.17
Number of Fines	0.25	0.27	0.21	0.15	0.15	0.20	0.29
Total Amount of Fines	$575	$897	$1,253	$1,799	$2,123	$3,012	$4,512

Figure 14: Quality Scores



II. Subgroup Analysis – Care-Related and Other Operating Costs

In this section of the report, care related and other operating costs will be examined across ten sub-group variables to ascertain if relationships exist. For numeric variables, subgroups are created by using quartile cut offs to create three groups to aid in visulatization, typically the lowest 25%, middle 50%, and highest 25% of the data. In one case (percentage of minority race/ethnicity resident days), the lowest 50%, third quartile (51-75%) and highest 25% were used to account for large number of very low percentages in the data. Numeric subgroups include the 2015 (pre-VBR) care related costs, number of beds, number of annual admissions per bed, occupancy rate, percentage of revenue from Medicaid, percentage of revenue from Medicare, and percentage of minority race/ethnicity resident days. Categorical variables include location/hospital affiliation and a binary indicator of whether or not the facility changed ownership during the data period (2013-2019). Location/hospital affiliation was broken into six categories, hospital affiliated and five free standing groups based on rural urban commuter areas (Twin cities metro area, other metro metropolitan statistical area (MSA), micropolitan, small town, and rural). In addition to tables and line plots, cross sectional regression models were fit to the 2018 data (audited) and growth models were fit to the full data set. The former models test for general relationships between the sub-groups and the cost measures and can be used to illustrate relative levels of importance in explaining variability in costs. The latter models can be used to quantity and test explicitly for changes in relationship that coincide with implementation of the VBR policy.

A. Subgroup Analysis: Care Related Costs

Table 8 displays the annual means in care related costs per resident day by each variable's sub-group (row titles) and cost year (column titles). There is strong separation between costs by 2015 Care Related Cost groups, this is to be expected given the nature of the reimbursement system. Since 2015, growth has occurred in the lower two groups (lowest 39% and middle quartiles 31%, Figure 15) faster than the facilities beginning with the highest costs (21% jump). For location/hospital affiliation, costs are highest for hospital attached facilities and free standing Twin City Metro facilities, with growth in the mean ranging from 23% (hospital attached) to 33% (32-33% for free standing facilities outside the metro area, Figure 16). For-profit owned facilities have the lowest mean care related costs, but the same growth rate as non-profit facilities (31% vs 23%,

Figure 17). Facilities that did not change ownership over the period have seen more growth in costs since 2015 (30% vs 27%, Figure 18). Care related costs PRD are highest for larger facilities but cost growth was similar across number of beds (29-31%, Figure 19). Care related costs PRD were higher for facilities with more annual admissions per bed, but with slower cost growth since 2015 than the middle 50% subgroup (29% vs 33%, Figure *20*). Highest occupancy rates had slightly higher costs and cost growth (32% vs 27-29%, Figure 21). Those facilities in the middle

50% of the data in terms of percentage of revenue from Medicaid had the highest care-related costs PRD and cost growth since 2015 (35% vs 27%, Figure 22). Those facilities in the highest quartile of percentage of revenue from Medicare had the highest costs and most growth since 2015 (35% vs 28-31%, Figure 23). The upper quartile in percentage of resident days that were from minority race/ethnicity residents had the lowest care related costs and cost growth since 2015 (25% vs 30-31%, Figure 24).

Table 8. Care Related Costs by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	88.60	90.47	90.77	102.90	109.19	118.34	125.95
Pre VBR (2015) Care Related Costs Middle Quartiles	109.26	111.63	114.21	128.51	135.38	141.17	150.03
Pre VBR (2015) Care Related Costs Highest Quartile	137.30	136.89	142.66	154.93	161.36	165.45	172.26
Hospital Attached	139.27	128.03	131.21	141.69	149.50	151.52	161.92
Location: Twin Cities	117.50	121.29	122.17	137.08	143.35	147.62	156.23
Location: Other MSA	105.21	108.11	111.44	124.64	132.28	140.16	147.34
Location: Micropolitan	101.45	104.93	110.98	125.47	130.11	139.53	147.59
Location: Small Town	93.89	96.80	100.24	112.30	117.29	125.91	133.64
Location: Rural	94.05	100.30	101.33	112.01	119.16	123.78	133.46
Ownership: For Profit	100.95	104.33	105.18	118.14	126.27	130.44	137.89
Ownership: Government	119.95	117.71	124.52	133.61	141.44	145.73	153.06
Ownership: Not for Profit	114.32	115.75	118.86	133.05	139.15	146.83	155.83
Change in Ownership during the Period	108.02	110.48	112.17	125.90	133.14	136.95	142.59
No Change in Ownership during the Period	112.05	113.32	116.48	129.57	136.00	142.94	151.73
Number of Beds: Lowest Quartile	104.37	106.12	111.00	123.17	129.20	134.52	142.67
Number of Beds: Middle Quartiles	107.77	109.19	111.53	124.88	131.62	138.43	146.58
Number of Beds: Highest Quartile	120.52	122.59	125.54	139.50	147.21	153.88	162.64
Admits per Bed: Lowest Quartile	105.97	103.10	107.40	120.45	124.96	129.47	137.31
Admits per Bed: Middle Quartile	106.68	109.76	112.18	124.41	132.30	138.31	148.73
Admits per Bed: Highest Quartile	124.50	127.41	127.03	142.08	150.56	157.21	163.67
Occupancy Rate: Lowest Quartile	107.62	107.49	116.23	129.30	135.64	137.87	147.69

Cost Year	2013	2014	2015	2016	2017	2018	2019
Occupancy Rate: Middle Quartiles	111.37	113.97	116.18	127.85	135.56	142.62	149.89
Occupancy Rate: Highest Quartile	111.80	112.55	114.05	129.68	134.64	143.25	150.89
% of Revenue from Medicaid: Lowest Quartile	114.73	116.05	118.83	131.76	137.22	145.10	150.47
% of Revenue from Medicaid: Middle Quartiles	109.25	111.29	113.34	128.35	135.69	142.61	152.68
% of Revenue from Medicaid: Highest Quartile	107.79	107.53	112.00	124.05	130.92	133.65	142.35
% of Revenue from Medicare: Lowest Quartile	106.62	105.10	110.27	119.74	129.23	133.58	140.65
% of Revenue from Medicare: Middle Quartiles	105.94	107.68	110.07	123.85	128.46	137.18	148.36
% of Revenue from Medicare: Highest Quartile	117.71	120.38	122.55	140.11	145.50	151.49	160.89
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	110.28	112.02	115.04	128.79	135.23	142.31	150.86
% of Minority Race/Ethnicity Resident Days: Third Quartile	112.73	113.68	116.01	128.43	136.99	142.04	150.65
% of Minority Race/Ethnicity Resident Days: Highest Quartile	111.81	113.38	116.09	128.75	134.13	139.07	145.22

Figure 15. Care Related Costs by 2015 Care Related Cost Quartiles

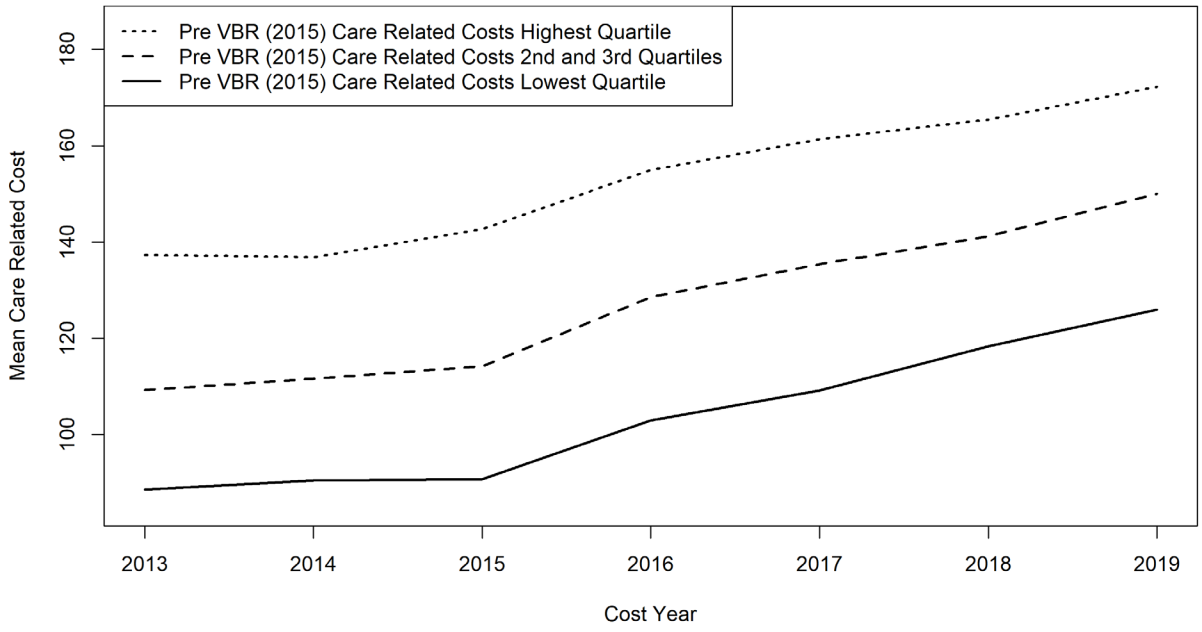


Figure 16. Care Related Costs by Location/Hospital Affiliation

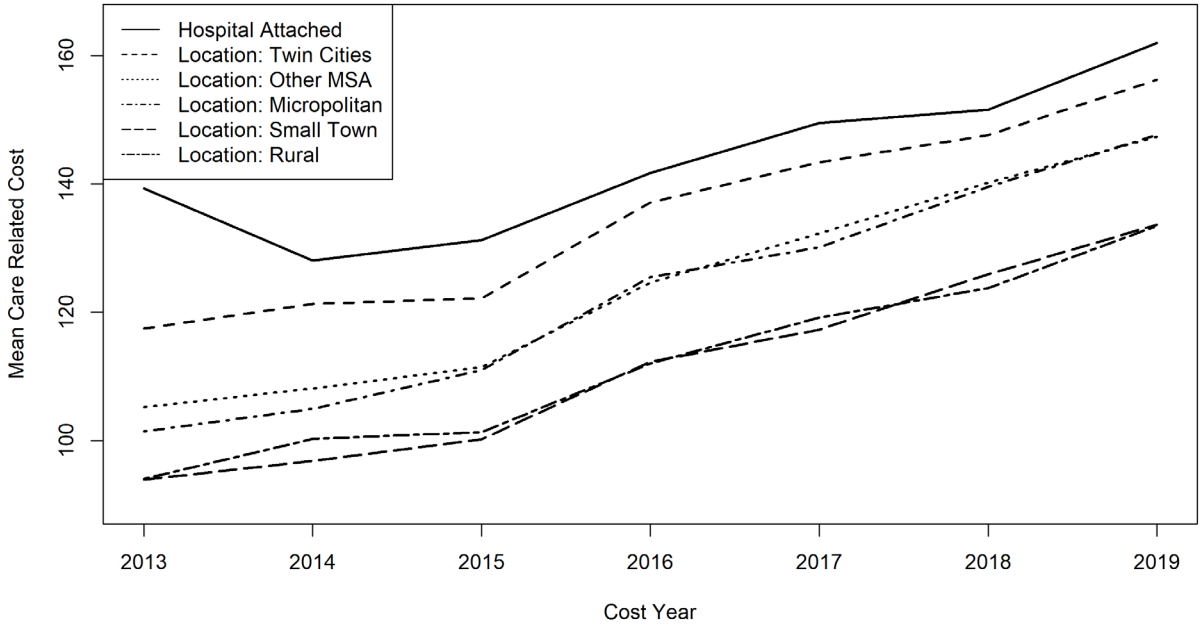


Figure 17. Care Related Costs by Ownership Type

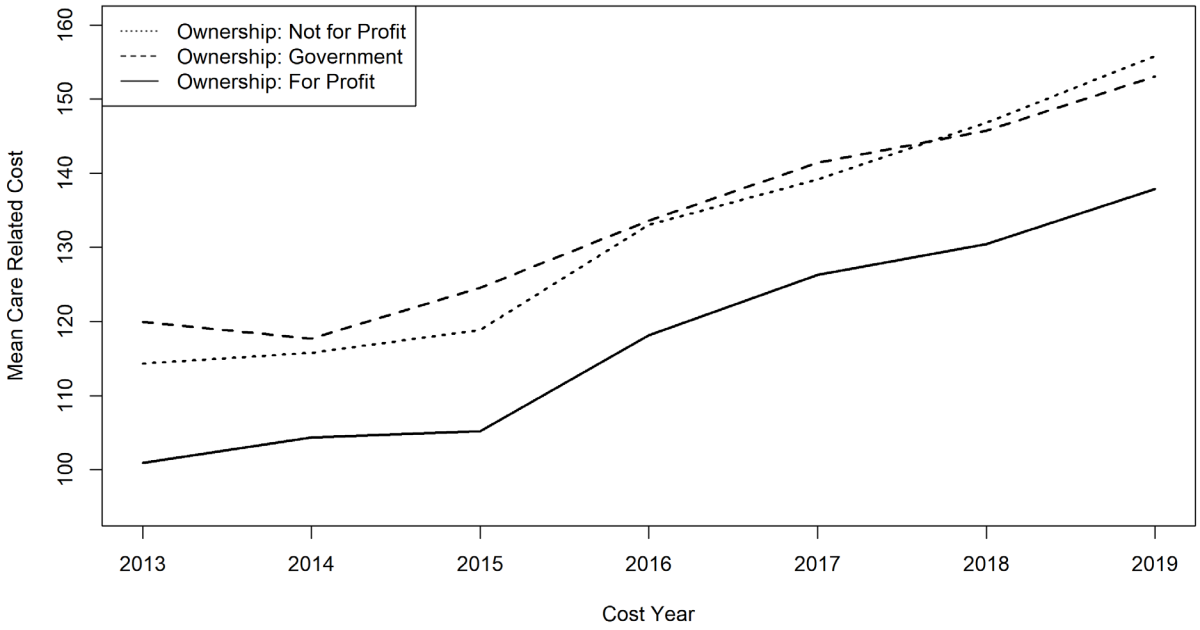

Ownership: Not for Profit
Ownership: Government
Ownership: For Profit
Mean Care Related Cost
100
110
120
130
140
150
160
2013
2014
2015
2016
2017
2018
2019
Cost Year

Figure 18. Care Related Costs by Change in Ownership over Data Period

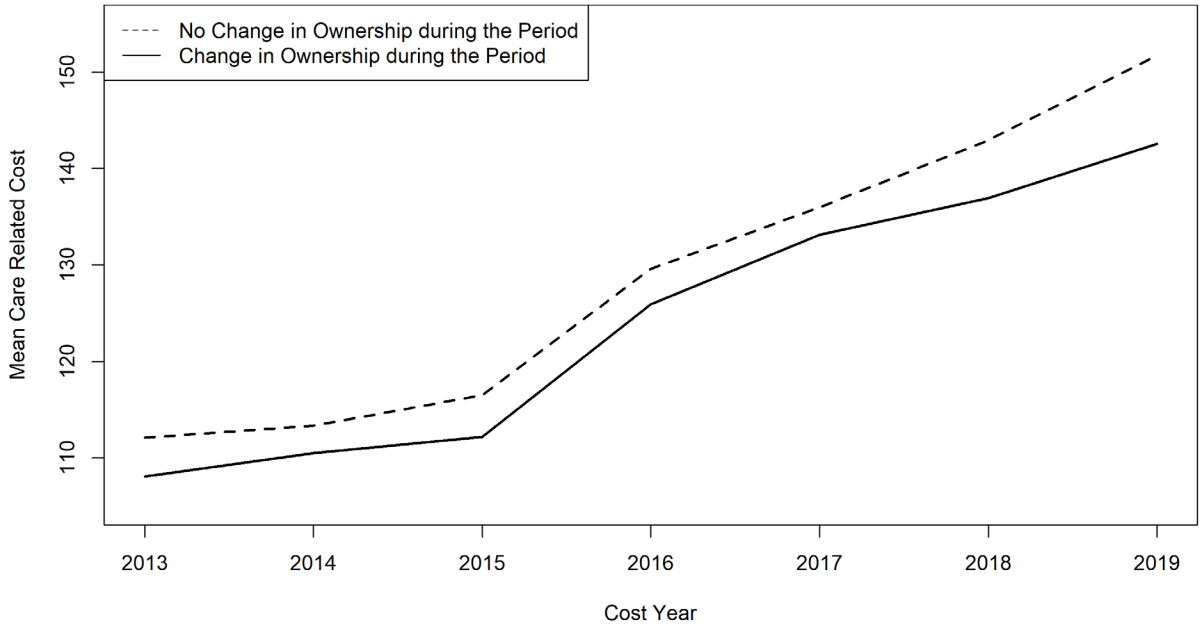


Figure 19. Care Related Costs by Number of Beds Quartile

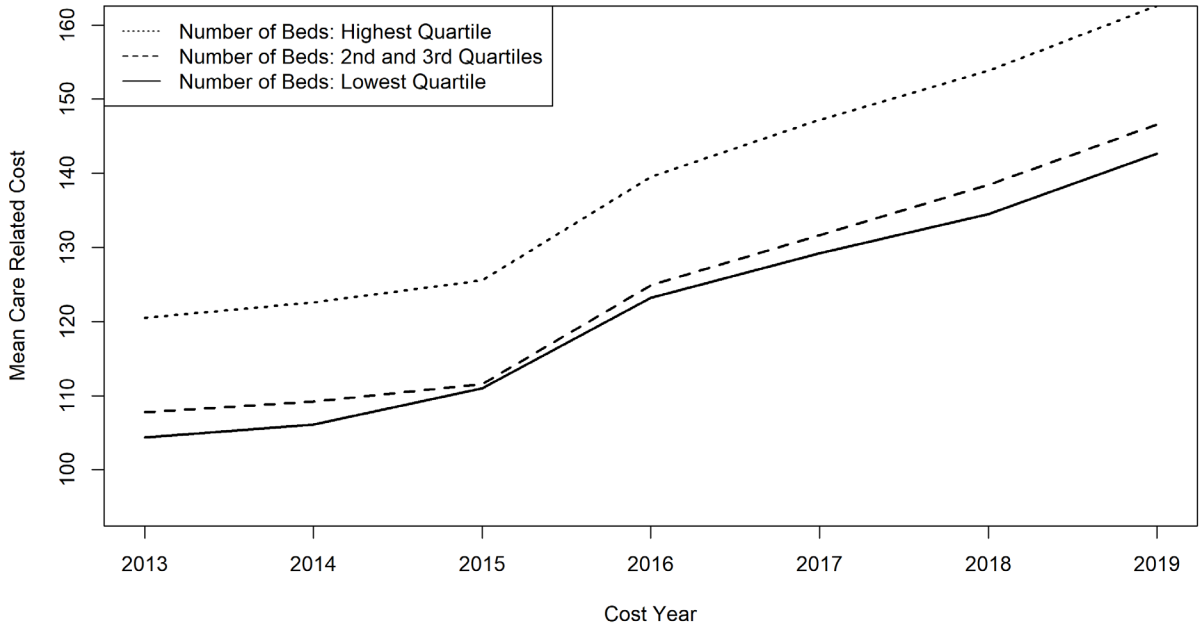


Figure 20. Care Related Costs by Annual Admits per Bed Quartile

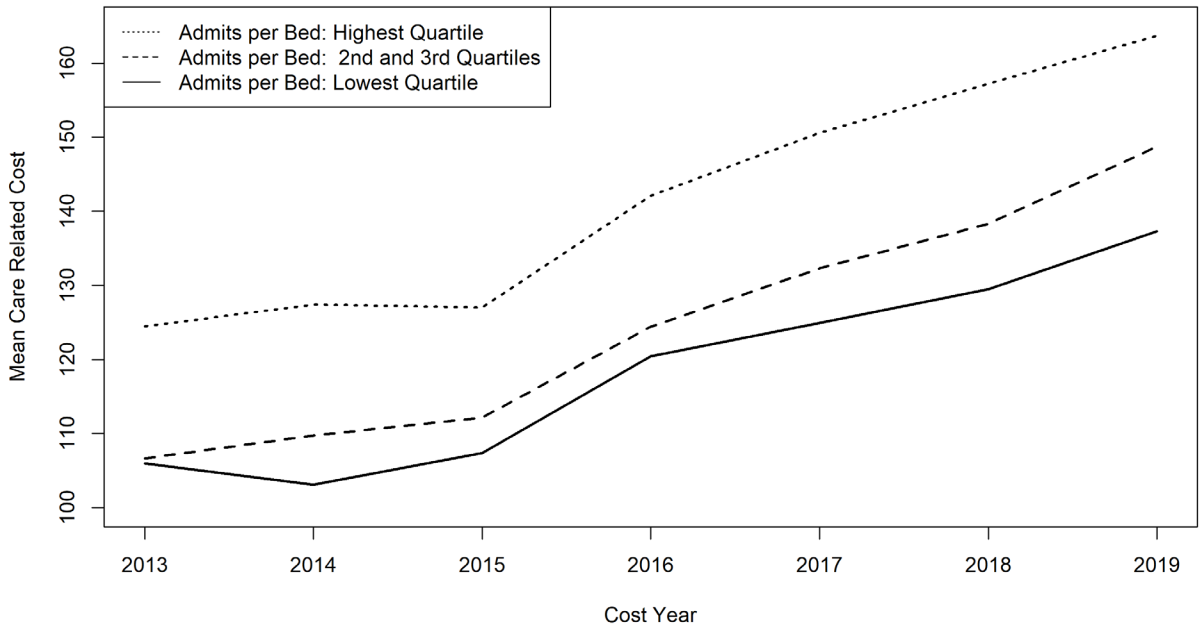


Figure 21. Care Related Costs by Occupancy Rate Quartile

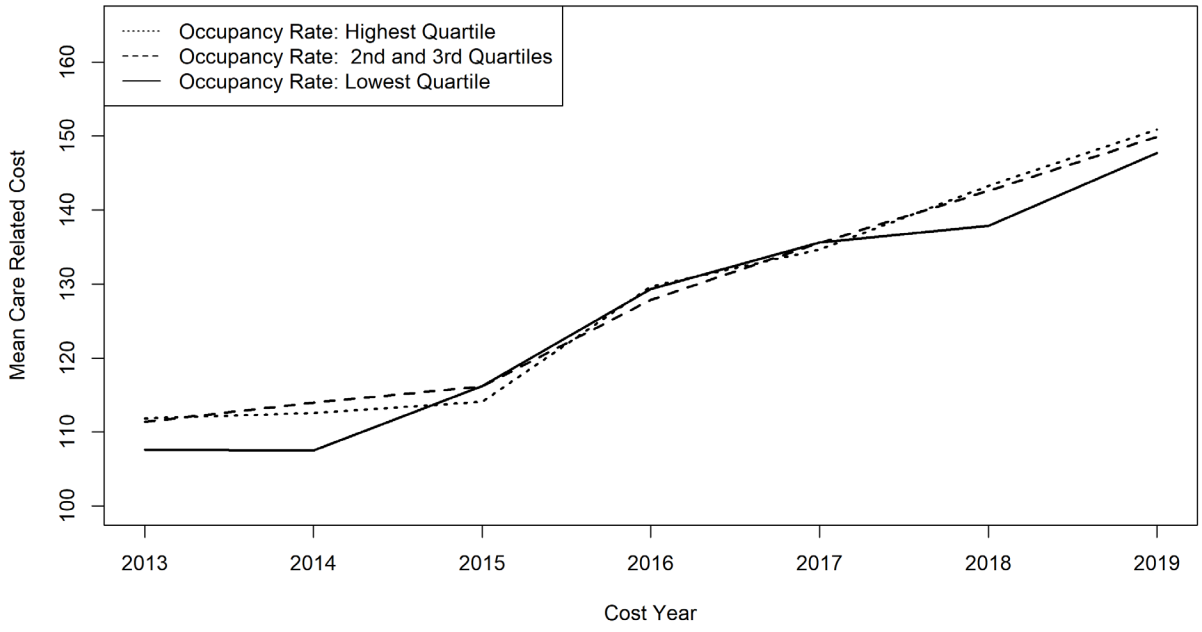


Figure 22. Care Related Costs by Percentage of Revenue from Medicaid Quartile

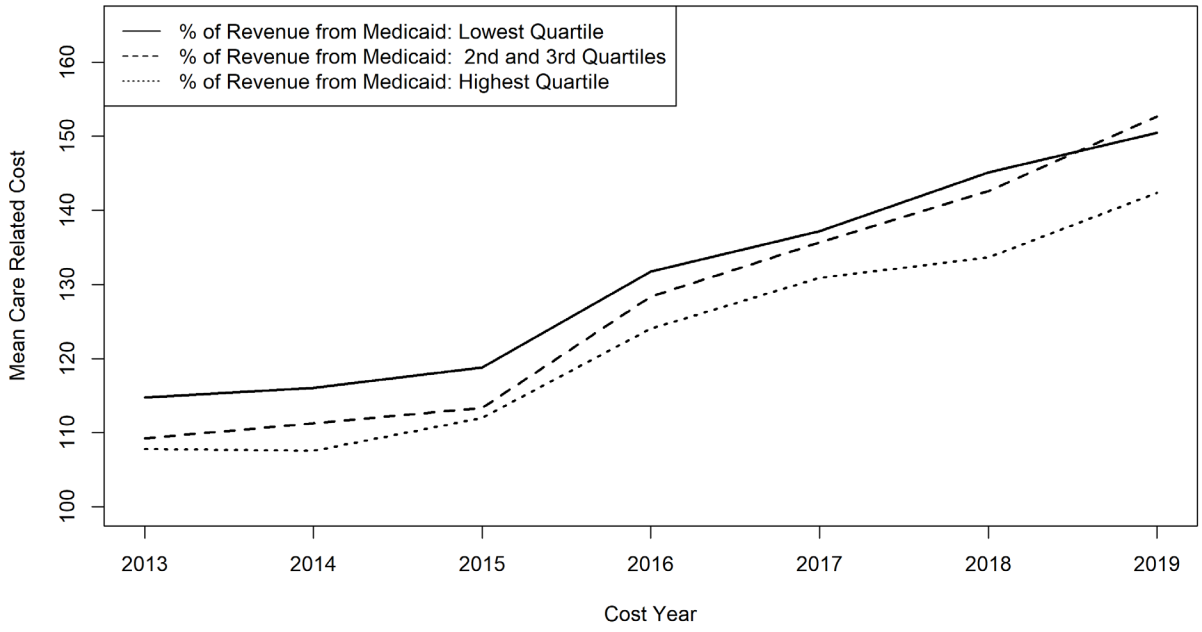


Figure 23. Care Related Costs by Percentage of Revenue from Medicare Quartile

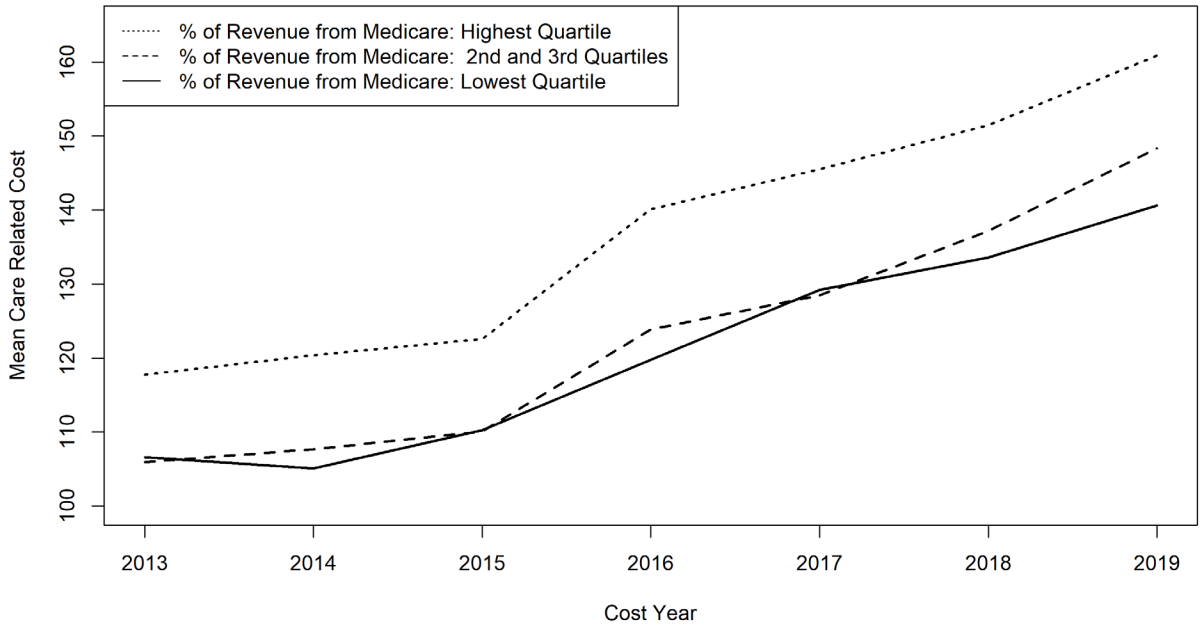
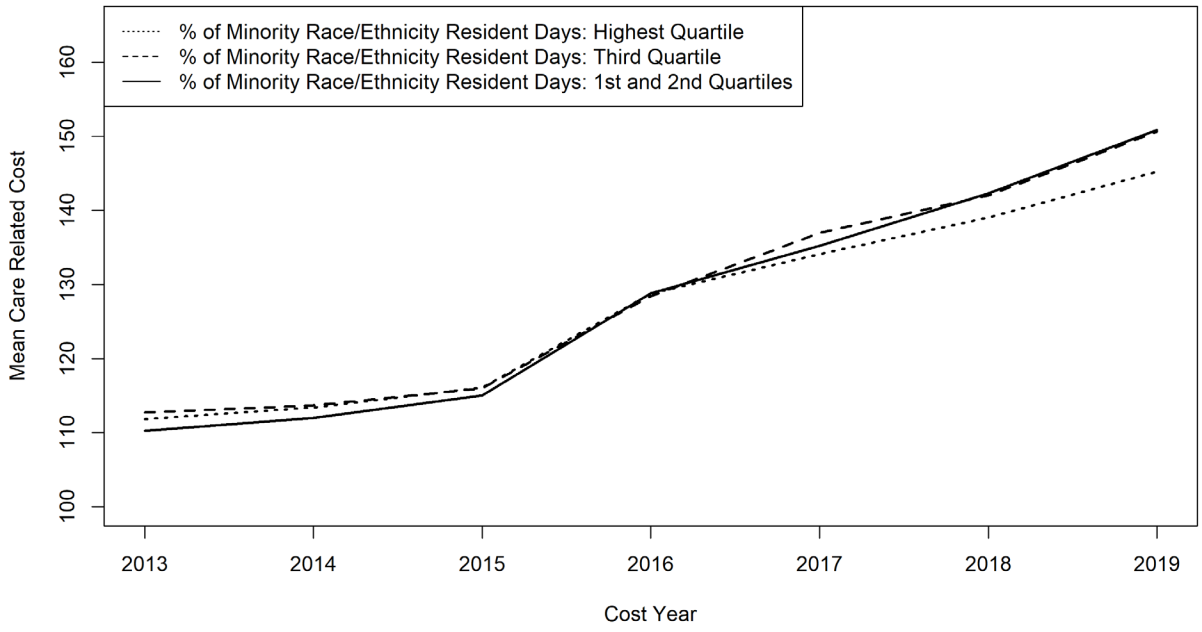


Figure 24. Care Related Costs by Percentage of Minority Race/Ethnicity Resident Day Quartile



B. Subgroup Analysis: Other Operating Costs

Table *9* displays the annual means in other operating costs per resident day by each variable's sub-group (row titles) and cost year (column titles). There is strong separation between costs by 2015 care related cost groups. Since 2015, growth has occurred in the lower two groups (lowest and middle quartiles, Figure *25*) at the same rate (26% jump) while growth has been slower in the facilities beginning with the highest costs (16% jump). For location/hospital affiliation, costs are highest for hospital attached facilities, but growth in the median is fairly similar across location/hospital affiliation (20-26% since 2015, Figure *26*). The Twin City Metro area has seen the slowest growth at a 20% increase since 2015. For-profit owned facilities have the lowest median other operating costs and the highest growth since 2015 (26% vs 21-23%, Figure *27*). Facilities that did not change ownership over the period have seen more growth in costs since 2015 (24% vs 19%, Figure *28*). Other Operating costs PRD are highest for smaller facilities but cost growth was slightly slower (21% vs 23%, Figure *29*). Conversely, other operating costs PRD were higher for facilities with more annual admissions per bed, but again with slightly slower cost growth since 2015 (23% vs 24-25%, Figure *30*). Lowest occupancy rates saw the highest costs, but the highest occupancy rates saw the slowest growth (19% vs 20-22%, Figure *31*). Those facilities in the middle 50% of the data in terms of percentage of revenue from Medicaid had the highest care-related costs PRD and cost growth since 2015 (28% vs16-19%, Figure *32*). Those facilities in the highest quartile of percentage of revenue from Medicare had the highest costs and the upper 75% saw the most growth since 2015 (25% vs 21%, Figure *33*). The upper quartile in percentage of resident days that were from minority race/ethnicity residents had the lowest other operating costs and cost growth since 2015 (17% vs 24-25%, Figure *34*).

Table 9. Other Operating Cost by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	54.76	57.77	58.18	62.71	65.08	70.18	73.44
Pre VBR (2015) Care Related Costs Middle Quartiles	59.57	62.79	63.32	68.58	72.28	75.30	79.55
Pre VBR (2015) Care Related Costs Highest Quartile	69.99	73.50	76.25	80.59	84.13	83.73	88.68
Hospital Attached	73.64	74.57	79.43	87.27	93.52	91.56	98.95
Location: Twin Cities	61.60	65.04	63.84	66.83	70.21	71.51	76.86
Location: Other MSA	58.99	62.82	63.45	68.48	71.59	76.14	78.70
Location: Micropolitan	55.47	60.07	63.23	67.32	69.48	74.07	78.44
Location: Small Town	55.62	59.60	61.48	67.65	70.09	74.31	77.59
Location: Rural	60.43	59.43	59.57	65.06	66.00	69.88	73.59
Ownership: For Profit	58.90	62.72	61.62	66.53	70.19	72.93	77.65
Ownership: Government	63.95	65.47	68.93	71.03	77.26	76.83	83.70
Ownership: Not for Profit	61.44	64.71	66.40	71.68	74.59	77.72	81.36
Change in Ownership during the Period	61.06	65.82	67.13	72.71	74.23	76.73	80.12
No Change in Ownership during the Period	60.95	63.72	64.70	69.31	73.20	75.94	80.36
Number of Beds: Lowest Quartile	64.01	67.54	69.58	74.73	77.28	80.48	84.12
Number of Beds: Middle Quartiles	59.81	62.69	64.09	68.92	71.88	74.59	78.88
Number of Beds: Highest Quartile	61.01	64.62	64.42	68.56	73.07	75.02	79.28
Admits per Bed: Lowest Quartile	59.24	60.39	62.06	68.41	74.38	74.00	77.55
Admits per Bed: Middle Quartile	59.07	62.31	63.57	67.59	70.26	74.79	78.67
Admits per Bed: Highest Quartile	66.26	71.59	70.48	75.32	78.27	80.32	86.40
Occupancy Rate: Lowest Quartile	64.99	69.26	72.36	77.17	80.89	82.32	86.77
Occupancy Rate: Middle Quartiles	61.86	65.08	65.24	68.89	72.00	73.82	79.88
Occupancy Rate: Highest Quartile	58.66	61.61	62.08	65.77	68.68	74.03	74.16
% of Revenue from Medicaid: Lowest Quartile	61.87	64.11	65.44	68.24	71.45	77.23	77.87
% of Revenue from Medicaid: Middle Quartiles	59.71	63.64	64.57	71.12	73.82	76.61	82.91
% of Revenue from Medicaid: Highest Quartile	62.86	66.32	67.02	70.40	75.85	73.32	77.45
% of Revenue from Medicare: Lowest Quartile	60.97	62.72	64.29	69.68	75.84	75.70	77.96
% of Revenue from Medicare: Middle Quartiles	58.76	60.70	63.61	67.57	70.26	74.06	79.67
% of Revenue from Medicare: Highest Quartile	63.08	68.13	67.20	73.62	75.51	79.00	83.91

Cost Year	2013	2014	2015	2016	2017	2018	2019
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	60.11	63.89	65.32	70.56	74.24	77.99	81.54
% of Minority Race/Ethnicity Resident Days: Third Quartile	62.29	64.05	65.94	71.08	74.35	76.41	81.88
% of Minority Race/Ethnicity Resident Days: Highest Quartile	62.05	65.19	64.56	68.12	70.59	71.04	75.66

Figure 25. Other Operating Costs by 2015 Care Related Cost Quartile

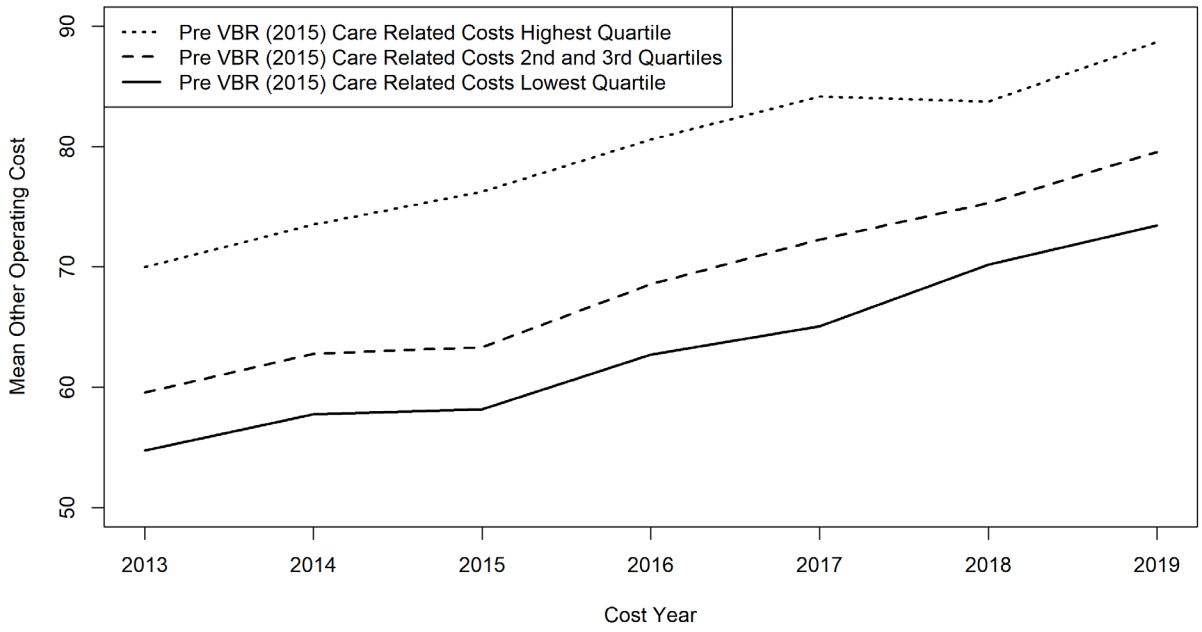


Figure 26. Other Operating Costs by Location/Hospital Affiliation

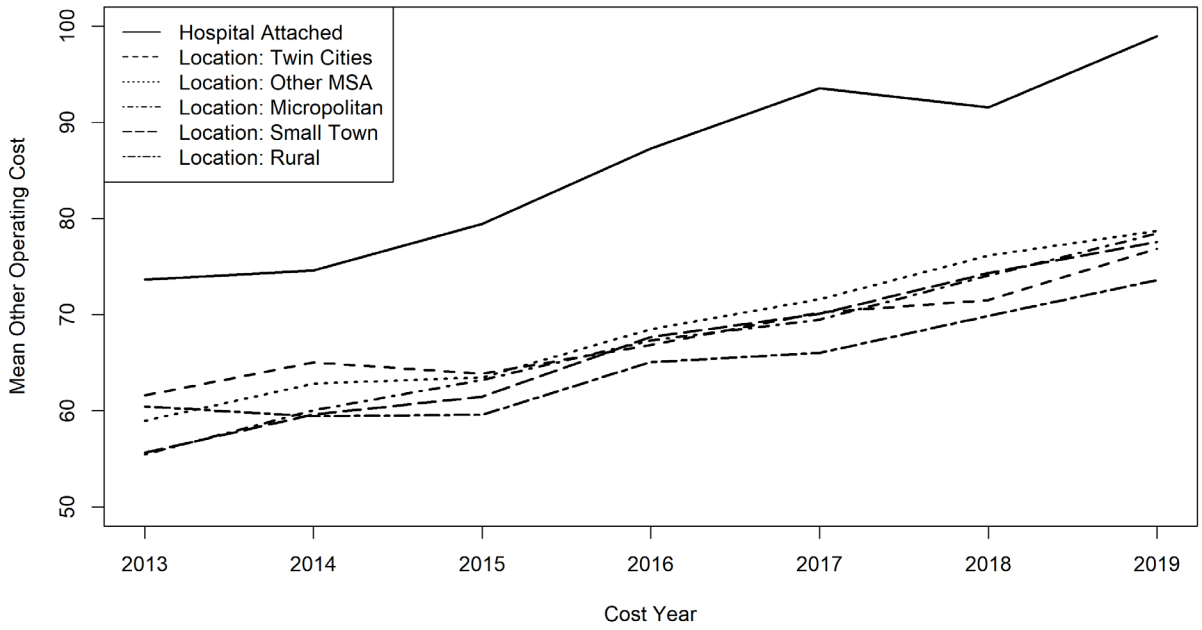


Figure 27. Other Operating Costs by Ownership Type

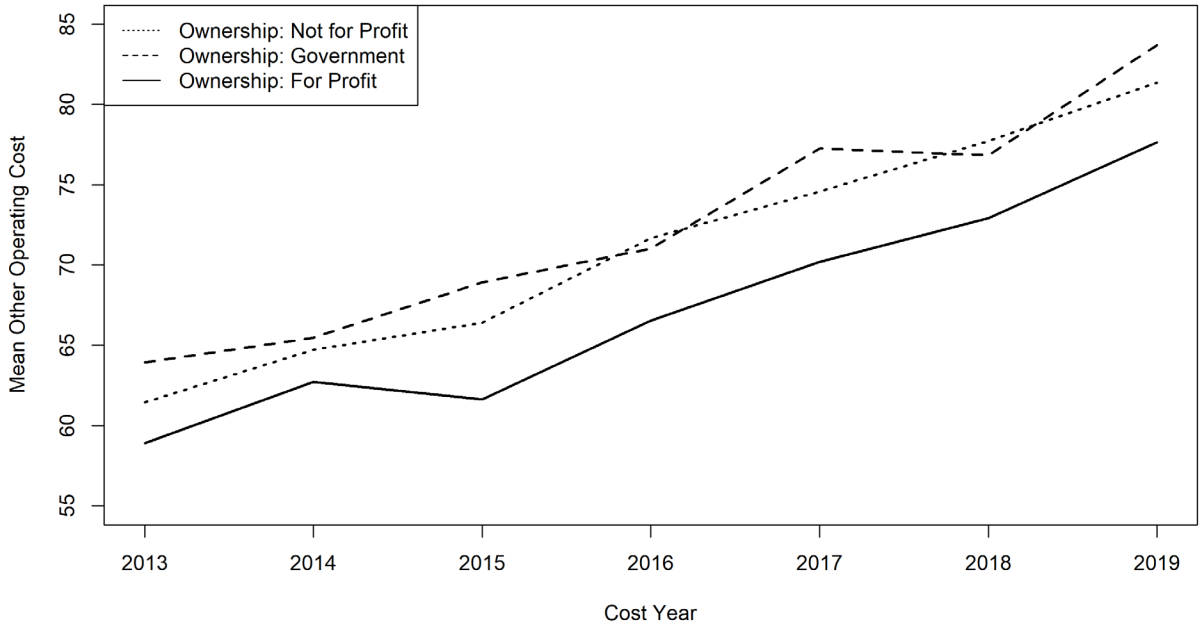


Figure 28. Other Operating Costs by Change in Ownership during the Data Period

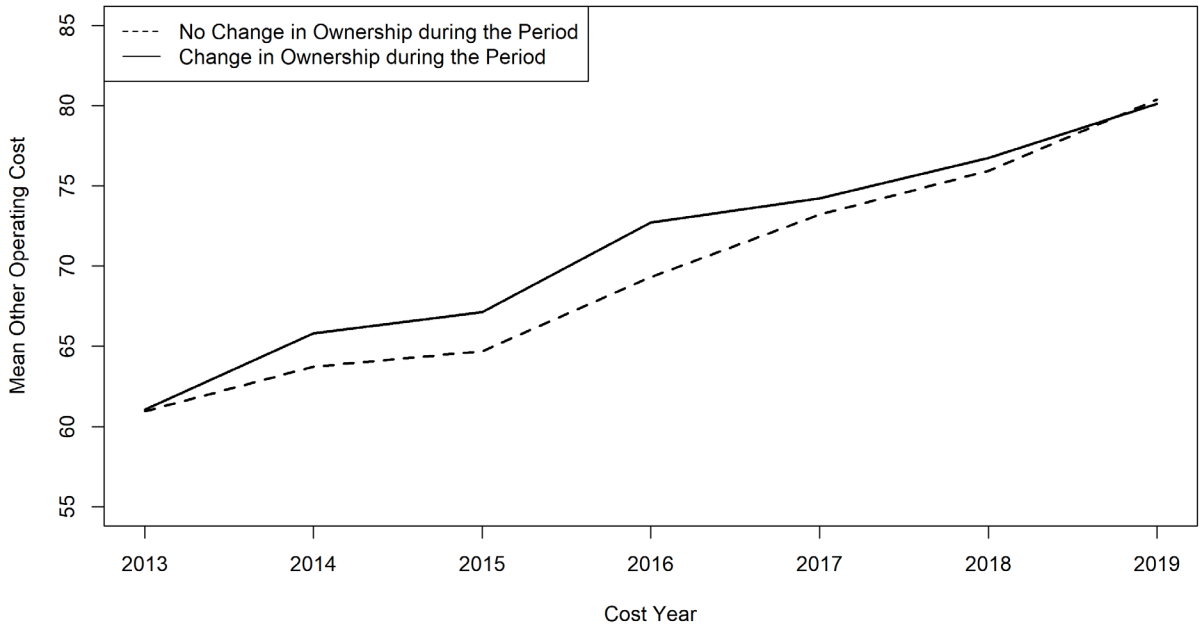

No Change in Ownership during the Period
Change in Ownership during the Period
Mean Other Operating Cost
55
60
65
70
75
80
85
2013
2014
2015
2016
2017
2018
2019
Cost Year

Figure 29. Other Operating Costs by Number of Beds Quartile

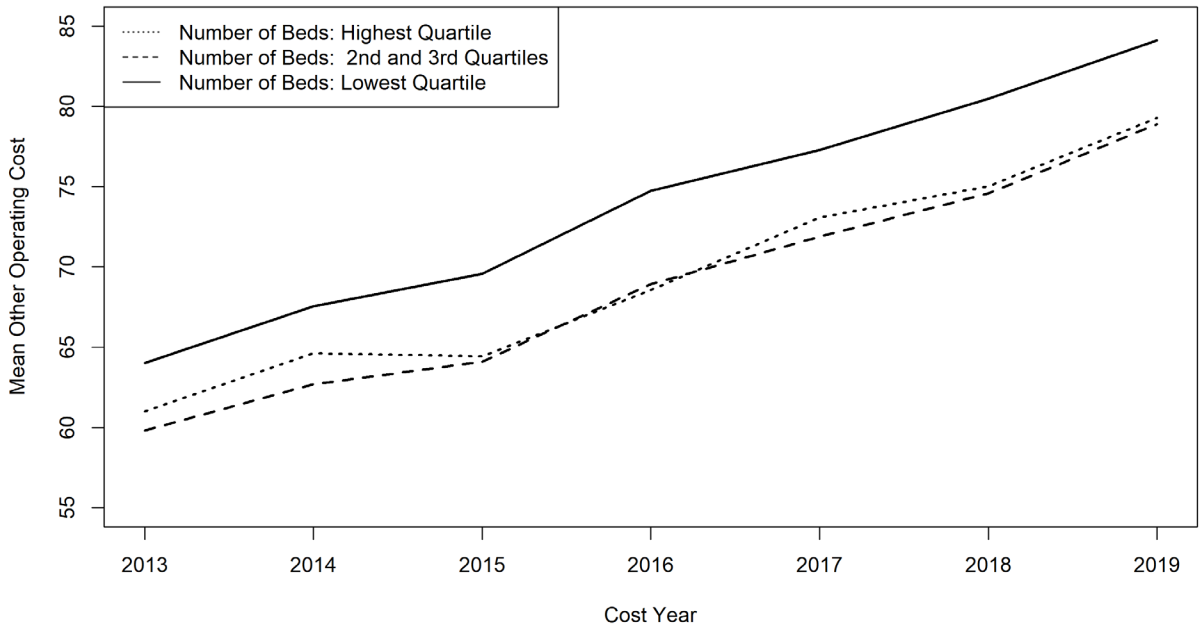


Figure 30. Other Operating Costs by Annual Admits per Bed Quartile

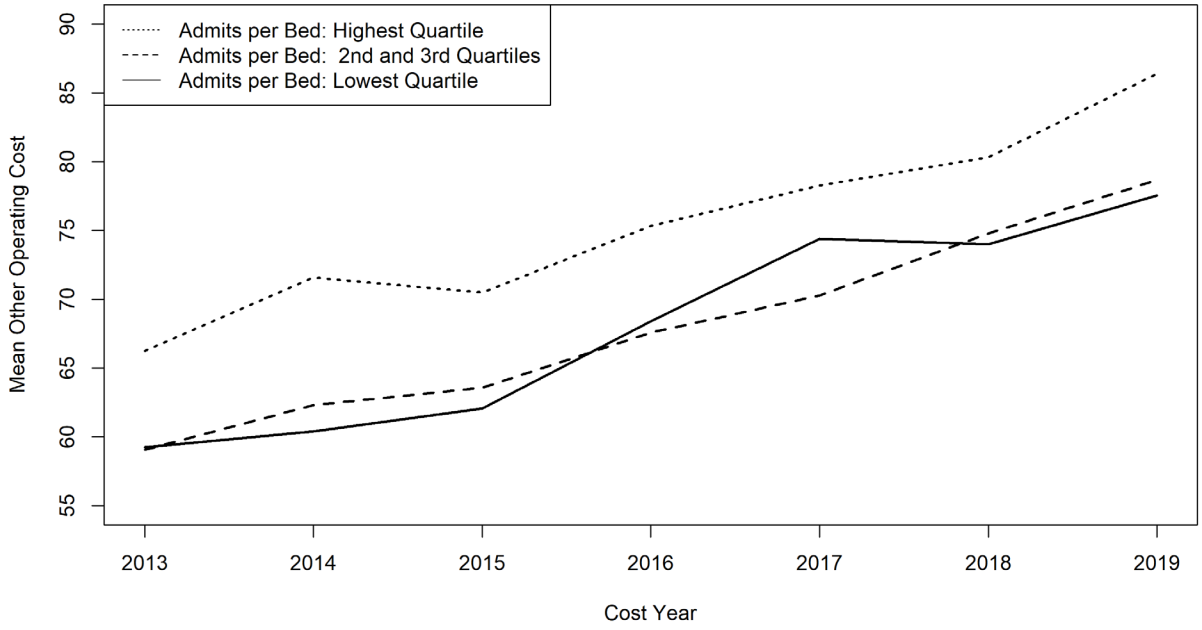


Figure 31. Other Operating Costs by Occupancy Rate Quartile

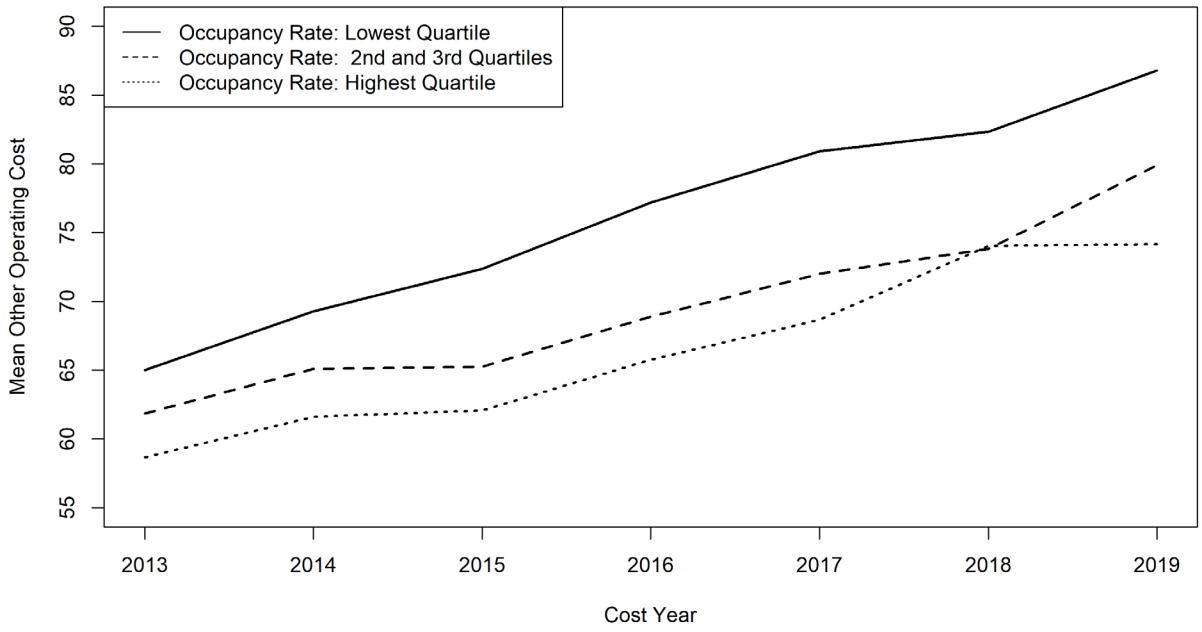


Figure 32. Other Operating Costs by Percentage of Revenue from Medicaid Quartile

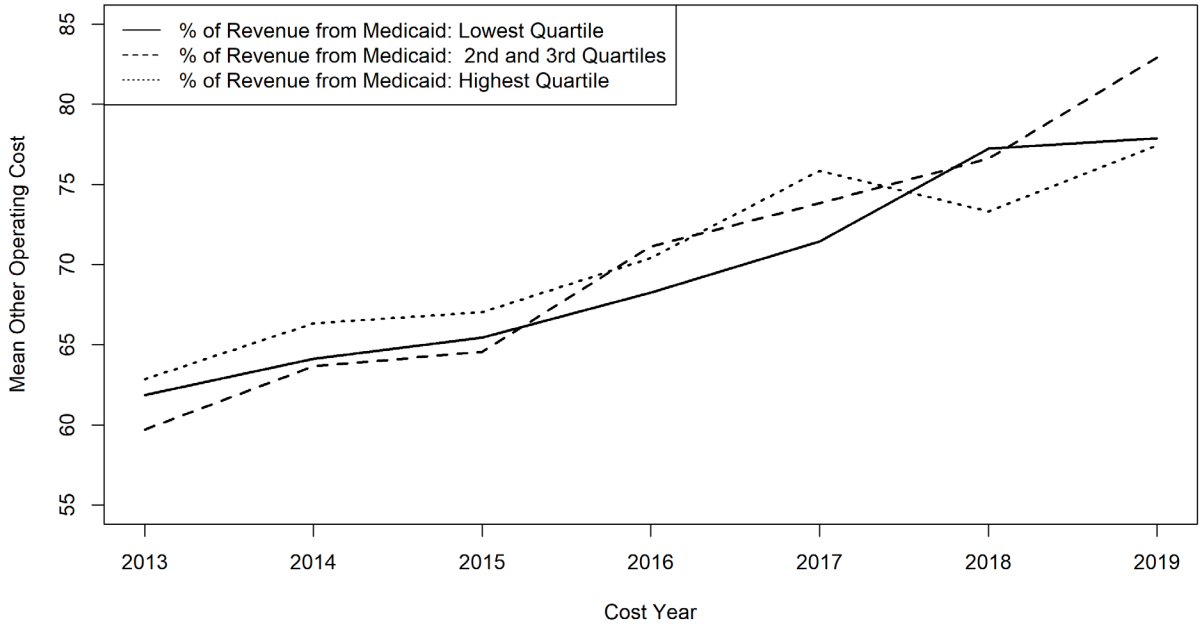


Figure 33. Other Operating Costs by Percentage of Revenue from Medicare Quartile

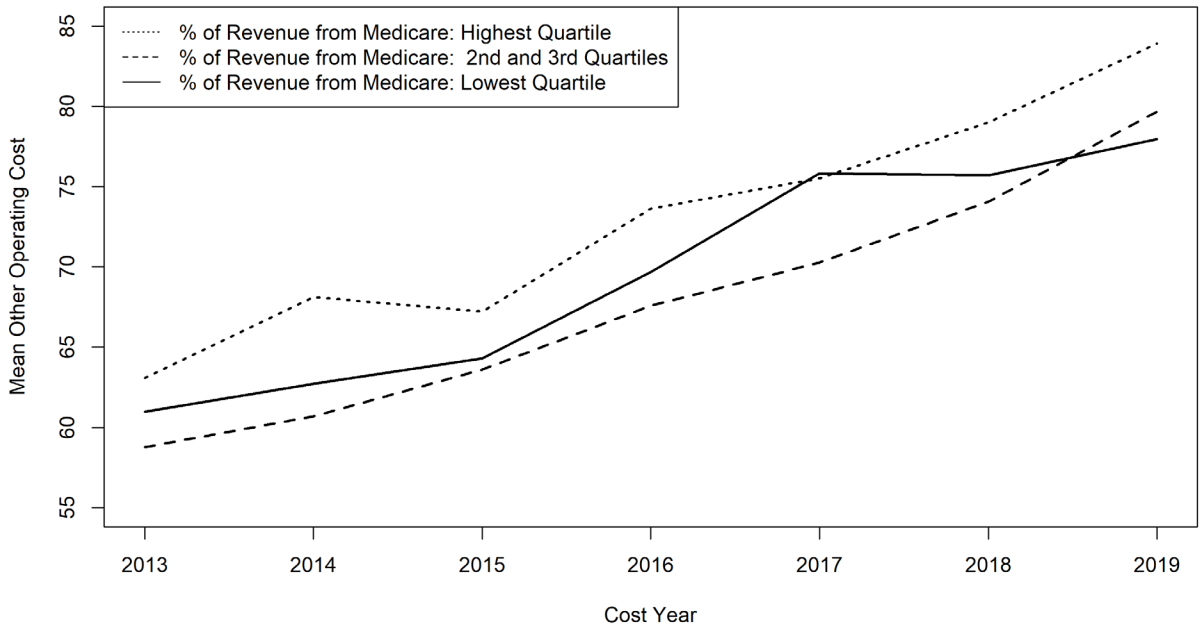
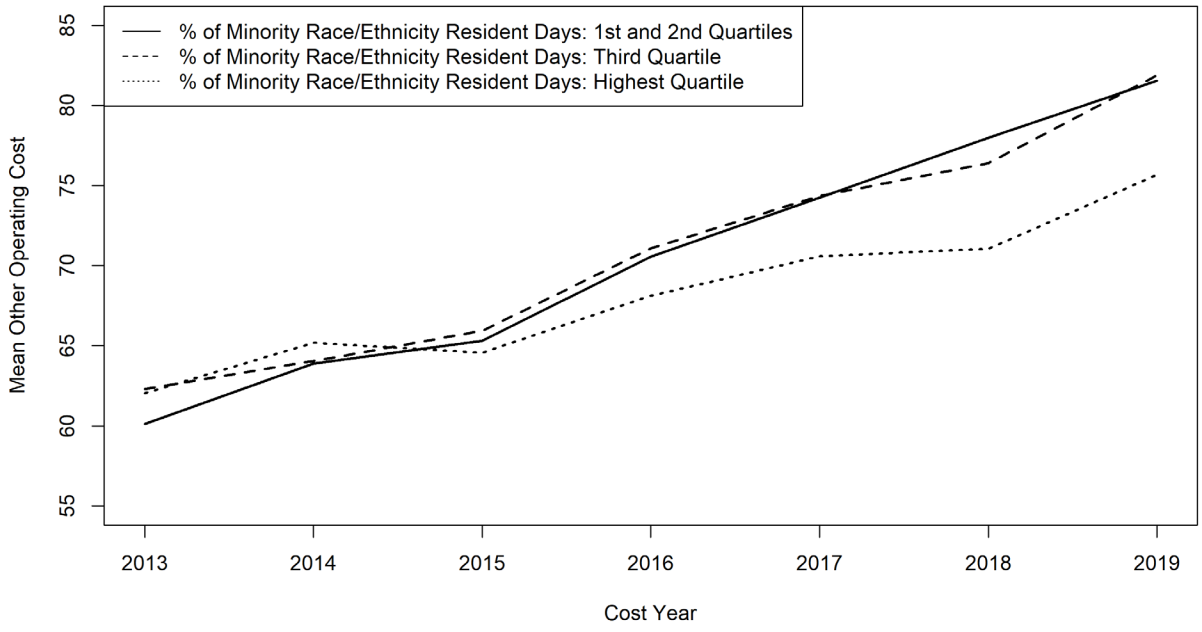


Figure 34. Other Operating Costs by Percentage of Minority Race/Ethnicity Resident Days Quartile



C. Care Related and Other Operating Costs 2018 Cross-Sectional Models

The purpose of these models are to test for general relationships between the sub-groups and the cost measures and to illustrate relative levels of importance of the sub-group variables in explaining variability in costs. Both models use the 2018 audited data, the most recent available audited data at the time of the analysis. Although displayed by quartile in the tables and figures, in the modeling, continuous variables are treated as continuous independent variables. Table *10* displays the model with care related costs PRD as the outcome. Each row of the table gives the independent variable (with the top row being the intercept). The second column gives the estimated regression coefficient and the third column the P-Value (with a value < 0.05 indicating statistical significance). The fourth column multiplies the regression coefficient by one standard deviation of independent variable for continuous variables (see Table 11) and gives a more comparable effect size among the continuous variables. Type 1 SS (Sum of Squares) and Type 3 SS help understand the relative importance of each independent variable in explaining the differences among facilities in terms of cost (variability in the dependent variable). Type 1 is the amount of variability explained by the independent variable alone, and Type 3 is the amount of variability explained by the independent variable after all other independent variables are taken into account (unique variability explained).

For the care-related costs model, the independent variables explain 72.9% of the variability in costs, most of which can be explained by the facilities costs prior to VBR (67%). Additionally, 29% of the total variability is unique to those pre-VBR care related costs. Location/hospital attachment, ownership type, annual admits per bed, number of beds, and revenue sources were also correlated with care-related costs (6-23% Type 1 SS), but much of this correlation overlapped with other factors (0-1.3% Type III SS). After controlling for other effects only pre-VBR costs, ownership type, and occupancy were statistically significantly correlated with care-related costs in 2018. Pre-VBR costs had an estimated coefficient of 0.8 which indicates that for every additional 2015 care related cost dollar, the 2018 figure was estimated to have an additional $0.80 (above and beyond the $69.11 intercept). The standard deviation for 2015 care related costs was $21.15, which means that facilities one standard deviation above the median in costs in 2015 are estimated to have an additional $16.86 more in costs than the median in 2018. The strong relationship between 2015 care costs and 2018 care costs underpins the impact of initial spending on future spending in the current system. The fact that the estimate is under a 1.00 (less than a dollar) suggests that the gap between initial lower and higher spenders is decreasing, after other factors are considered. Notably, for-profit owned facilities are estimated to spend $7.92 less per resident on care-related costs in 2018 than non-profit owned facilities, after accounting for other factors. Occupancy rate also was significantly negatively correlated with care related costs, but like ownership type, did not account for much of the cost variability. Occupancy rate is on a percentage scale, for interpretation purposes, a one standard deviation change in occupancy rate (increase of 9%) is estimated to correspond to a $2.63 per resident day decrease in care-related costs, likely a function of efficiency (spreading costs over more residents).

Table 10. 2018 Cross Sectional Model of Care Related Costs

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	69.11	<.0001			
2015 Care Related Cost	0.80	<.0001	16.86	67%	29%
Hospital Attached	1.86	0.6379		12%	0.6%
Free Standing: Twin City MSA	6.79	0.0781			
Free Standing: Other Metro MSA	5.56	0.1132			
Free Standing: Micropolitan	5.02	0.1903			
Free Standing: Small Town	1.67	0.6628			
Baseline: Free Standing Rural	0.00	-			
Ownership: For Profit	-7.92	0.0002		11%	1.3%
Ownership: Government	-2.76	0.2928			
Baseline: Non-Profit Ownership	0.00	-			
Change of Ownership	0.35	0.8712		1.2%	0.0%
Number of Beds	0.01	0.4227	0.65	8%	0.1%
Annual Admits per Bed	1.17	0.045	1.77	23%	0.3%
Occupancy Rate	-28.20	0.0004	-2.63	0.1%	1.1%
% of Annual Revenue from Medicaid	-1.41	0.8272	-0.25	6%	0.0%
% of Annual Revenue from Medicare	3.22	0.5593	0.45	6%	0.0%
% of Minority Race/Ethnicity Resident Days	-18.94	0.0772	-1.76	0.7%	0.3%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Care Related Costs explained by the variation in the independent variable alone. Type III SS is the amount of variability in Care Related Costs additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Care Related Costs explained by the model (R^2) is 72.9%.

Table 11. Standard Deviations Relevant to Model Interpretation

Variable	Standard Deviation
2015 Care Related Cost	21.15
Number of Beds	45.68
Annual Admits per Bed	1.52
Occupancy Rate	0.09
% of Annual Revenue from Medicaid	0.18
% of Annual Revenue from Medicare	0.14
% of Minority Race/Ethnicity Resident Days	0.09

Table *12* displays the results for the 2018 cross sectional model with other operating costs as the response. For more description on the model and description of columns see page 39. The same set of independent variables are used for this model as in the care-related cost model. The total variability in other operating cost explained by the model is 38.3%, substantially less than the care-related model, but still enough to represent some substantive relationships. Care related costs in 2015 (a general measure of spending), location/hospital affiliation, and occupancy rate are the three most important independent variables in terms of amount of variability explained (Type 1/3 sums of squares). Facility size (number of beds) and resident volume (annual admissions per bed) are also statistically significantly related to other operating costs. In terms of practical impact, hospital attached facilities average much higher other operating costs than free standing facilities generally ($15.52 per resident day higher than rural free standing, more specifically), which is likely due to the way in which costs are allocated between the hospital and the attached skilled nursing facility. Those facilities which spent more on care-related costs in 2015 by one standard deviation ($21.15 per Table 11) had an estimated increase in 2018 other operating costs PRD of $5.35 after controlling for other factors. This underscores the idea that facility spending in one area is correlated with spending amounts in other areas. For occupancy rates a one standard deviation increase in occupancy (9% per Table 11) leads to an estimated drop in other operating cost PRD of $6.05, likely due to diminishing increase in costs per additional resident. Larger facilities (number of beds) tend to have lower costs such that a one standard deviation increase in number of beds (45.68 beds, per Table 11) is related to a $2.40 drop in other operating costs PRD. However, an increase in patient volume (annual admits per bed) had a positive relationship, such that a one standard deviation increase in admits per bed (1.52, per Table 11) is related to a $2.15 increase in other operating costs PRD.

Table 12. 2018 Cross Sectional Model of Other Operating Costs

	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	95.34	<.0001			
2015 Care Related Cost	0.25	<.0001	5.35	12%	5%
Hospital Attached	15.52	0.0005		14%	6%
Free Standing: Twin City MSA	-1.02	0.8124			
Free Standing: Other Metro MSA	2.56	0.5154			
Free Standing: Micropolitan	0.79	0.8547			
Free Standing: Small Town	4.04	0.3477			
Baseline: Free Standing Rural	0.00	-			
Ownership: For Profit	-3.73	0.1097		1.6%	1.4%
Ownership: Government	-6.85	0.0203			
Baseline: Non-Profit Ownership	0.00	-			
Change of Ownership	-0.92	0.7		0.0%	0.0%
Number of Beds	-0.05	0.0085	-2.40	1.6%	1.3%
Annual Admits per Bed	1.41	0.0302	2.15	1.7%	0.9%
Occupancy Rate	-64.73	<.0001	-6.05	7.5%	10%
% of Annual Revenue from Medicaid	10.87	0.1345	1.92	0.7%	0.4%
% of Annual Revenue from Medicare	7.63	0.2173	1.08	0.6%	0.3%
% of Minority Race/Ethnicity Resident Days	-18.00	0.1341	-1.67	3.4%	0.4%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Other Operating Costs explained by the variation in the independent variable alone. Type III SS is the amount of variability in Other Operating Costs additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Other Operating Costs explained by the model (R^2) is 38.3%.

D. Growth Models for Care Related and Other Operating Costs

This section describes the results of growth models fitting the same independent and response variables (care-related and other operating costs) as in the cross sectional models. Growth models are fit across time (longitudinal) to test for changes in the relationship between variables. Both models were fit using the same methodology using data from 2013-2019. Full models were fit using an intercept for years when VBR was in effect (2016-2019) and interactions between each independent variable and that term to test for changes in relationship (change in slope) due to VBR. Interaction terms that were not statistically significant in the full model (p-value > 0.05) were removed to avoid over fitting.

Table *13* displays the results of both growth models. Columns 2 and 3 related to the model with care-related costs PRD as the outcome and columns 4 and 5 are for the model with other operating costs PRD as the outcome (dependent variable). The number given are the estimated regression coefficient which have the same interpretation as in linear regression, the marginal impact on the response for a unit change in the independent variable. Coefficients in parentheses are negative, and bolded terms are statistically significantly different than 0 (P-value < 0.05). The VBR Effect columns are of most interest. The row titled 'VBR Years (2016-2019)' is an intercept term which indicates the jump in the response related to the implementation of VBR. Remaining terms in the column are the modification (interaction terms) to the row effect associated with the implementation of VBR. For example, care-related costs PRD jumped by an estimated $19.43 and other operating costs PRD jumped by an estimated $11.16 when VBR was implemented, after controlling for the other factors. Spending on care related costs PRD increased for free-standing metro facilities by an estimated $4.81 PRD more than rural facilities during the, and by an estimated $7.96 more than hospital attached facilities. Non-Profit facilities spent significantly more than For-Profit or Government owned facilities during the VBR period ($3.23 and $3.32 respectively), which is in addition to the $3.22 gap between Non-Profit and For-Profit facilities that existed prior to VBR. The negative relationship between occupancy rate and minority race/ethnicity resident days increased during the VBR period ($1.26 less for a standard deviation increase in occupancy and $1.47 less for a standard deviation increase in minority race/ethnicity resident day percentage).

For other operating costs PRD, only relationships with occupancy and minority resident days were estimated to have significantly changed during the VBR period. For occupancy, a one standard deviation change in occupancy was estimated to add an additional drop in other operating costs PRD of $0.96 and for minority resident day percentage of $1.98, a threefold change from the period just before VBR implementation (2013-2015).

Table 13. Growth Model Results for Care Related and Other Operating Costs

	Care Related Cost		Other Operating Cost	
	Pre-VBR Effect[&]	VBR Effect*	Pre-VBR Effect[&]	VBR Effect*
Base Value[#]	42.35		67.91	
Year	**4.96**		**2.56**	
VBR Years (2016-2019)		**19.43**		**11.16**
2015 Care Related Cost	**0.81**		**0.31**	
Hospital Attached	**9.59**	(3.15)	**5.79**	
Free Standing: Twin City MSA	4.52	**4.81**	**1.35**	
Free Standing: Other Metro MSA	0.52	2.03	(0.44)	
Free Standing: Micropolitan	(0.81)	3.75	(1.64)	
Free Standing: Small Town	(0.74)	0.39	(0.14)	
Baseline: Free Standing Rural				
Ownership: For Profit	**(3.22)**	**(3.23)**	**(5.12)**	
Ownership: Government	0.40	**(3.32)**	(2.49)	
Baseline: Non-Profit Ownership				
Change of Ownership	(0.80)		1.97	
Number of Beds	**0.02**		**(0.08)**	
Annual Admits per Bed	**0.77**		**0.72**	
Occupancy Rate	**(43.46)**	**(14.01)**	**(49.20)**	**(10.69)**
% of Annual Revenue from Medicaid	3.79		5.20	
% of Annual Revenue from Medicare	3.73		3.18	
% of Minority Race/Ethnicity Resident Days	**(21.70)**	**(16.38)**	11.02	**(22.00)**

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients. *Interaction term with VBR years indicator. [#]Regression intercept.

III. Subgroup Analysis – Quality of Care

This section of the report replicates the analysis done in section 2, but now using quality measures as outcomes, rather than cost measures. The quality measures are the quality indicator scores (out of 50 points, derived from MDS clinical measures), quality of life scores (out of 40 points, derived from resident and family surveys), Minnesota Department of Heath scores (out of 10 points, derived from MDS inspection data), overall direct care retention rates, acuity adjusted community discharge rates (3-30 and 31-90 day), acuity adjusted hospitalization rates (3-30 day), unadjusted hospitalization rates per 1000 resident days (31+ days). Each of the eight measures has its own section, with tables and plots describing the trends over the cost years from 2013-2019. This is followed by two latter sections replicating the 2018 cross sectional models (one for each quality measure) and the growth models (one for each quality measure).

A. Subgroup Analysis: Quality Indicator Scores (Max 50 Points)

Table 14 displays the annual means in facility quality indicator scores by each variable's sub-group (row titles) and cost year (column titles). Generally separation among the scores across subgroups is low and have generally declined since VBR was implemented due to some changes to scoring methodology implemented in 2018. Facilities with the lowest care related spending in 2015 had the lowest mean QI scores (Figure *35*). For location/hospital affiliation, score are marginally lowest in hospital attached facilities (Figure *36*). For-profit owned facilities have the lowest QI scores, about 1.1 points lower than Non-Profit facilities in 2019 (Figure *37*). Facilities that did not change ownership over the period had generally higher QI scores (2.1 points higher in 2019, Figure 38). Smaller facilities (bed size) tended to have the lowest QI scores (1.4 point lower mean than highest quartile in 2019, Figure 39). Facilities with less annual admissions per bed had lower QI scores (1.1 point lower mean than highest quartile in 2019, Figure *40*). Facilities with the lowest occupancy rate finished the period with the lowest QI scores (2.3 point lower mean than highest occupancy quartile in 2019, Figure *41*). Facilities with the lowest percentage of their revenue coming from Medicaid had the highest QI scores (2.7 point mean higher than the highest quartile in 2019, Figure *42*). Facilities with the highest percentage of their revenue coming from Medicare had the highest QI scores (2.5 point higher mean than the highest quartile in 2019, Figure *43*). The lowest 50% of facilities in terms of percentage of minority race/ethnicity resident days had the highest QI scores (0.8 point higher mean than the upper 50%, Figure *44*).

Table 14. Average Quality Indicator Scores by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	33.4	33.3	34.6	36.0	36.4	33.9	33.6
Pre VBR (2015) Care Related Costs Middle Quartiles	34.0	34.2	35.2	36.4	37.5	34.4	34.5
Pre VBR (2015) Care Related Costs Highest Quartile	33.9	34.1	35.6	36.2	36.8	34.5	34.5
Hospital Attached	33.4	34.4	35.5	35.5	36.8	33.9	33.3
Location: Twin Cities	33.9	34.1	35.5	36.8	37.1	34.5	34.3
Location: Other MSA	34.4	33.9	34.3	35.8	36.6	34.2	34.8
Location: Micropolitan	33.5	33.3	35.3	36.0	37.2	34.3	34.2
Location: Small Town	33.1	33.6	35.5	36.9	38.0	34.3	33.9
Location: Rural	34.0	34.1	36.2	38.0	37.9	34.7	34.7
Ownership: For Profit	33.4	33.4	34.1	35.6	36.6	34.0	33.6
Ownership: Government	32.5	33.6	35.4	35.2	37.0	33.4	34.1
Ownership: Not for Profit	34.3	34.3	35.6	36.8	37.3	34.5	34.7
Change in Ownership during the Period	33.3	33.0	33.7	35.1	35.6	33.1	32.7
No Change in Ownership during the Period	34.0	34.2	35.6	36.6	37.5	34.6	34.8
Number of Beds: Lowest Quartile	32.5	33.0	34.0	35.2	36.7	33.5	33.8
Number of Beds: Middle Quartiles	34.1	34.3	35.6	36.7	37.3	34.7	34.1
Number of Beds: Highest Quartile	34.3	34.0	35.1	36.5	36.9	34.2	35.2
Admits per Bed: Lowest Quartile	33.4	34.6	35.9	35.7	36.6	33.8	33.3
Admits per Bed: Middle Quartile	33.8	33.5	34.8	36.1	37.2	34.2	34.7
Admits per Bed: Highest Quartile	34.3	34.1	35.1	37.0	37.3	34.8	34.4
Occupancy Rate: Lowest Quartile	33.7	34.2	34.9	34.5	35.7	33.1	33.1
Occupancy Rate: Middle Quartiles	33.3	33.4	34.8	36.8	37.6	34.3	34.4
Occupancy Rate: Highest Quartile	34.6	34.6	35.8	37.0	37.4	35.5	35.4
% of Revenue from Medicaid: Lowest Quartile	34.3	34.2	35.6	36.9	37.4	34.9	35.0
% of Revenue from Medicaid: Middle Quartiles	33.9	34.0	34.8	36.1	37.0	34.0	34.4
% of Revenue from Medicaid: Highest Quartile	32.6	33.1	34.8	35.7	36.6	34.1	33.3

Cost Year	2013	2014	2015	2016	2017	2018	2019
% of Revenue from Medicare: Lowest Quartile	33.3	34.4	36.1	35.4	37.1	34.5	33.1
% of Revenue from Medicare: Middle Quartiles	33.5	34.0	35.0	36.3	37.0	34.3	34.3
% of Revenue from Medicare: Highest Quartile	34.4	33.7	34.9	36.7	37.1	34.2	35.6
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	33.8	34.0	35.3	36.4	37.6	34.5	34.6
% of Minority Race/Ethnicity Resident Days: Third Quartile	33.6	34.0	34.5	36.6	36.2	34.0	33.8
% of Minority Race/Ethnicity Resident Days: Highest Quartile	34.2	33.9	35.4	35.8	36.5	33.9	33.8

Figure 35. Quality Indicator Score by 2015 Care Related Cost Quartiles

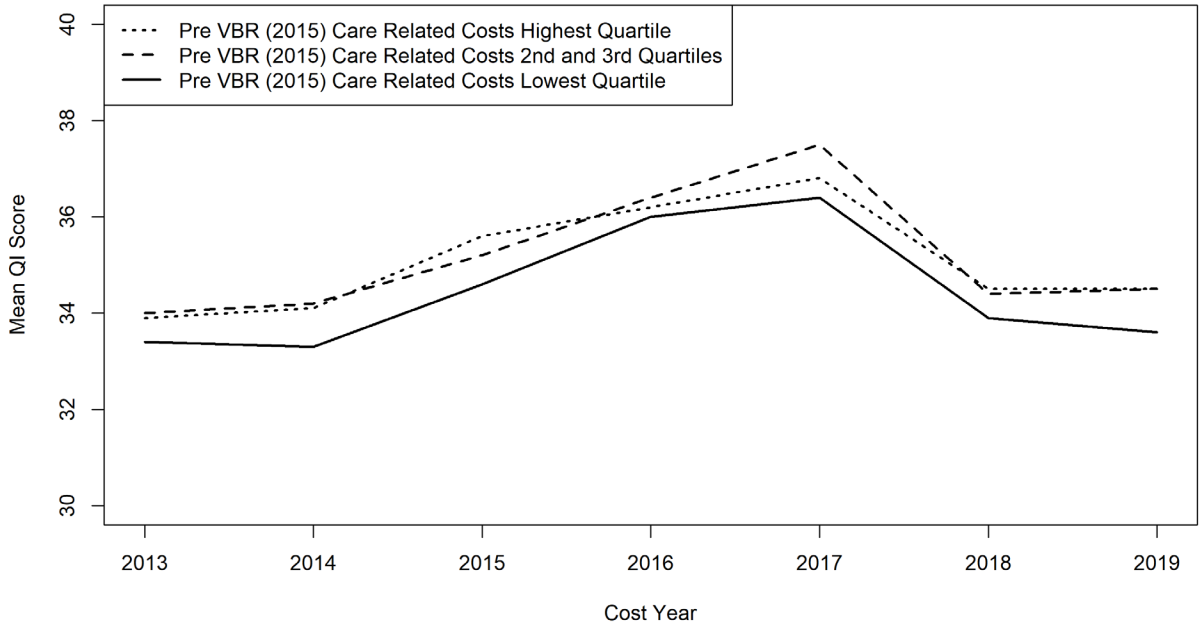


Figure 36. Quality Indicator Score by Location/Hospital Affiliation

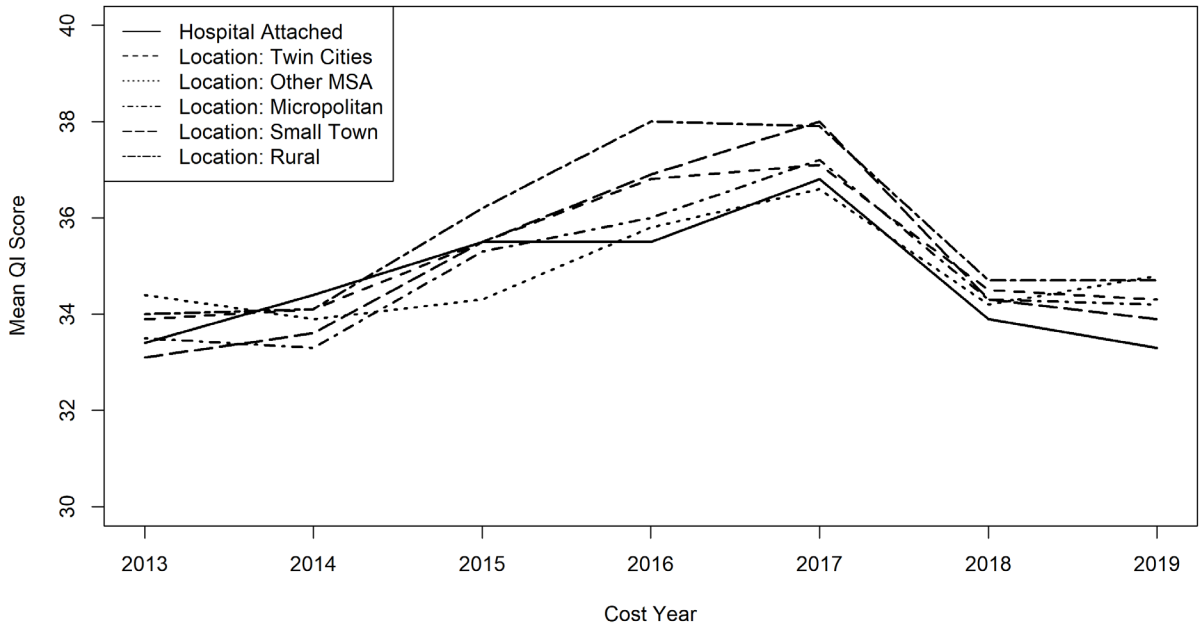


Figure 37. Quality Indicator Score by Ownership Type

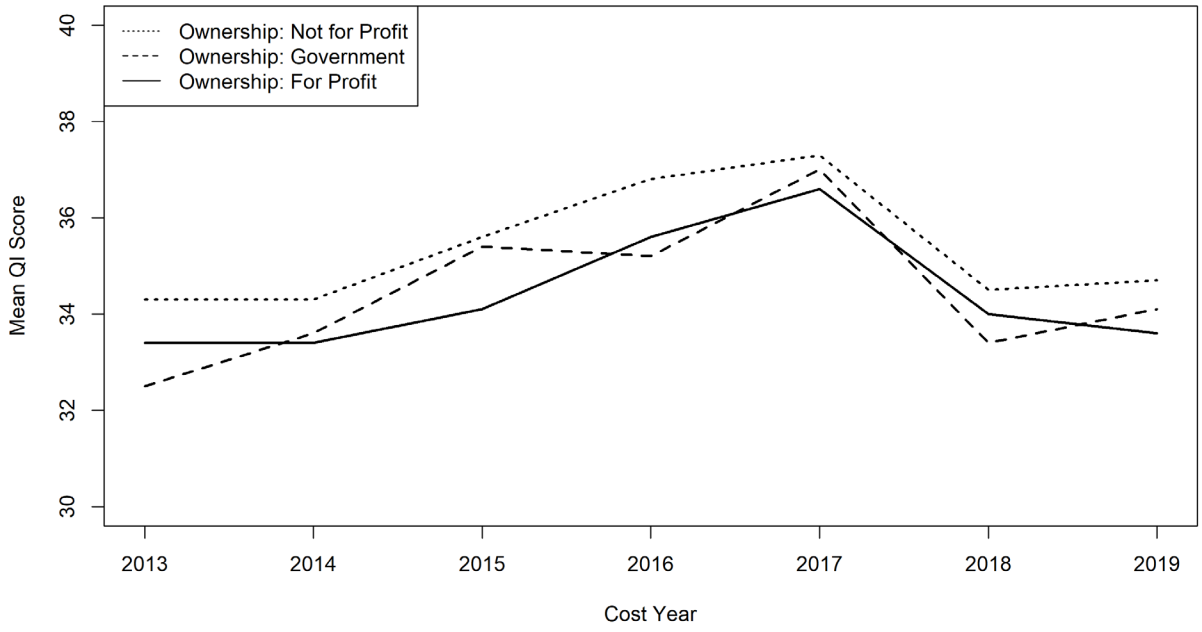


Figure 38. Quality Indicator Score by Change in Ownership over Data Period

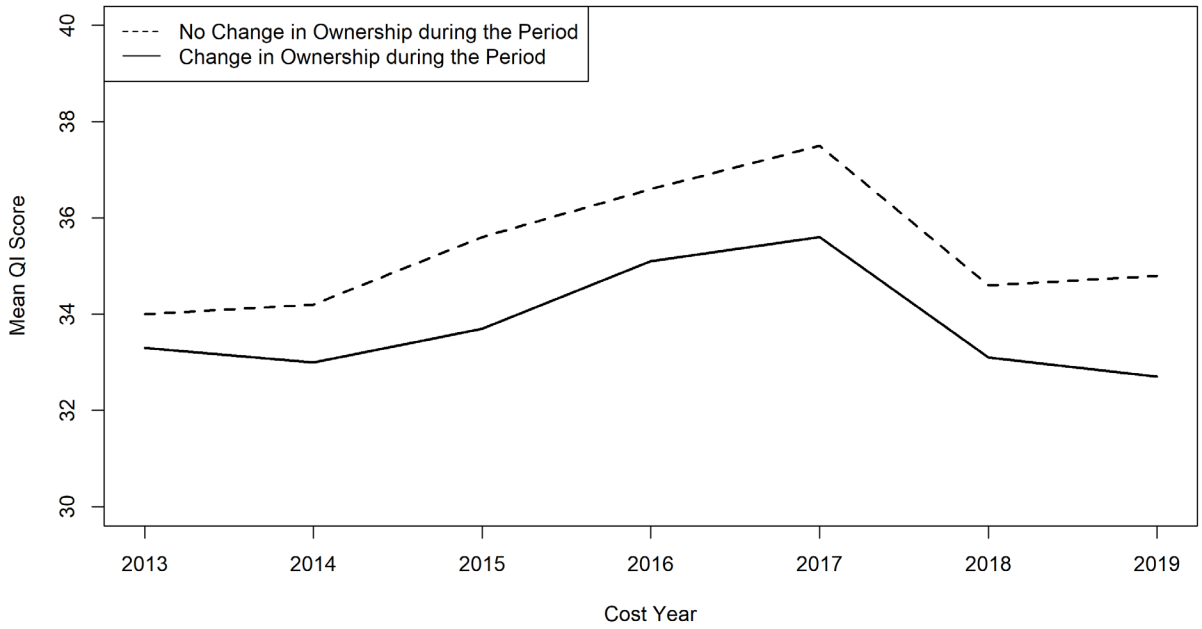


Figure 39. Quality Indicator Score by Number of Beds Quartile

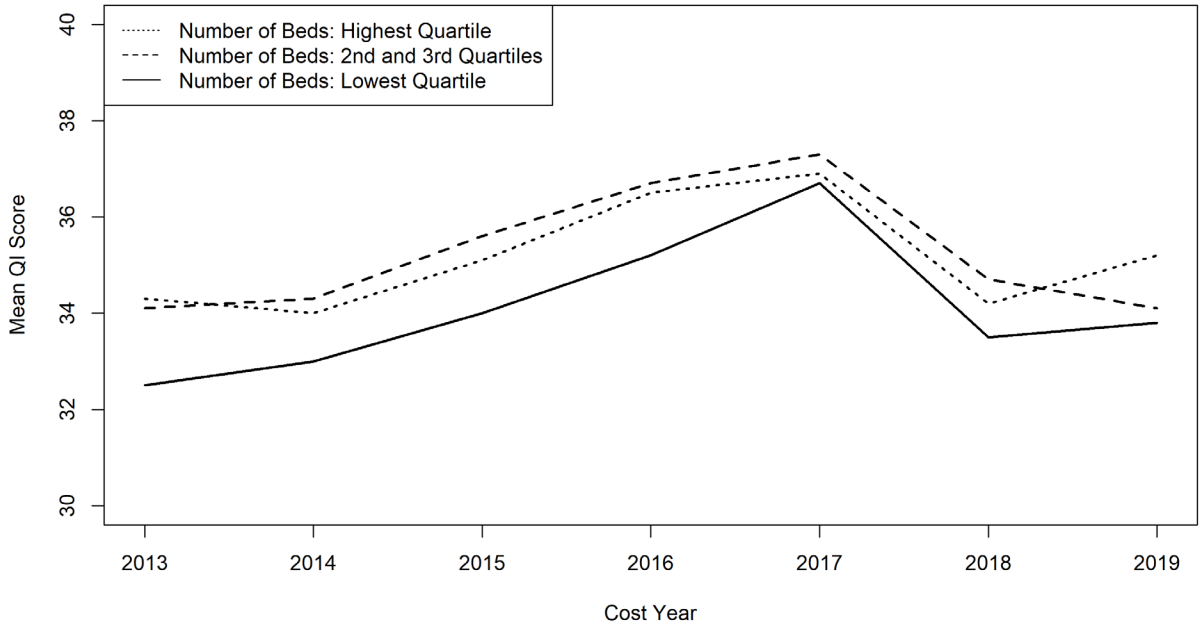


Figure 40. Quality Indicator Score by Annual Admits per Bed Quartile

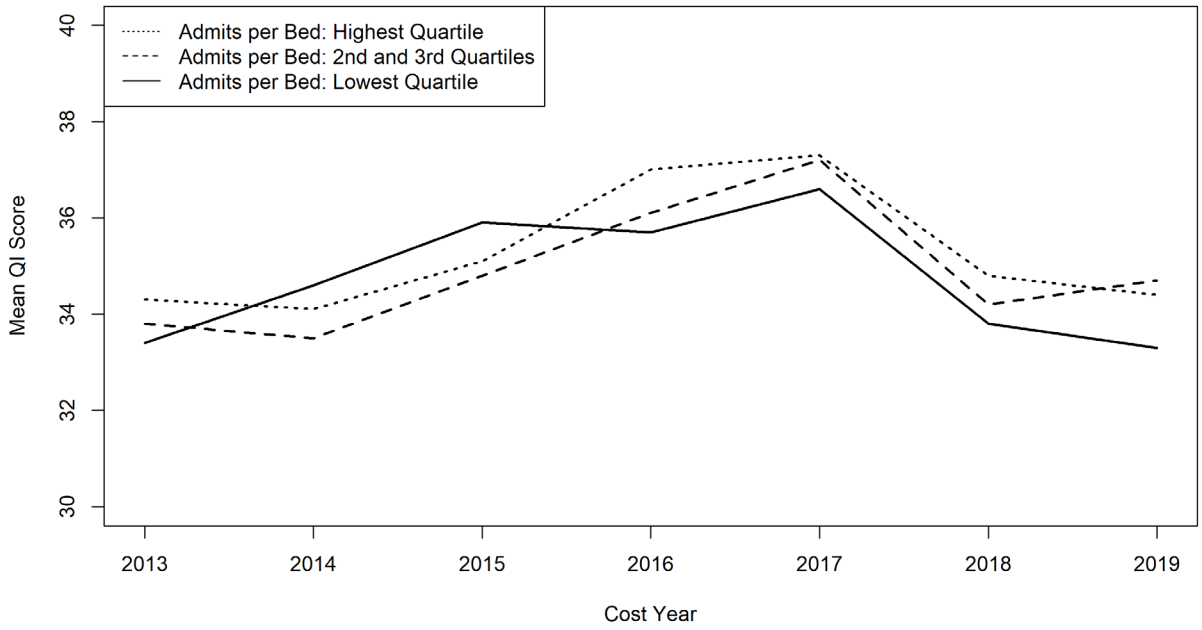


Figure 41. Quality Indicator Score by Occupancy Rate Quartile

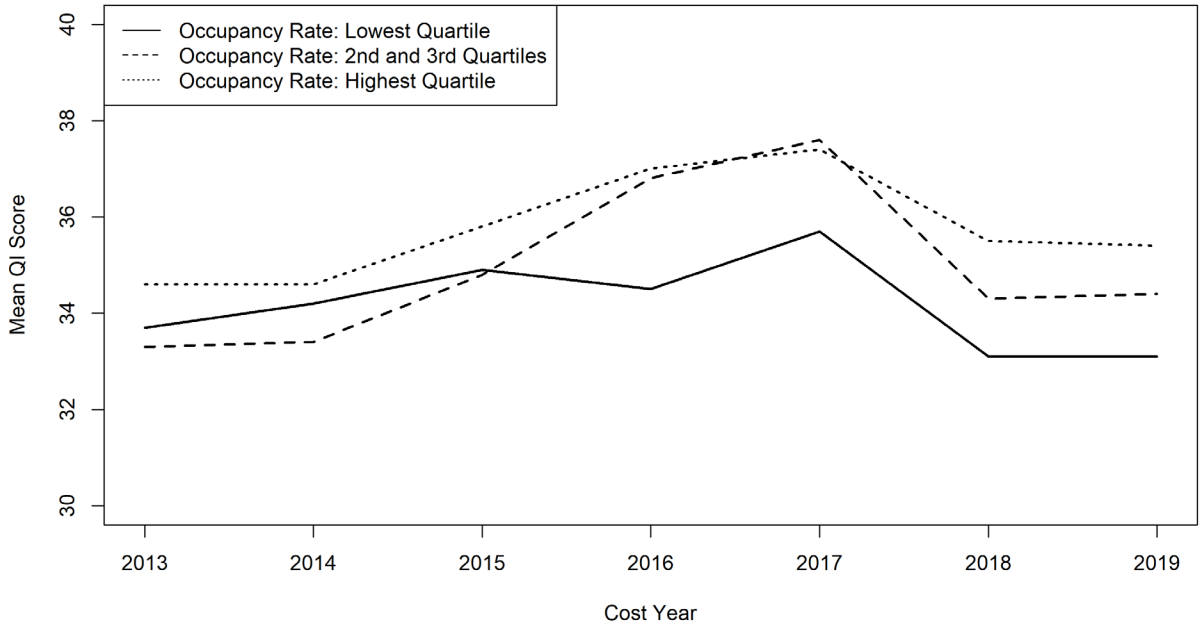


Figure 42. Quality Indicator Score by Percentage of Revenue from Medicaid Quartile

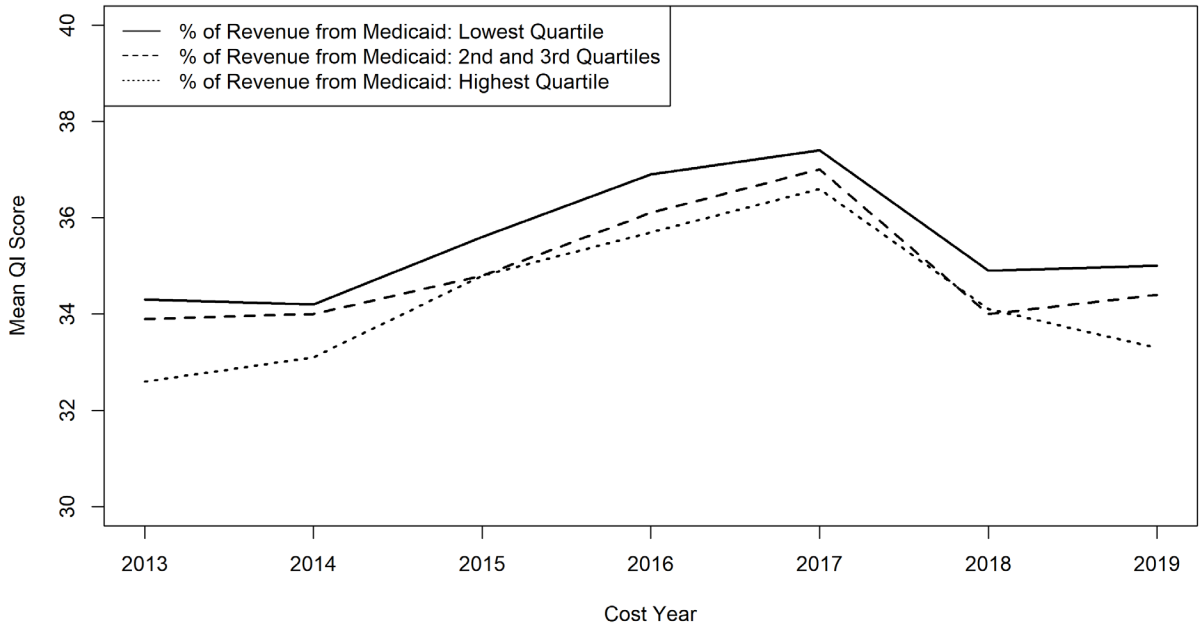


Figure 43. Quality Indicator Score by Percentage of Revenue from Medicare Quartile

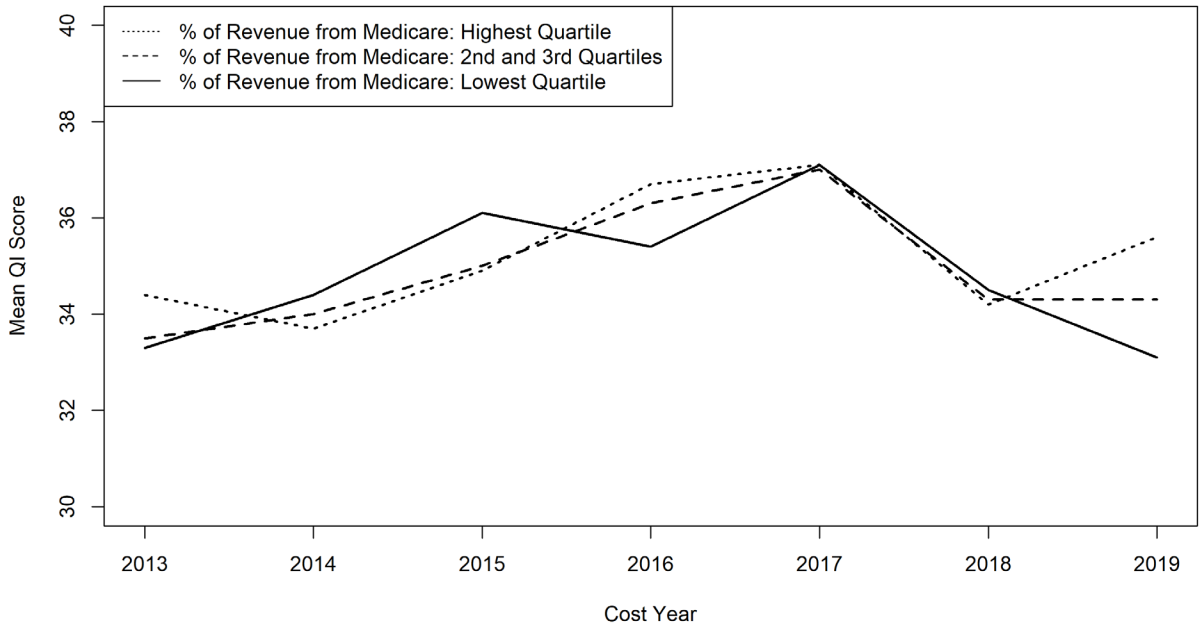
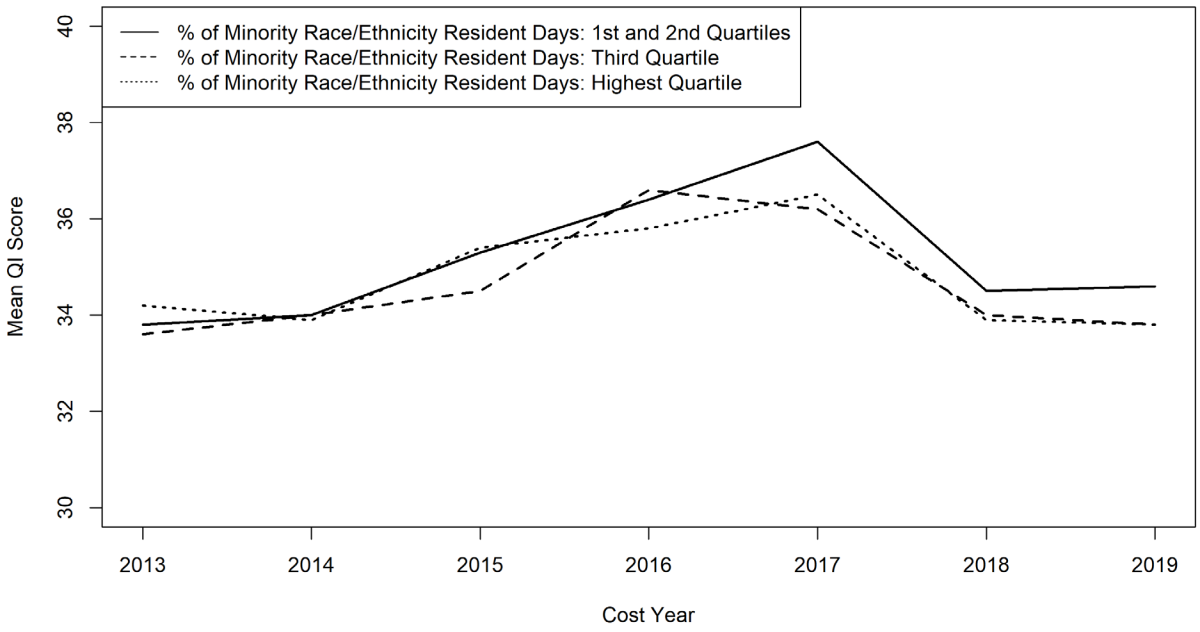


Figure 44. Quality Indicator Score by Percentage of Minority Race/Ethnicity Resident Day Quartile



B. Subgroup Analysis: Quality of Life Scores (Max 40 Points)

Table 15 displays the annual means in facility quality of life scores by each variable's sub-group (row titles) and cost year (column titles). Generally separation among the scores across subgroups is low, but have remained fairly stable over the period. Facilities with the highest care related spending in 2015 had the highest mean QOL scores (0.4 point mean higher than lowest quartile in 2019, Figure *45*). For location/hospital affiliation, scores finished marginally highest for hospital attached and free standing rural facilities, although only the former tended to be highest over the period (Figure *46*). For-profit owned facilities have the lowest QOL scores, about 0.8 points lower than Non-Profit facilities in 2019 (Figure *47*). Facilities that did not change ownership over the period had generally higher QOL scores, with the gap increasing over the period (1.0 point mean higher in 2019, Figure *48*). Bigger facilities (bed size) tended to have the lowest QI scores (0.5 point lower mean than smallest quartile in 2019, Figure *49*). Facilities with less annual admissions per bed had marginally higher QI scores (0.1 point higher mean than highest quartile in 2019, Figure *50*). Facilities with the lowest occupancy rate finished the period with the lowest QI scores (0.8 point lower mean than highest occupancy quartile in 2019, Figure *51*). Facilities with the lowest percentage of their revenue coming from Medicaid had the highest QI scores (0.7 point mean higher than the highest quartile in 2019, Figure *52*). Facilities with the lowest percentage of their revenue coming from Medicare had the lowest QI scores, marginally (0.2 point higher mean than the highest quartile in 2019, Figure *53*). Taken together with the previous finding, this indicates a slight positive relationship between private pay revenue percentage and quality of life scores. The lowest 75% of facilities in terms of percentage of minority race/ethnicity resident days had the highest QI scores (0.8 point higher mean than the upper 25%, Figure *54*).

Table 15. Average Quality of Life Scores by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	33.0	33.0	33.0	32.6	32.3	32.5	32.3
Pre VBR (2015) Care Related Costs Middle Quartiles	33.1	33.0	32.9	32.6	32.2	32.5	32.2
Pre VBR (2015) Care Related Costs Highest Quartile	33.3	33.3	33.4	32.9	32.5	32.7	32.7
Hospital Attached	33.4	33.4	33.5	33.1	32.7	32.9	32.8
Location: Twin Cities	33.0	33.0	33.0	32.5	32.2	32.4	32.2
Location: Other MSA	33.1	33.0	32.9	32.5	32.4	32.6	32.3
Location: Micropolitan	33.0	32.9	33.0	32.8	32.0	32.6	32.2
Location: Small Town	33.0	33.2	33.1	32.9	32.5	32.6	32.5
Location: Rural	33.4	33.5	33.1	32.5	32.4	32.6	32.8
Ownership: For Profit	32.7	32.6	32.5	32.1	31.8	31.9	31.8
Ownership: Government	33.3	33.4	33.4	33.1	32.9	33.0	32.7
Ownership: Not for Profit	33.2	33.3	33.3	32.9	32.6	32.9	32.6
Change in Ownership during the Period	32.7	32.7	32.5	32.0	31.7	31.8	31.6
No Change in Ownership during the Period	33.2	33.2	33.2	32.9	32.5	32.8	32.6
Number of Beds: Lowest Quartile	33.1	33.3	33.2	32.9	32.6	32.8	32.7
Number of Beds: Middle Quartiles	33.1	33.1	33.1	32.7	32.3	32.6	32.3
Number of Beds: Highest Quartile	33.0	32.9	32.8	32.4	32.1	32.3	32.2
Admits per Bed: Lowest Quartile	33.1	33.2	33.2	33.0	32.5	32.8	32.5
Admits per Bed: Middle Quartile	33.1	33.0	33.0	32.5	32.2	32.5	32.3
Admits per Bed: Highest Quartile	33.0	33.0	33.1	32.6	32.4	32.6	32.4
Occupancy Rate: Lowest Quartile	33.0	32.7	32.7	32.3	32.0	32.3	31.9
Occupancy Rate: Middle Quartiles	33.0	33.0	33.1	32.6	32.3	32.5	32.4
Occupancy Rate: Highest Quartile	33.2	33.3	33.2	33.0	32.7	33.0	32.7
% of Revenue from Medicaid: Lowest Quartile	33.2	33.3	33.2	32.8	32.8	32.9	32.6
% of Revenue from Medicaid: Middle Quartiles	33.0	33.0	32.9	32.7	32.2	32.5	32.4
% of Revenue from Medicaid: Highest Quartile	32.8	32.6	32.9	32.2	31.9	32.4	31.9
% of Revenue from Medicare: Lowest Quartile	33.0	33.3	33.3	33.0	32.6	32.7	32.5
% of Revenue from Medicare: Middle Quartiles	33.1	33.1	33.1	32.5	32.2	32.6	32.3
% of Revenue from Medicare: Highest Quartile	33.2	33.0	33.0	32.7	32.3	32.4	32.3
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	33.3	33.2	33.3	32.9	32.6	32.8	32.5
% of Minority Race/Ethnicity Resident Days: Third Quartile	33.2	33.1	33.0	32.7	32.4	32.6	32.6

Cost Year	2013	2014	2015	2016	2017	2018	2019
% of Minority Race/Ethnicity Resident Days: Highest Quartile	32.5	32.6	32.6	32.0	31.5	31.8	31.7

Figure 45. Quality of Life Score by 2015 Care Related Cost Quartiles

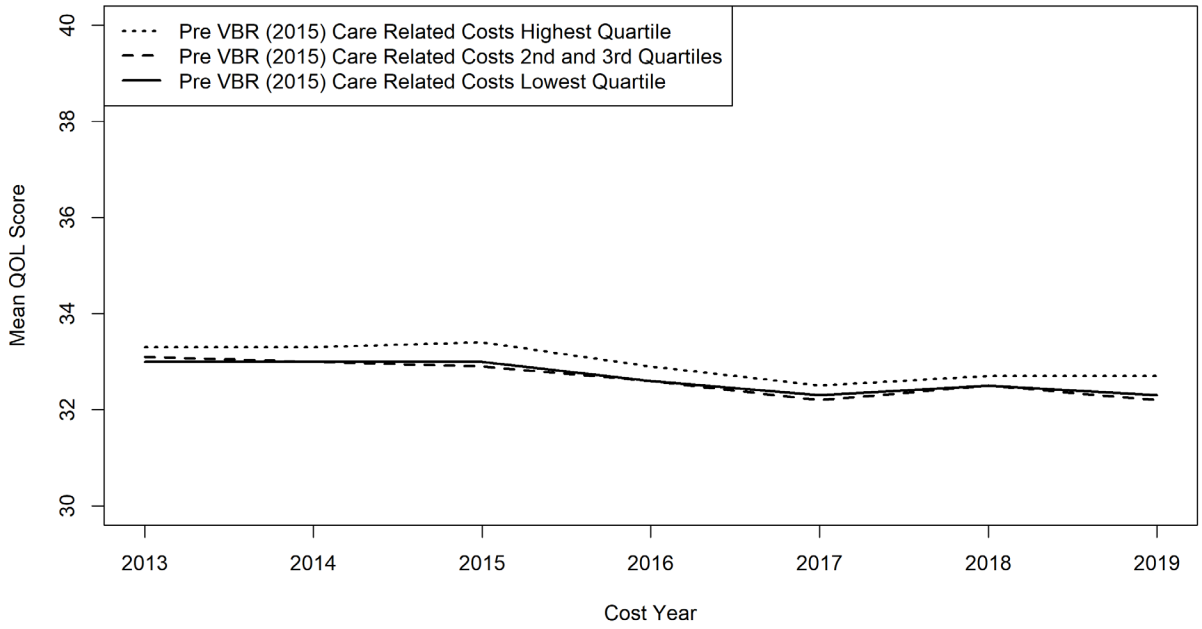


Figure 46. Quality of Life Score by Location/Hospital Affiliation

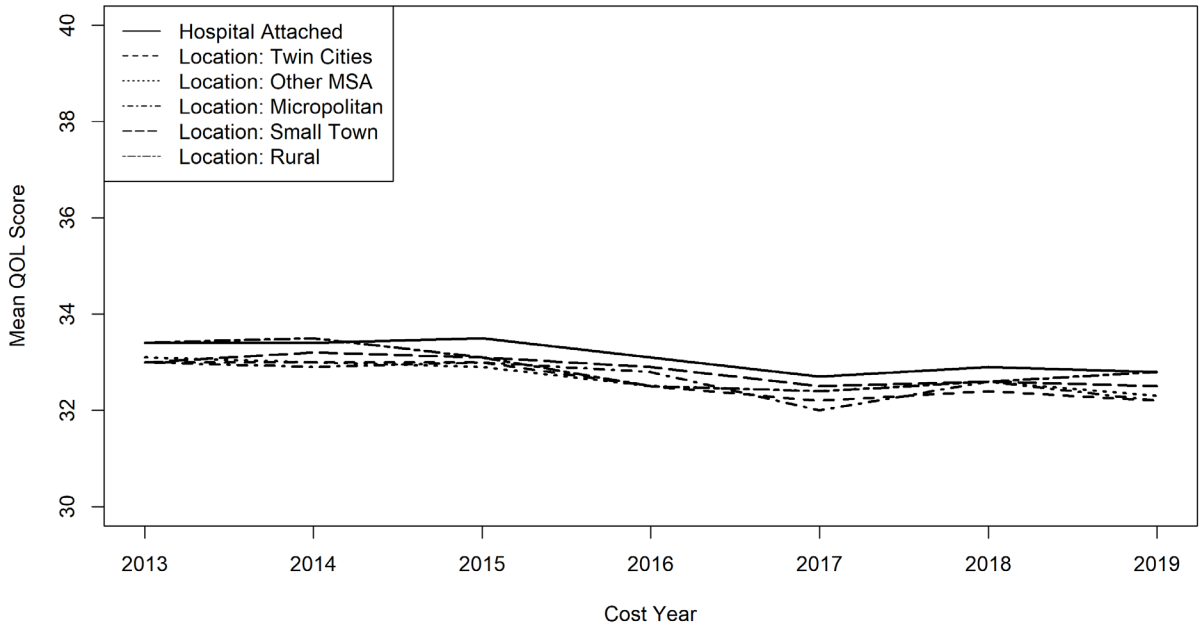


Figure 47. Quality of Life Score by Ownership Type

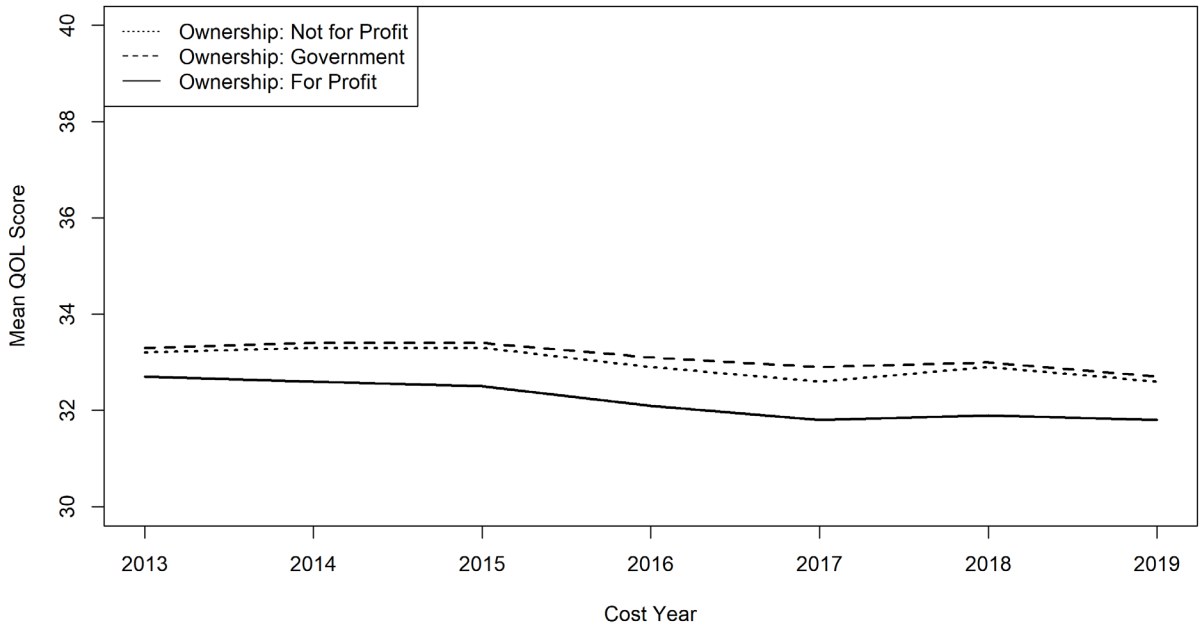


Figure 48. Quality of Life Score by Change in Ownership over Data Period

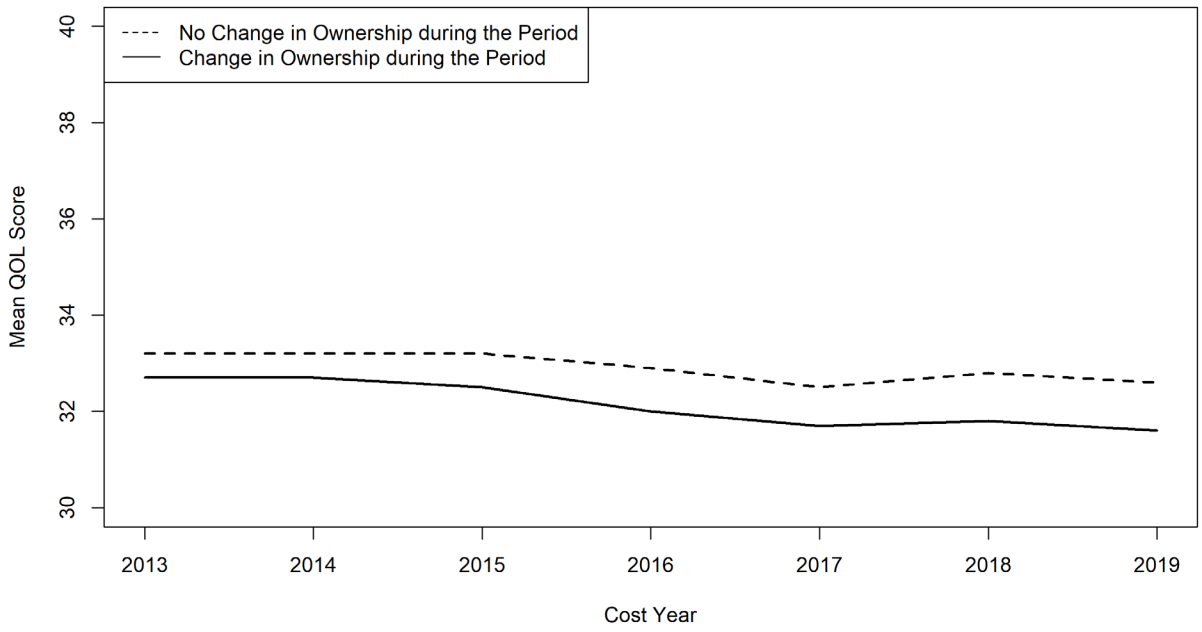


Figure 49. Quality of Life Score by Number of Beds Quartile

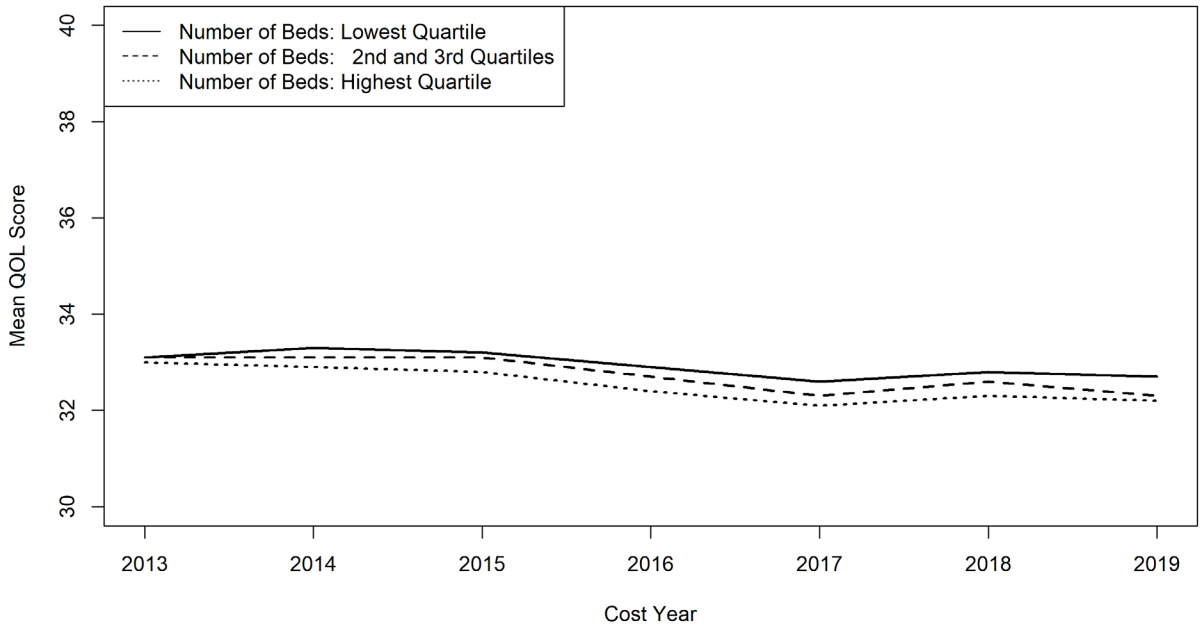


Figure 50. Quality of Life Score by Annual Admits per Bed Quartile

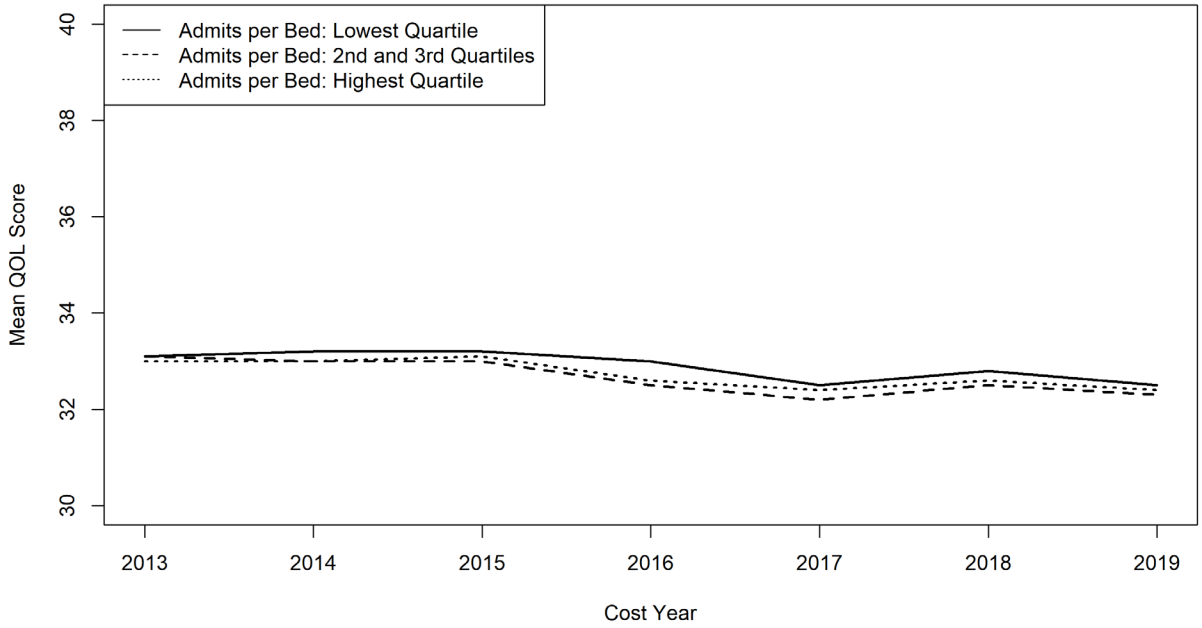


Figure 51. Quality of Life Score by Occupancy Rate Quartile

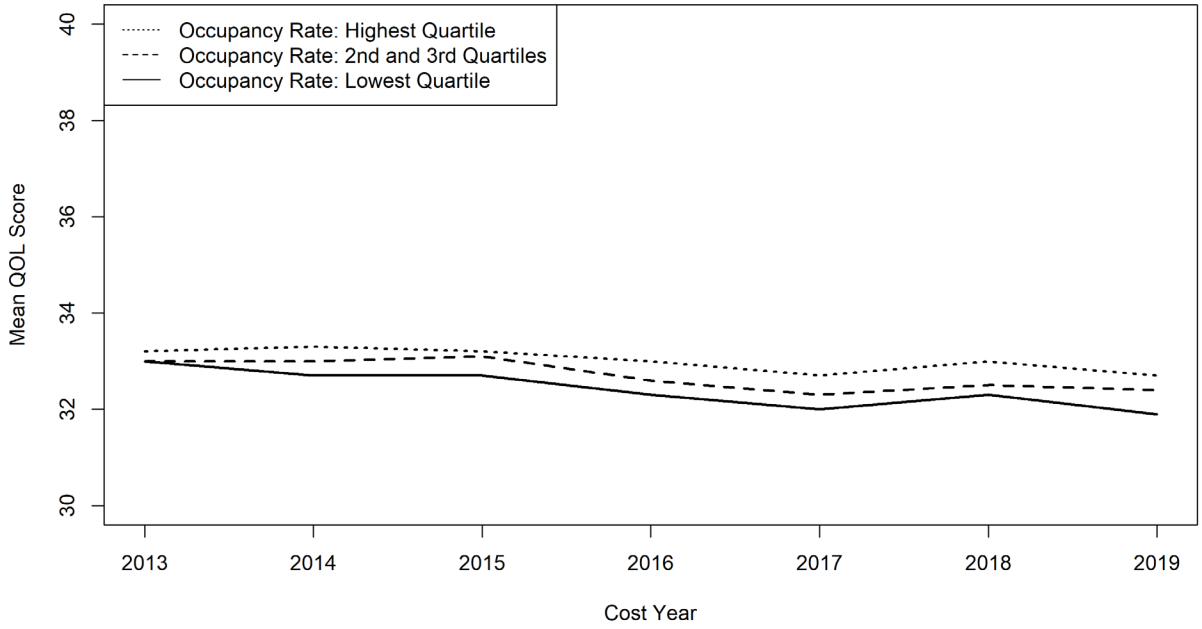


Figure 52. Quality of Life Score by Percentage of Revenue from Medicaid Quartile

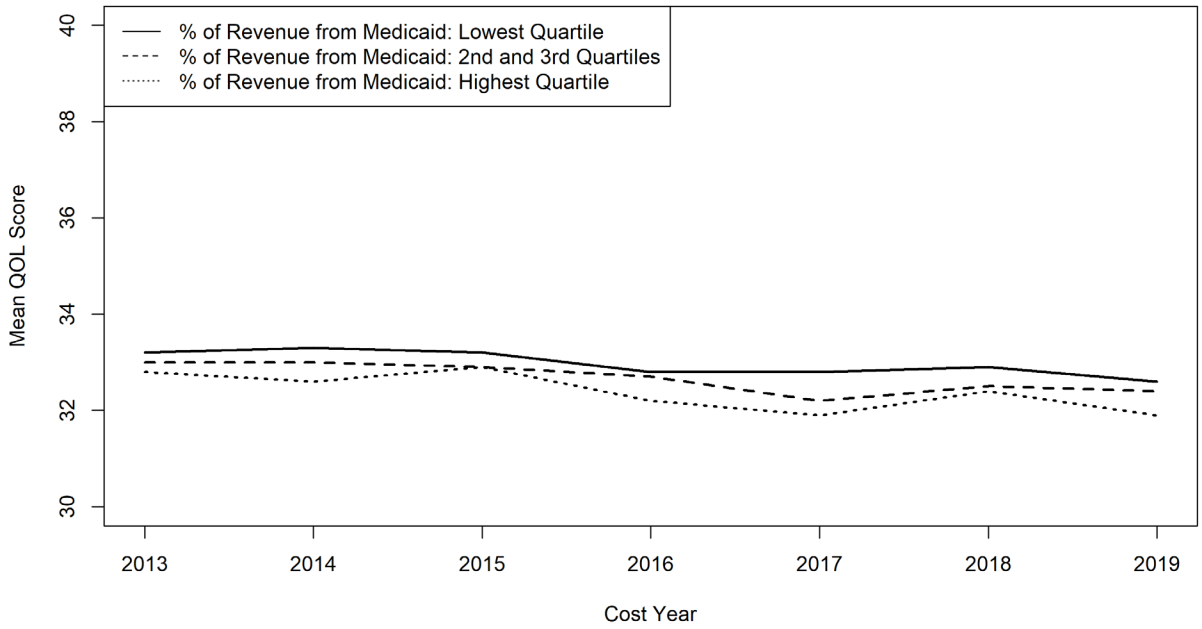


Figure 53. Quality of Life Score by Percentage of Revenue from Medicare Quartile

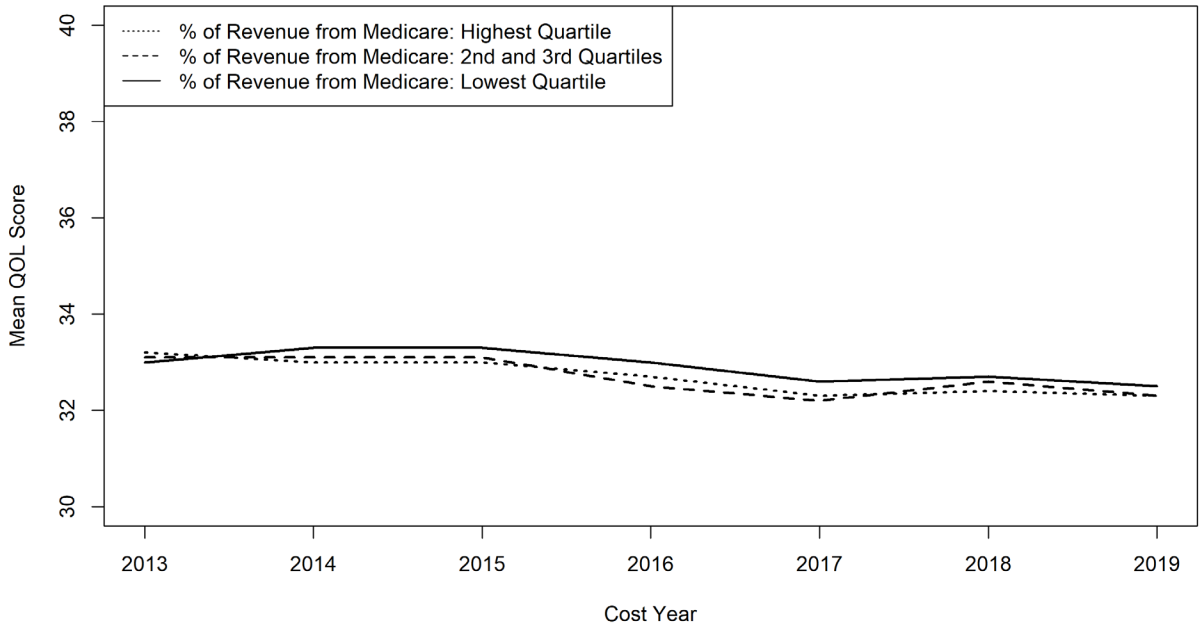
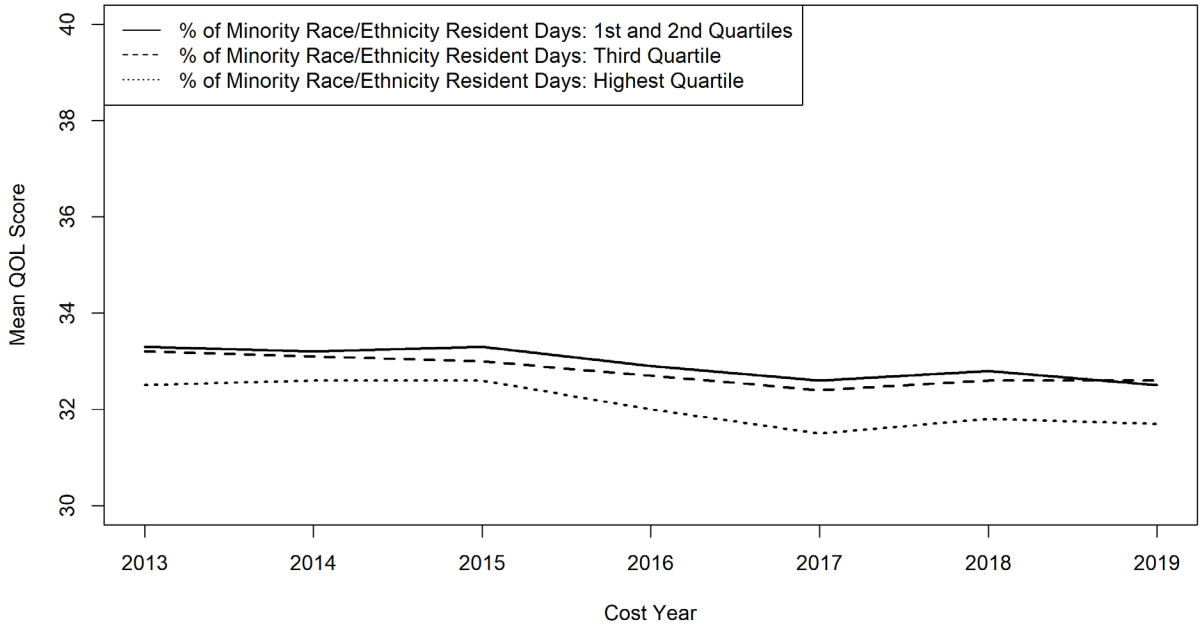


Figure 54. Quality of Life Score by Percentage of Minority Race/Ethnicity Resident Day Quartile



C. Subgroup Analysis: Minnesota Department of Health Inspection Scores

Table *16* displays the annual means in facility quality of life scores by each variable's sub-group (row titles) and cost year (column titles). Separation among the scores on some subgroups in pronounced, a decline in scores beginning in 2017 is attributable to changes in inspection procedure. Care-related spending in 2015 does not appear to be related to MDH scores (Figure *55*). For location/hospital affiliation, mean scores have been lowest for free standing metro facilities beginning in 2016 (Figure 56). For-profit owned facilities have the lowest MDH scores, about 1.49 points lower than Non-Profit facilities in 2019 (Figure 57). Facilities that did not change ownership over the period had generally higher MDH scores, with the gap increasing over the period (1.75 point mean higher in 2019, Figure 58). Bigger facilities (bed size) tended to have the lowest MDH scores (1.12 point mean lower than smallest quartile in 2019, Figure 59). Annual admissions per bed does not appear to be related to MDH scores (Figure 60). Facilities with the lowest occupancy rate finished the period with the lowest MDH scores (1.2 point lower mean than highest occupancy quartile in 2019, Figure 61). Facilities with the lowest percentage of their revenue coming from Medicaid had the highest MDH scores (1.01 point mean higher than the highest quartile in 2019, Figure 62). Percentage of revenue coming from Medicare does not appear to be related to MDH scores (Figure 63). The lowest 75% of facilities in terms of percentage of minority race/ethnicity resident days had the highest MDH scores, a gap which grew over the period (1.05-1.50 point higher mean than the upper 25%, Figure 64).

Table 16. Average Minnesota Department of Health Scores by Subgroup (Max 10 Points)

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	8.32	9.21	8.47	8.65	8.18	7.59	7.00
Pre VBR (2015) Care Related Costs Middle Quartiles	8.48	8.74	8.26	8.16	8.12	7.47	6.75
Pre VBR (2015) Care Related Costs Highest Quartile	8.41	9.06	8.38	8.18	7.91	7.91	7.12
Hospital Attached	9.06	9.22	8.33	8.61	8.33	8.39	7.80
Location: Twin Cities	8.72	8.96	8.36	7.60	7.27	7.15	6.31
Location: Other MSA	7.69	8.82	8.16	8.25	8.16	7.50	6.65
Location: Micropolitan	8.53	8.49	8.55	8.49	9.34	7.88	7.88
Location: Small Town	8.38	9.05	8.72	9.32	8.58	7.57	7.11
Location: Rural	9.50	9.50	8.17	9.00	7.67	8.50	7.00
Ownership: For Profit	8.46	8.47	7.81	7.60	7.22	6.75	5.98
Ownership: Government	8.53	8.97	8.48	9.05	8.53	8.66	6.61
Ownership: Not for Profit	8.39	9.15	8.58	8.51	8.46	7.92	7.47
Change in Ownership during the Period	8.26	8.41	7.56	7.50	6.81	5.95	5.57
No Change in Ownership during the Period	8.47	9.10	8.59	8.53	8.47	8.12	7.32
Number of Beds: Lowest Quartile	8.16	9.09	8.47	8.42	8.17	8.45	7.44
Number of Beds: Middle Quartiles	8.71	8.96	8.41	8.51	8.34	7.49	6.92
Number of Beds: Highest Quartile	8.12	8.79	8.14	7.81	7.53	7.07	6.33

Cost Year	2013	2014	2015	2016	2017	2018	2019
Admits per Bed: Lowest Quartile	8.53	9.19	8.72	8.55	8.31	7.50	7.18
Admits per Bed: Middle Quartile	8.19	8.84	8.32	8.29	7.87	7.73	6.70
Admits per Bed: Highest Quartile	8.75	8.88	8.09	8.06	8.24	7.47	7.05
Occupancy Rate: Lowest Quartile	7.89	7.88	8.25	7.76	7.86	7.16	6.10
Occupancy Rate: Middle Quartiles	8.35	8.76	8.26	8.42	7.98	7.64	7.11
Occupancy Rate: Highest Quartile	8.67	9.47	8.51	8.53	8.47	8.00	7.30
% of Revenue from Medicaid: Lowest Quartile	8.61	9.10	8.60	8.60	8.85	8.37	7.29
% of Revenue from Medicaid: Middle Quartiles	8.45	8.94	8.23	8.24	8.12	7.51	7.02
% of Revenue from Medicaid: Highest Quartile	7.82	8.47	7.93	7.86	6.61	6.73	6.28
% of Revenue from Medicare: Lowest Quartile	8.27	9.09	8.26	8.33	7.68	7.69	7.21
% of Revenue from Medicare: Middle Quartiles	8.41	9.12	8.76	8.52	8.21	7.73	6.89
% of Revenue from Medicare: Highest Quartile	8.50	8.69	8.00	7.96	8.15	7.42	6.65
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	8.47	9.00	8.62	8.76	8.59	8.07	7.32
% of Minority Race/Ethnicity Resident Days: Third Quartile	8.40	8.96	8.43	8.25	8.21	7.65	6.87
% of Minority Race/Ethnicity Resident Days: Highest Quartile	8.33	8.75	7.57	7.11	6.64	6.35	5.82

Figure 55. Minnesota Department of Health Inspection Score by 2015 Care Related Cost Quartiles

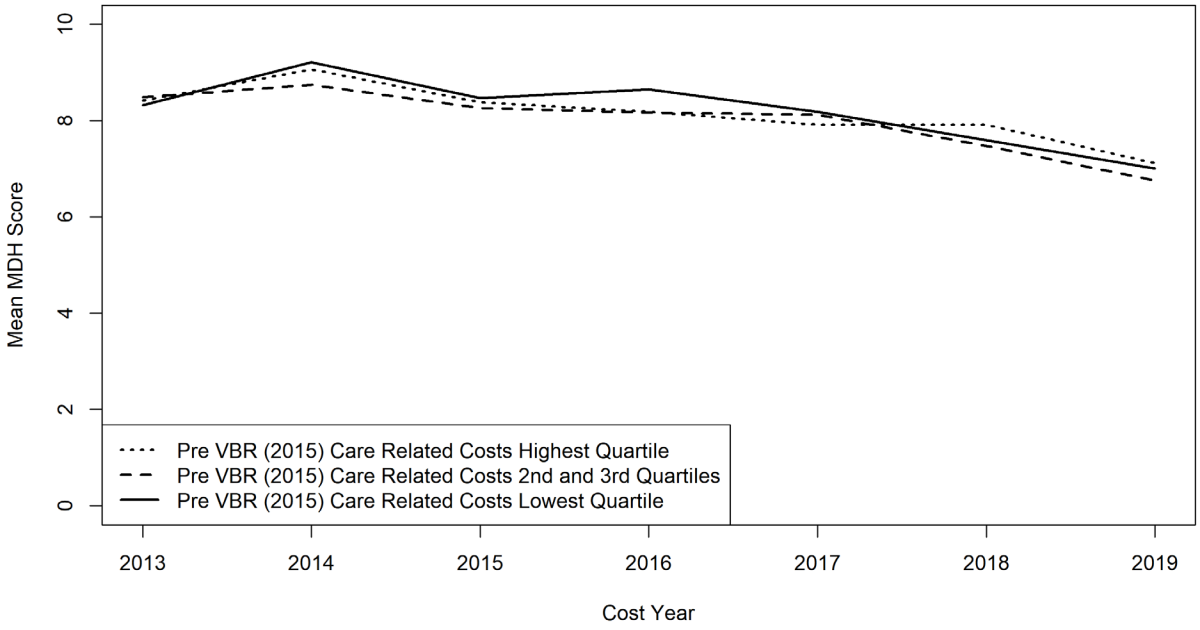


Figure 56. Minnesota Department of Health Inspection Score by Location/Hospital Affiliation

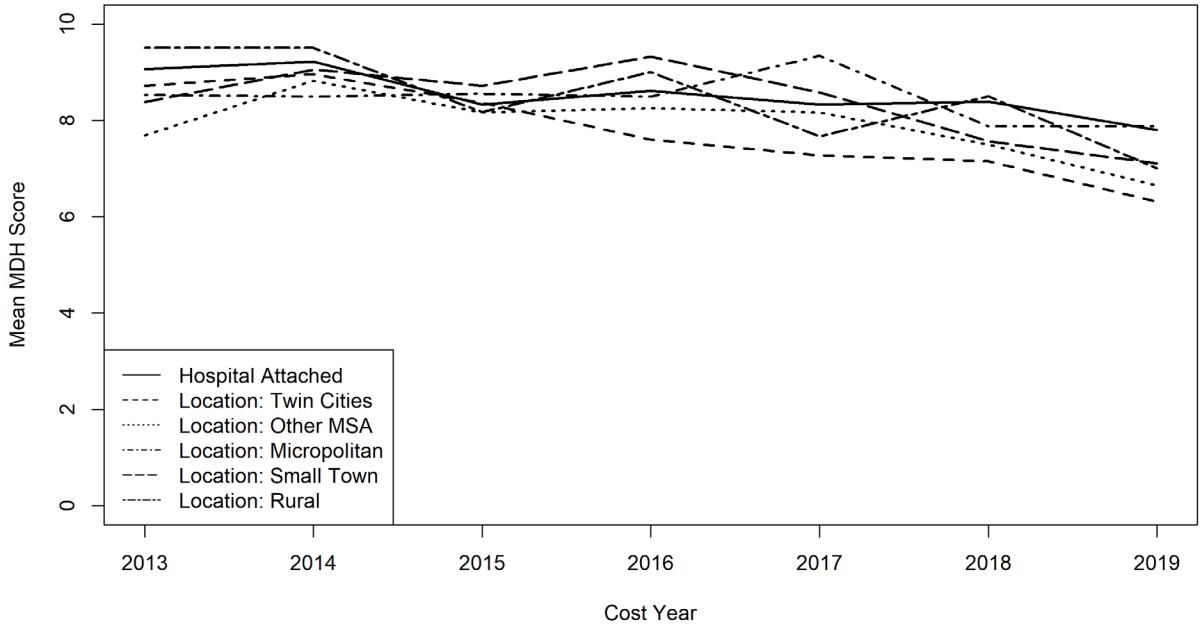


Figure 57. Minnesota Department of Health Inspection Score by Ownership Type

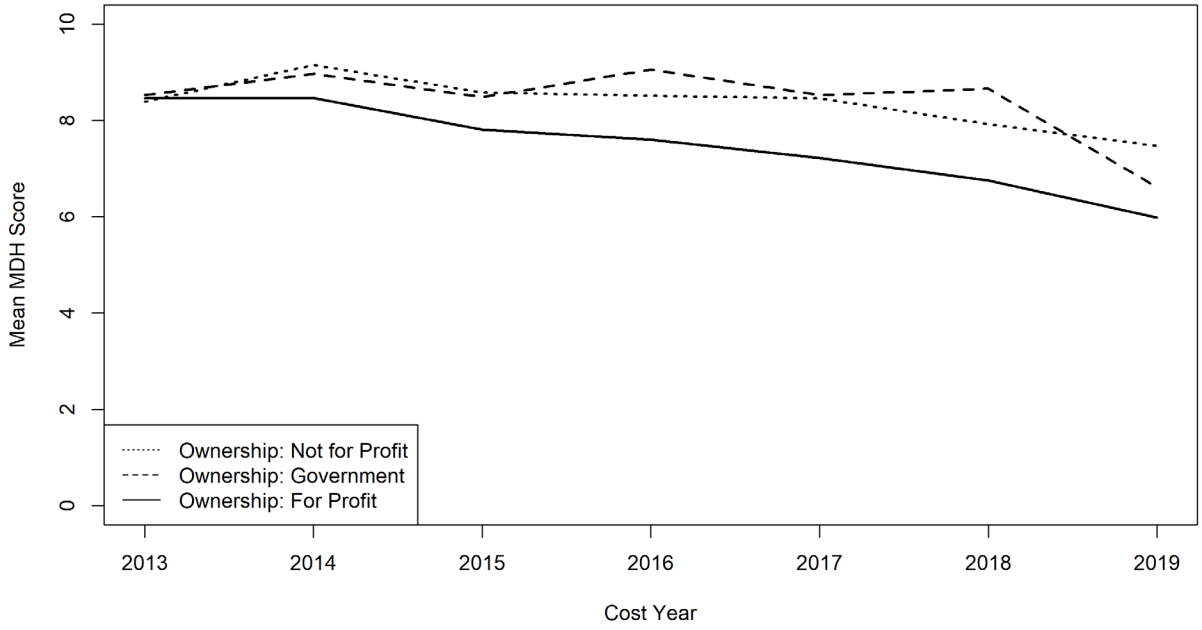


Figure 58. Minnesota Department of Health Inspection Score by Change in Ownership over Data Period

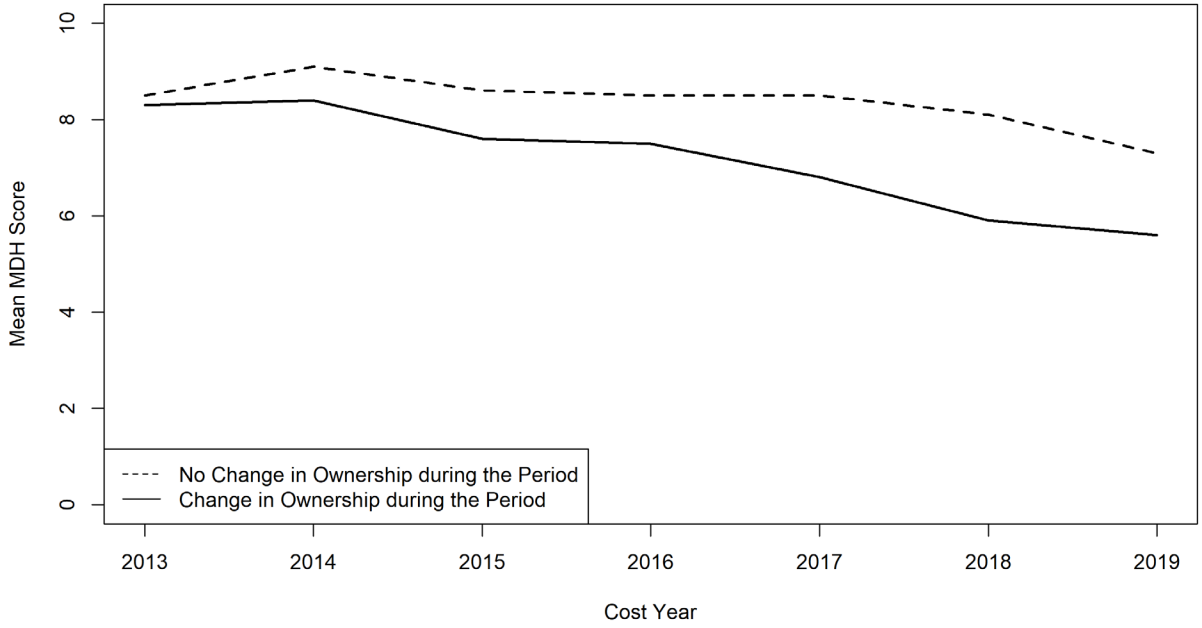


Figure 59. Minnesota Department of Health Inspection Score by Number of Beds Quartile

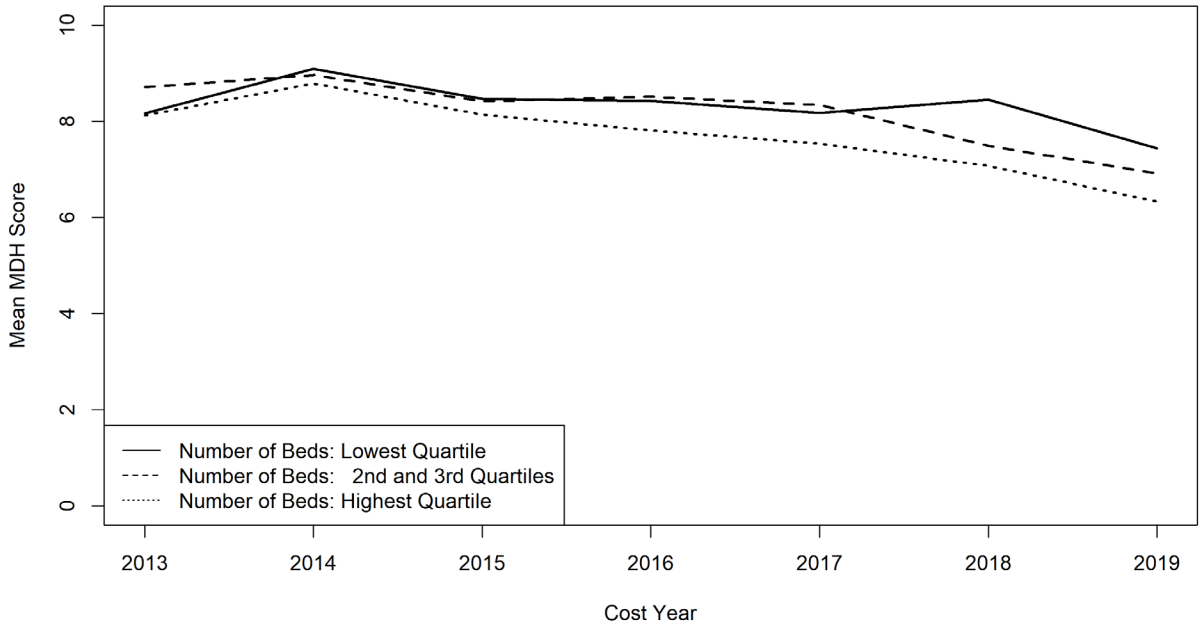


Figure 60. Minnesota Department of Health Inspection Score by Annual Admits per Bed Quartile

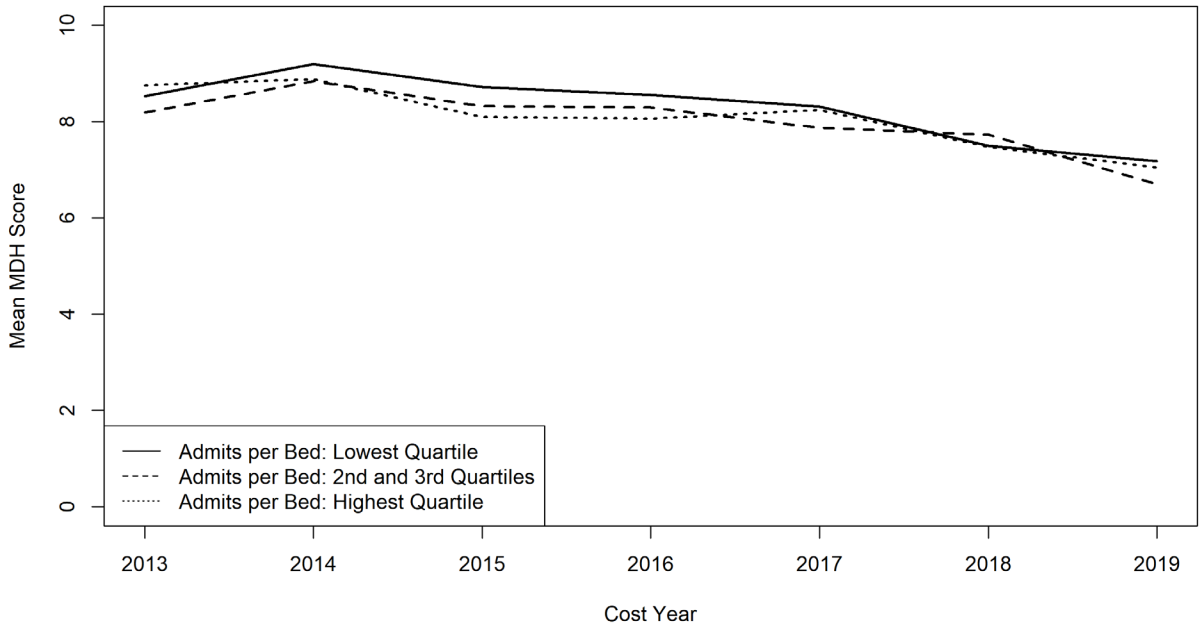


Figure 61. Minnesota Department of Health Inspection Score by Occupancy Rate Quartile

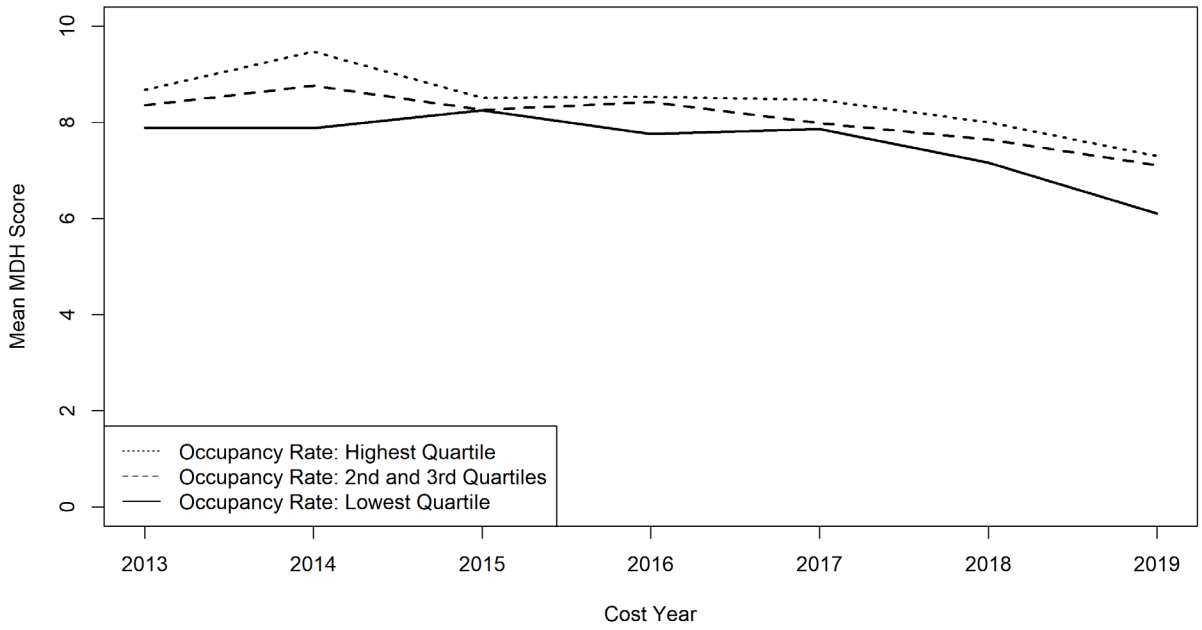


Figure 62. Minnesota Department of Health Inspection Score by Percentage of Revenue from Medicaid Quartile

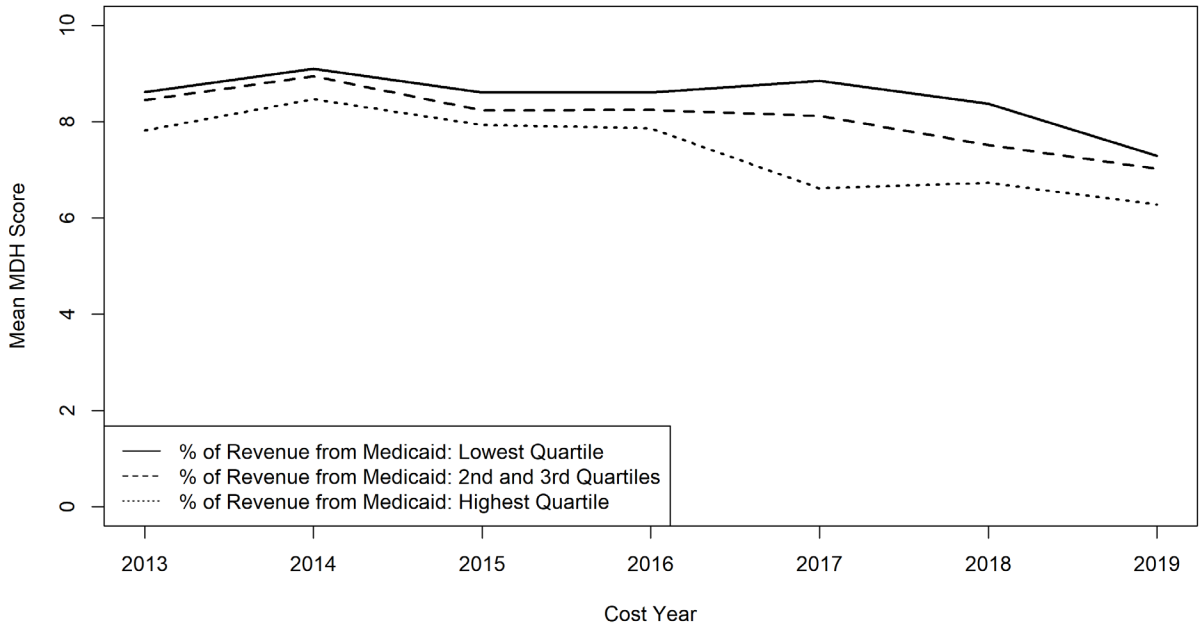


Figure 63. Minnesota Department of Health Inspection Score by Percentage of Revenue from Medicare Quartile

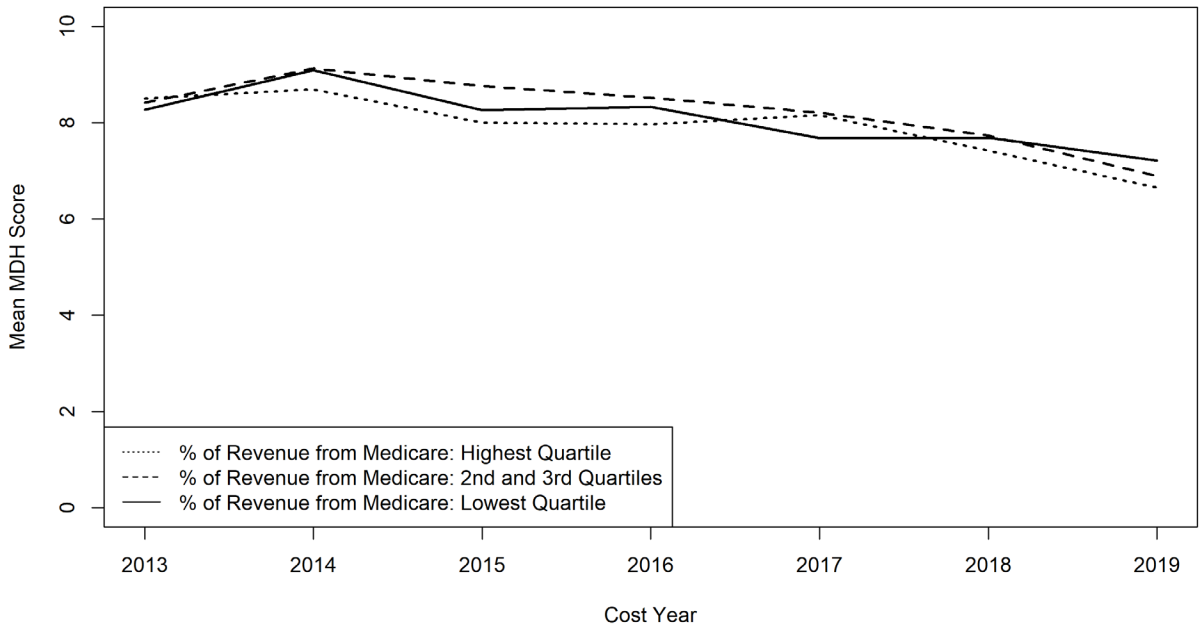
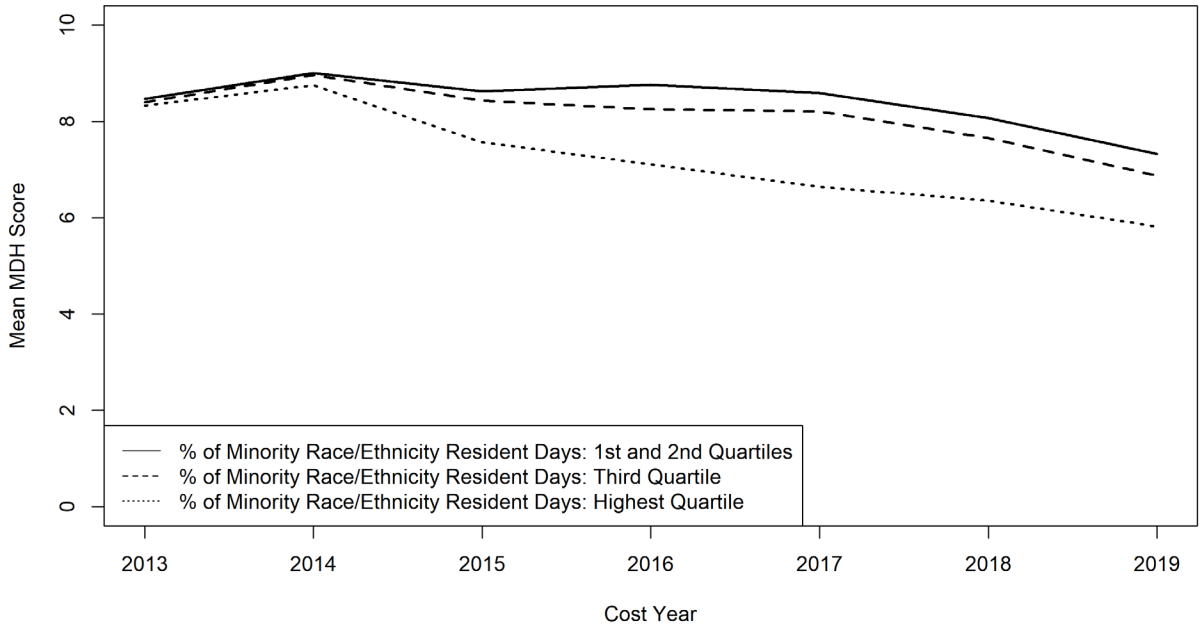


Figure 64. Minnesota Department of Health Inspection Score by Percentage of Minority Race/Ethnicity Resident Day Quartile



D. Subgroup Analysis: Direct Care Staff Retention Rates

Table *17* displays the annual means in direct care staff retention rates by each variable's sub-group (row titles) and cost year (column titles). At the time of analysis, data was only available through 2018. Generally separation among the scores across subgroups is high, but rates show some instability over the period. Facilities with the highest care related spending in 2015 had the highest mean retention rates, particularly at the start and end of the period (mean 3.2% higher than lowest quartile in 2018, Figure *65*). For location/hospital affiliation, hospital attached tended to have the highest retention while facilities in metro MSAs outside the Twin City area had the lowest (Figure *66*). For-profit owned facilities had the lowest retention, with a mean 5.9% lower than Non-Profit facilities in 2018 (Figure *67*). Facilities that did not change ownership over the period had substantially higher retention rates (mean 7.6% higher in 2018, Figure *68*). Bigger facilities (bed size) tended to have the highest retention rates for most of the period (mean 5.2% higher than smallest quartile in 2018, Figure *69*). Facilities with less annual admissions per bed had higher retention rates (mean 4% higher than highest quartile in 2018, Figure *70*). Facilities with the lowest occupancy rate had the lowest retention rates (mean 8.5% lower than highest occupancy quartile in 2018, Figure *71*). Revenue percentage from Medicaid does not appear to be closely related to retention rates (Figure *72*). Facilities with the highest percentage of their revenue coming from Medicare had the lowest retention rates (mean 3.9% lower than the lowest quartile in 2018, Figure *73*). The lowest 25% of facilities in terms of percentage of minority race/ethnicity resident days had the highest retention rates (mean 3.4% higher than the upper 75% in 2018, Figure *74*).

Table 17. Average Direct Care Staff Retention Percentage by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018
Pre VBR (2015) Care Related Costs Lowest Quartile	68.2	68.5	67.8	68.9	67.2	69.2
Pre VBR (2015) Care Related Costs Middle Quartiles	68.0	67.0	65.9	68.0	66.7	68.6
Pre VBR (2015) Care Related Costs Highest Quartile	74.1	71.4	68.5	69.6	70.7	72.4
Hospital Attached	74.6	74.6	72.7	73.2	73.0	72.2
Location: Twin Cities	72.4	71.8	67.2	68.5	67.6	71.8
Location: Other MSA	65.5	63.5	62.8	65.4	64.7	66.7
Location: Micropolitan	68.4	66.8	68.1	71.3	70.3	71.7
Location: Small Town	69.8	67.5	70.8	69.4	67.4	66.9
Location: Rural	67.7	70.7	65.9	68.9	69.9	70.5
Ownership: For Profit	67.4	65.6	62.9	64.3	62.6	65.6
Ownership: Government	73.5	70.5	70.9	72.7	69.9	72.2
Ownership: Not for Profit	70.0	69.5	68.3	70.1	70.2	71.5
Change in Ownership during the Period	65.9	64.3	61.3	60.8	59.7	63.9
No Change in Ownership during the Period	70.8	69.8	68.8	71.0	70.3	71.5
Number of Beds: Lowest Quartile	67.0	66.6	67.3	69.7	65.9	67.0
Number of Beds: Middle Quartiles	69.3	68.0	66.8	68.1	67.7	69.7
Number of Beds: Highest Quartile	71.6	70.5	67.1	68.6	69.5	72.2
Admits per Bed: Lowest Quartile	73.1	73.2	70.2	71.3	69.6	73.2
Admits per Bed: Middle Quartile	67.8	66.5	66.9	69.3	67.4	68.4
Admits per Bed: Highest Quartile	69.5	67.9	64.7	65.2	66.8	69.2
Occupancy Rate: Lowest Quartile	63.2	61.8	62.1	63.8	60.5	63.7
Occupancy Rate: Middle Quartiles	69.0	67.5	66.2	68.8	70.4	71.7
Occupancy Rate: Highest Quartile	72.2	71.8	70.5	72.7	70.5	72.2
% of Revenue from Medicaid: Lowest Quartile	69.9	67.7	68.1	69.4	68.7	70.9
% of Revenue from Medicaid: Middle Quartiles	68.9	68.9	65.6	68.2	68.2	68.8
% of Revenue from Medicaid: Highest Quartile	71.1	69.2	68.1	68.4	64.9	70.2
% of Revenue from Medicare: Lowest Quartile	72.9	74.1	72.3	71.9	70.9	70.8
% of Revenue from Medicare: Middle Quartiles	68.9	68.5	68.3	68.6	67.9	71.4
% of Revenue from Medicare: Highest Quartile	69.0	66.2	63.7	66.7	66.1	66.9
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	69.4	69.0	67.8	69.8	69.2	71.1
% of Minority Race/Ethnicity Resident Days: Third Quartile	69.1	65.1	66.4	66.8	65.3	65.9
% of Minority Race/Ethnicity Resident Days: Highest Quartile	70.7	70.2	65.5	67.1	66.4	69.6

Figure 65. Direct Care Staff Retention Percentage by 2015 Care Related Cost Quartiles

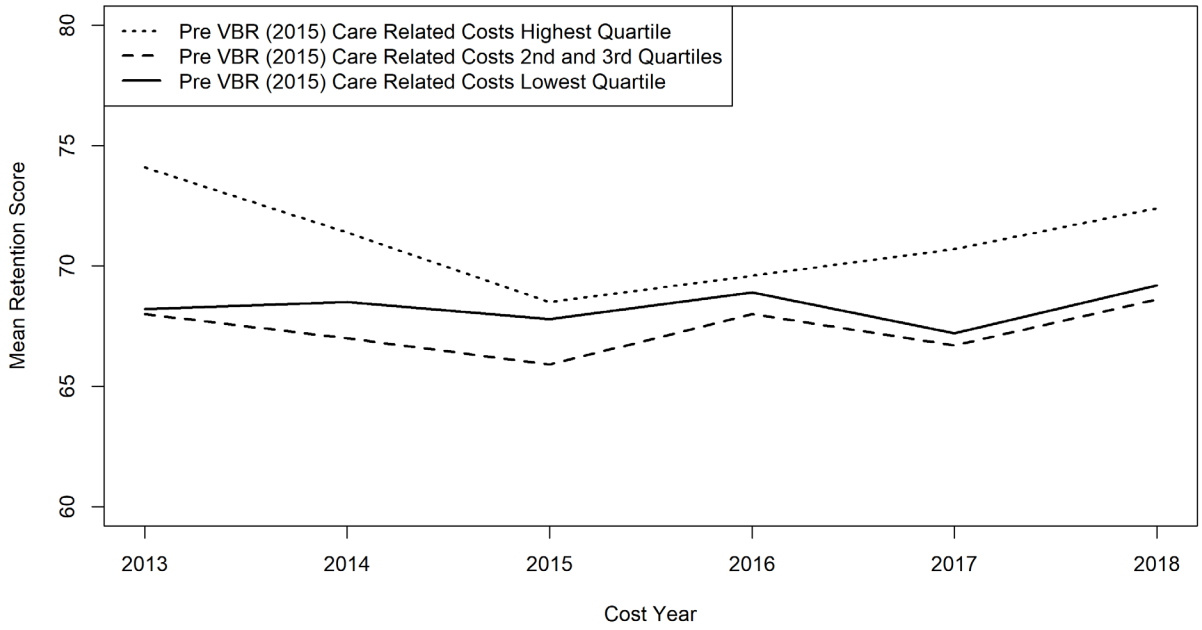


Figure 66. Direct Care Staff Retention Percentage by Location/Hospital Affiliation

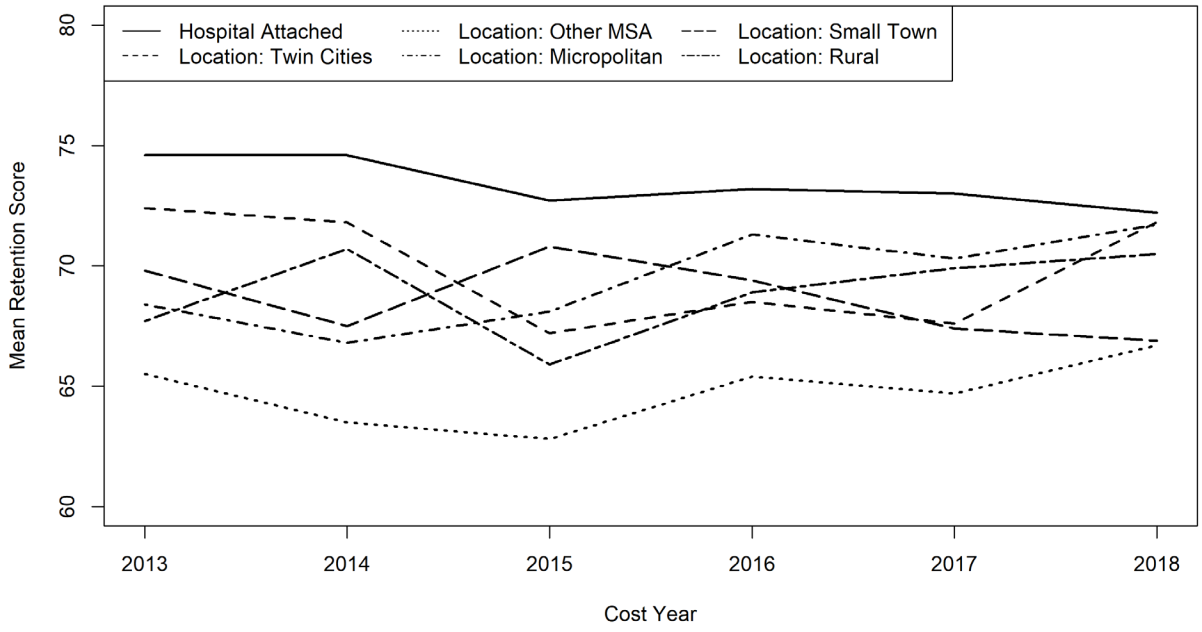


Figure 67. Direct Care Staff Retention Percentage by Ownership Type

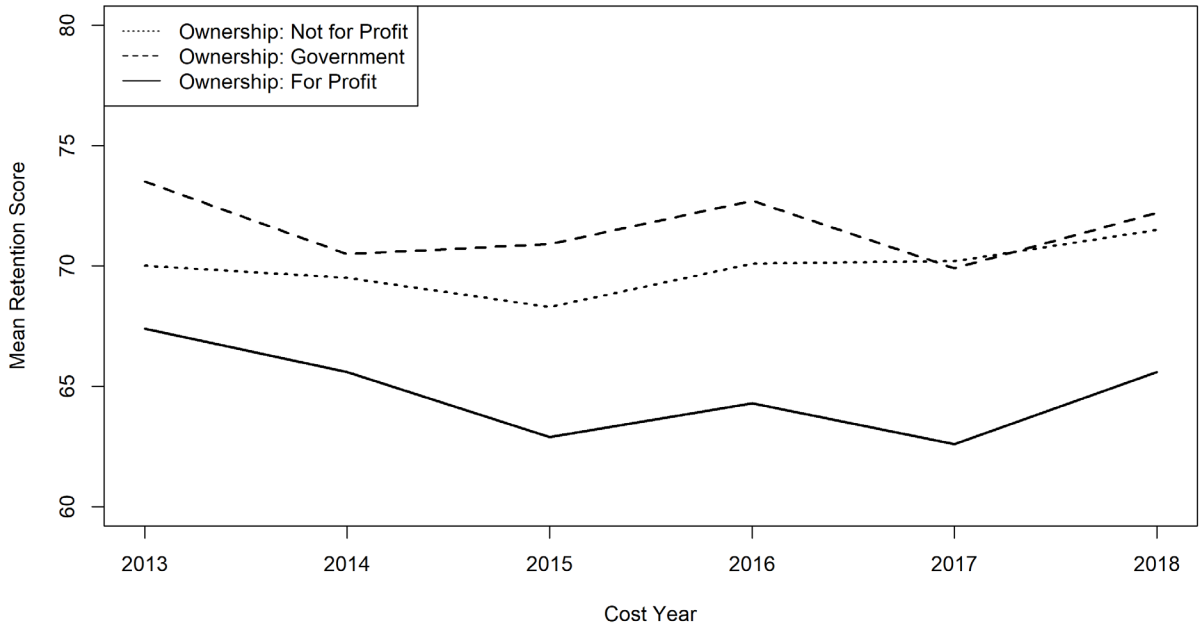


Figure 68. Direct Care Staff Retention Percentage by Change in Ownership over Data Period

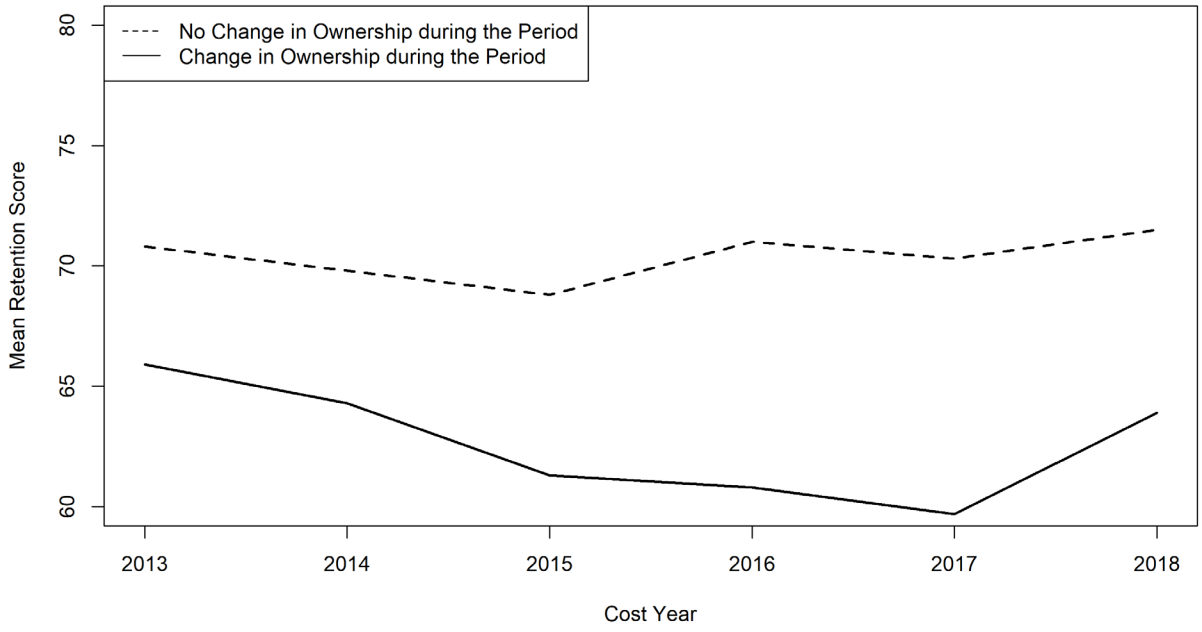


Figure 69. Direct Care Staff Retention Percentage by Number of Beds Quartile

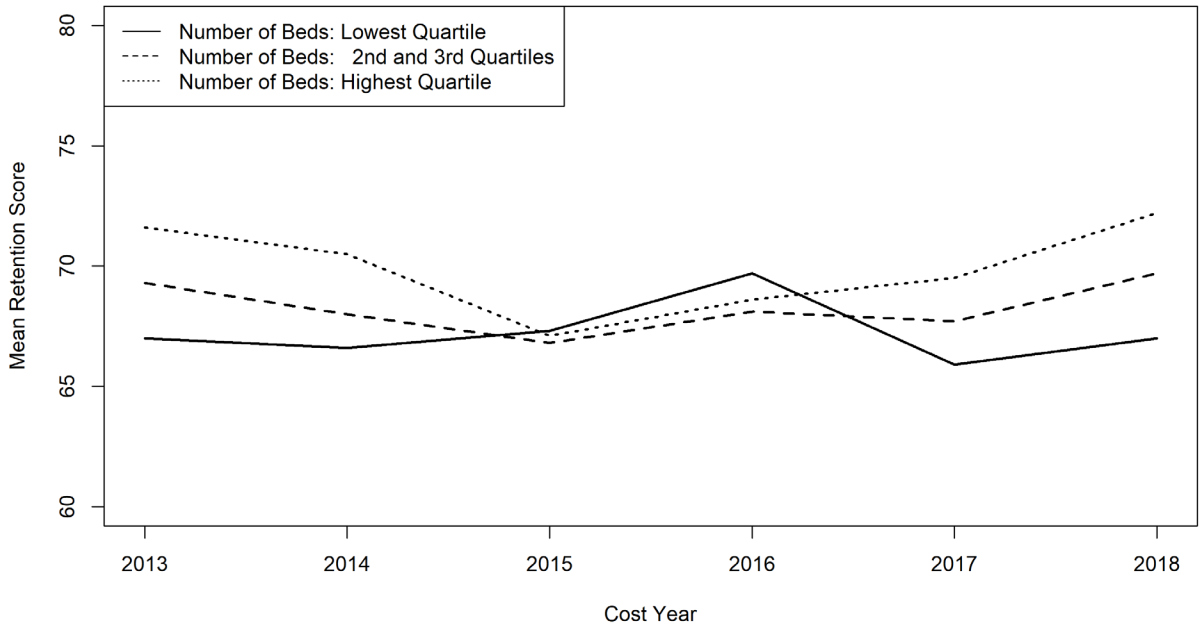


Figure 70. Direct Care Staff Retention Percentage by Annual Admits per Bed Quartile

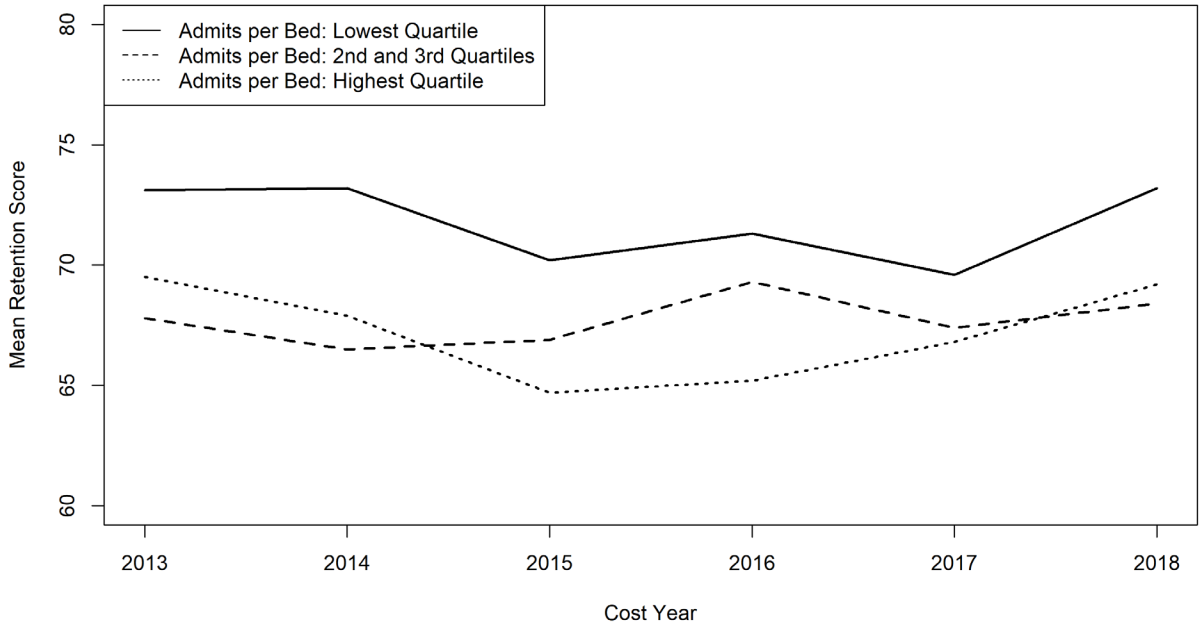


Figure 71. Direct Care Staff Retention Percentage by Occupancy Rate Quartile

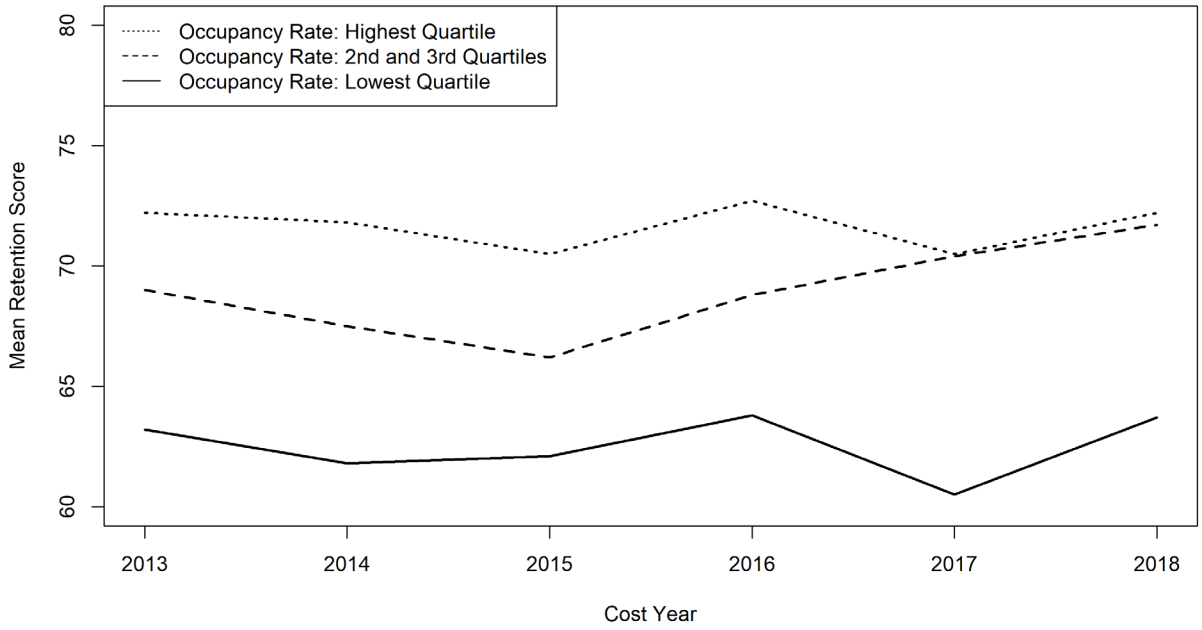


Figure 72. Direct Care Staff Retention Percentage by Percentage of Revenue from Medicaid Quartile

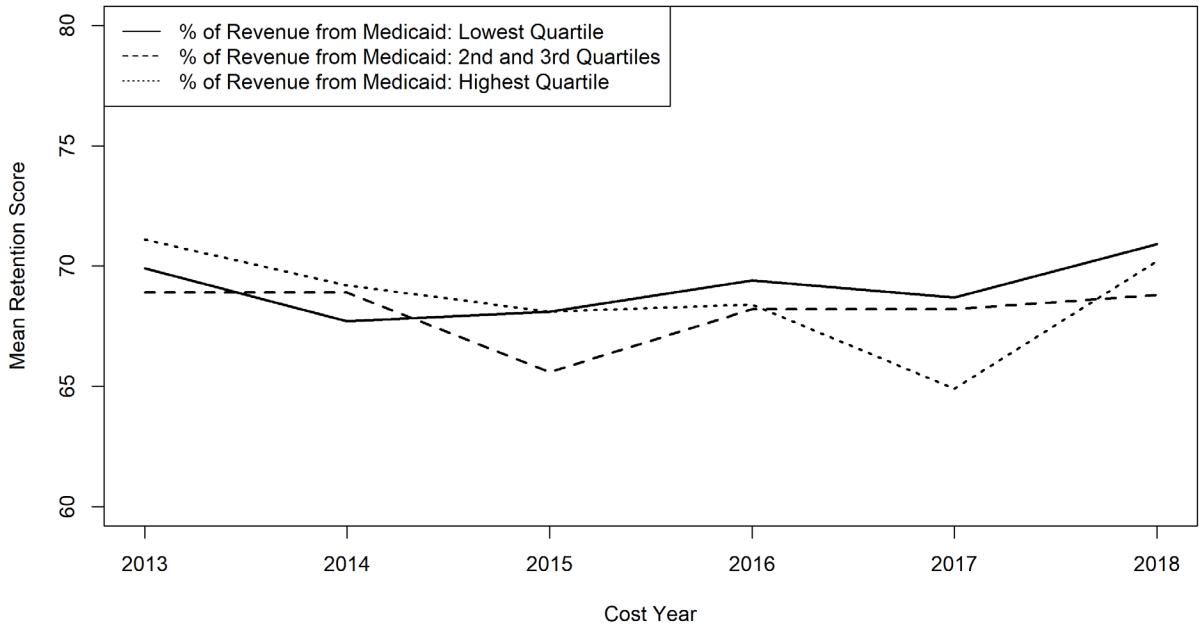


Figure 73. Direct Care Staff Retention Percentage by Percentage of Revenue from Medicare Quartile

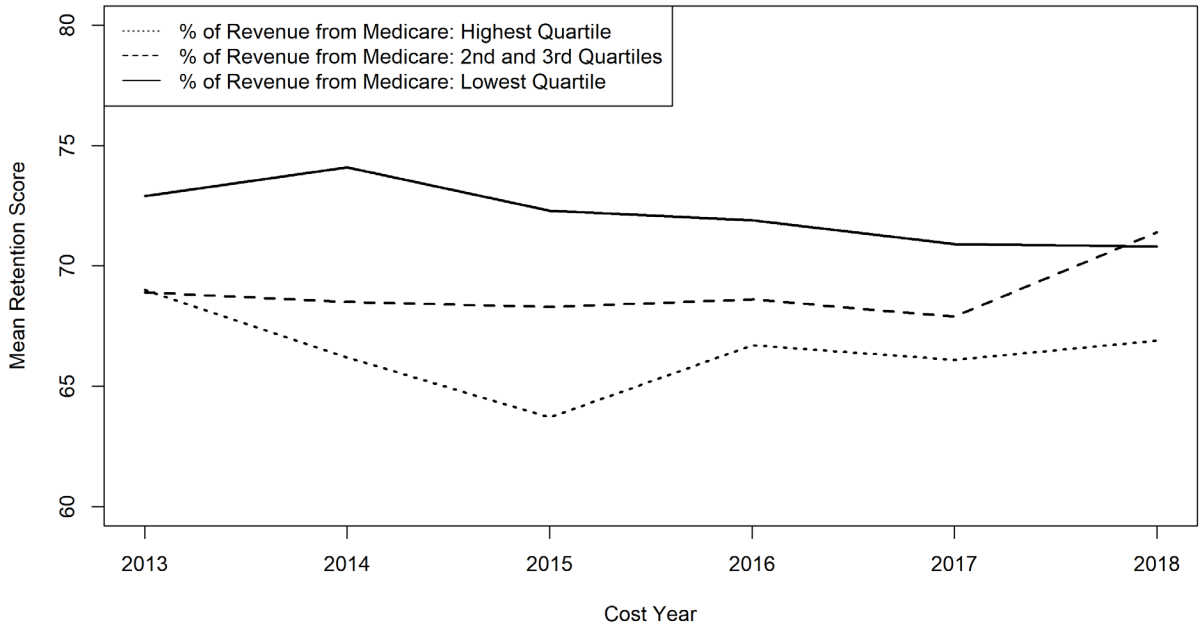
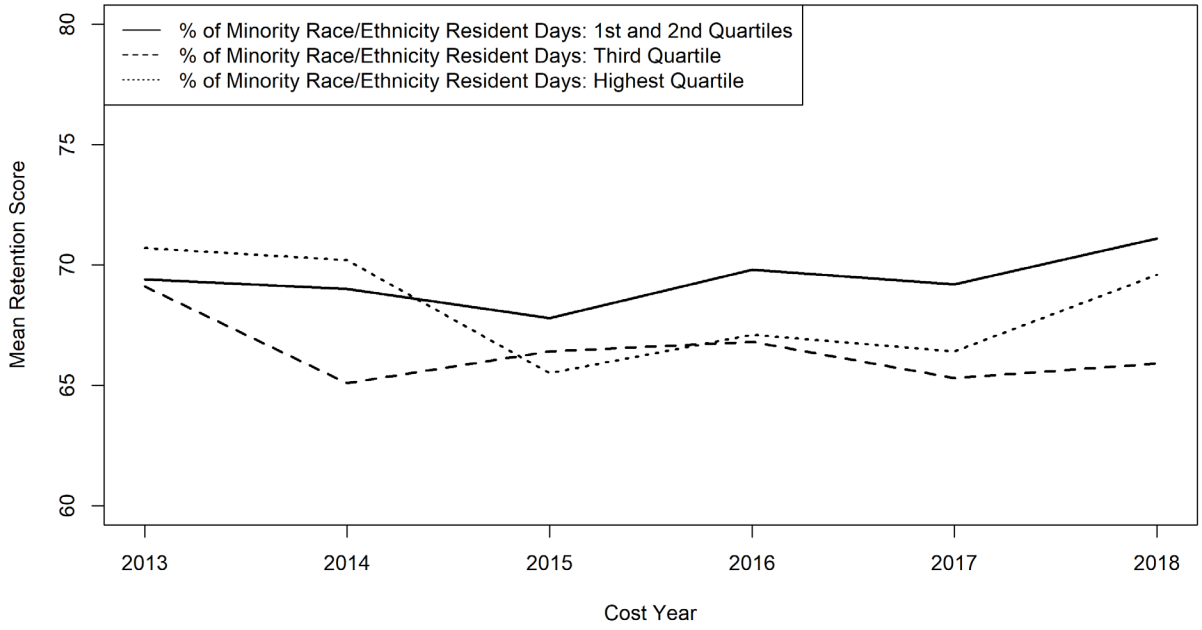


Figure 74. Direct Care Staff Retention Percentage by Percentage of Minority Race/Ethnicity Resident Day Quartile



E. Subgroup Analysis: Adjusted Community Discharge Rate (3-30 Day)

Table *18* displays the annual means in adjusted community discharge rates for the first 30 days of a resident's stay (CD30) by each variable's sub-group (row titles) and cost year (column titles). Generally separation among the rates across subgroups is high, and rates show fair stability over the period. Facilities with the highest care related spending in 2015 had the highest mean CD30 rates (mean 8.4% higher than lowest quartile in 2019, Figure *75*). For location/hospital affiliation, hospital attached tended to have the highest CD30 rates (Figure *76*). For-profit owned facilities had the lowest CD30 rates, with a mean 8.5% lower than Non-Profit facilities in 2019 (Figure *77*). Facilities that did not change ownership over the period had substantially higher CD30 rates (mean 8.4% higher in 2019, Figure *78*). Bigger facilities (bed size) had the highest CD30 rates (mean 4.5% higher than smallest quartile in 2019, Figure *79*). Facilities with more annual admissions per bed had the highest CD30 rates (mean 4.1% higher than lowest quartile in 2019, Figure *80*). Facilities with the lowest occupancy rate had the lowest CD30 rates, this difference became much more pronounced beginning in 2016 (mean 6.9% lower than highest occupancy quartile in 2019, Figure *81*). Facilities with the lowest percentage of revenue from Medicaid had the highest CD30 rates (mean 7.2% higher than the highest quartile in 2019, Figure *82*). Facilities with the highest percentage of their revenue coming from Medicare tended to have the highest CD30 rates, but only marginally (mean 0.6% higher than the lowest quartile in 2019, Figure *83*). The lowest 75% of facilities in terms of percentage of minority race/ethnicity resident days had highest CD30 rates (mean 7.0% higher than the upper 25% in 2019, Figure *84*).

Table 18. Average Adjusted Community Discharge Rates (3-30 Days) by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	32.2	31.3	29.9	33.8	29.7	29.7	30.7
Pre VBR (2015) Care Related Costs Middle Quartiles	33.7	33.2	32.1	33.4	33.3	34.3	33.8
Pre VBR (2015) Care Related Costs Highest Quartile	39.2	39.0	39.2	39.8	38.7	40.5	39.1
Hospital Attached	38.1	37.4	36.5	38.3	35.7	38.9	37.7
Location: Twin Cities	35.4	34.9	34.1	35.3	34.6	34.5	34.4
Location: Other MSA	33.3	31.7	31.0	33.6	32.5	34.0	32.9
Location: Micropolitan	36.7	37.0	34.4	36.1	34.4	33.3	35.5
Location: Small Town	31.5	33.6	33.2	33.5	32.0	32.6	33.5
Location: Rural	31.2	30.8	32.4	35.9	32.8	36.9	34.3
Ownership: For Profit	30.2	29.6	28.6	30.3	28.7	29.5	28.9
Ownership: Government	34.7	34.9	35.0	35.5	31.7	35.6	34.5
Ownership: Not for Profit	36.7	36.2	35.2	37.3	36.5	37.3	37.4
Change in Ownership during the Period	29.2	29.5	29.7	29.7	27.6	29.0	27.9
No Change in Ownership during the Period	36.3	35.6	34.4	36.7	35.6	36.4	36.3

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Beds: Lowest Quartile	32.7	32.2	32.4	34.4	31.7	33.5	32.7
Number of Beds: Middle Quartiles	34.0	33.4	32.3	34.2	32.9	33.7	33.8
Number of Beds: Highest Quartile	36.9	36.8	35.7	37.1	36.9	37.6	37.2
Admits per Bed: Lowest Quartile	32.4	32.7	31.9	34.2	31.1	32.3	33.7
Admits per Bed: Middle Quartile	34.5	33.8	32.5	34.5	32.6	32.5	33.0
Admits per Bed: Highest Quartile	37.2	36.4	35.7	36.7	38.2	40.6	37.7
Occupancy Rate: Lowest Quartile	33.3	33.2	32.9	31.7	29.5	31.2	30.8
Occupancy Rate: Middle Quartiles	34.4	33.6	32.9	35.0	34.0	35.5	34.5
Occupancy Rate: Highest Quartile	35.4	35.2	34.0	38.3	37.2	36.7	37.8
% of Revenue from Medicaid: Lowest Quartile	36.7	36.2	35.6	37.2	35.6	35.8	36.4
% of Revenue from Medicaid: Middle Quartiles	34.3	33.7	32.6	35.4	34.0	36.4	35.8
% of Revenue from Medicaid: Highest Quartile	30.4	29.9	28.4	29.9	29.6	28.9	29.2
% of Revenue from Medicare: Lowest Quartile	32.9	33.3	32.9	34.4	33.5	34.5	34.2
% of Revenue from Medicare: Middle Quartiles	33.9	33.8	32.8	34.8	34.0	33.2	34.2
% of Revenue from Medicare: Highest Quartile	36.1	34.9	34.0	35.8	33.6	36.7	34.8
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	35.2	34.7	34.2	36.6	35.3	36.2	36.0
% of Minority Race/Ethnicity Resident Days: Third Quartile	35.6	35.6	34.1	34.3	33.0	35.9	35.5
% of Minority Race/Ethnicity Resident Days: Highest Quartile	32.4	31.5	30.3	31.8	30.1	29.5	28.8

Figure 75. Adjusted Community Discharge Rate (3-30 Day) by 2015 Care Related Cost Quartiles

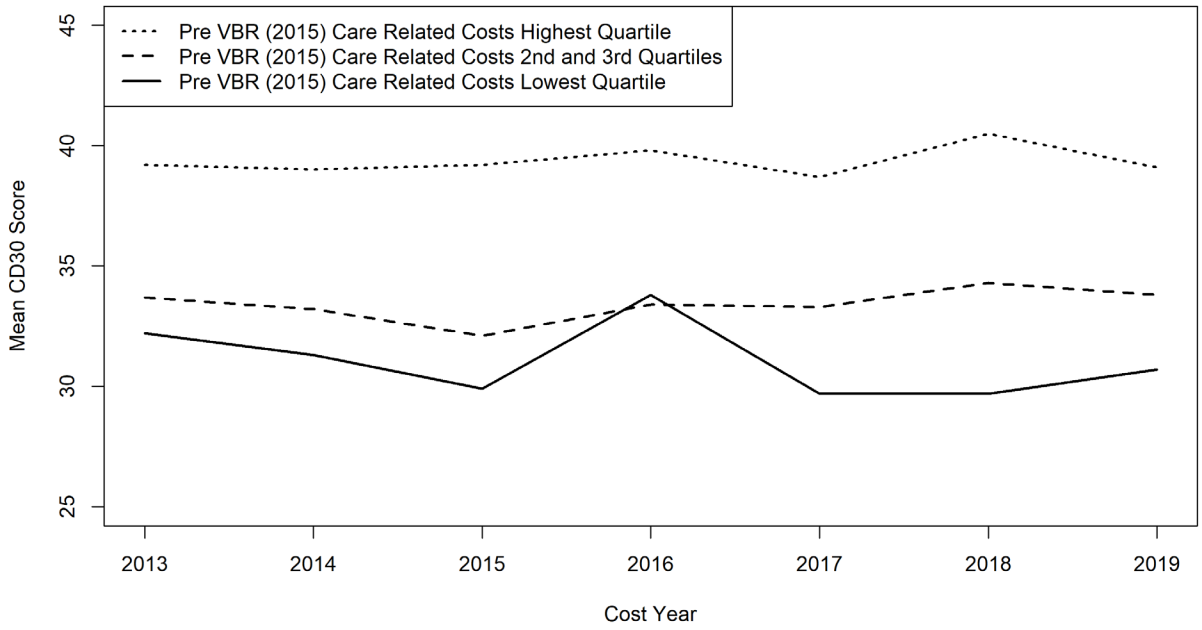


Figure 76. Adjusted Community Discharge Rate (3-30 Day) by Location/Hospital Affiliation

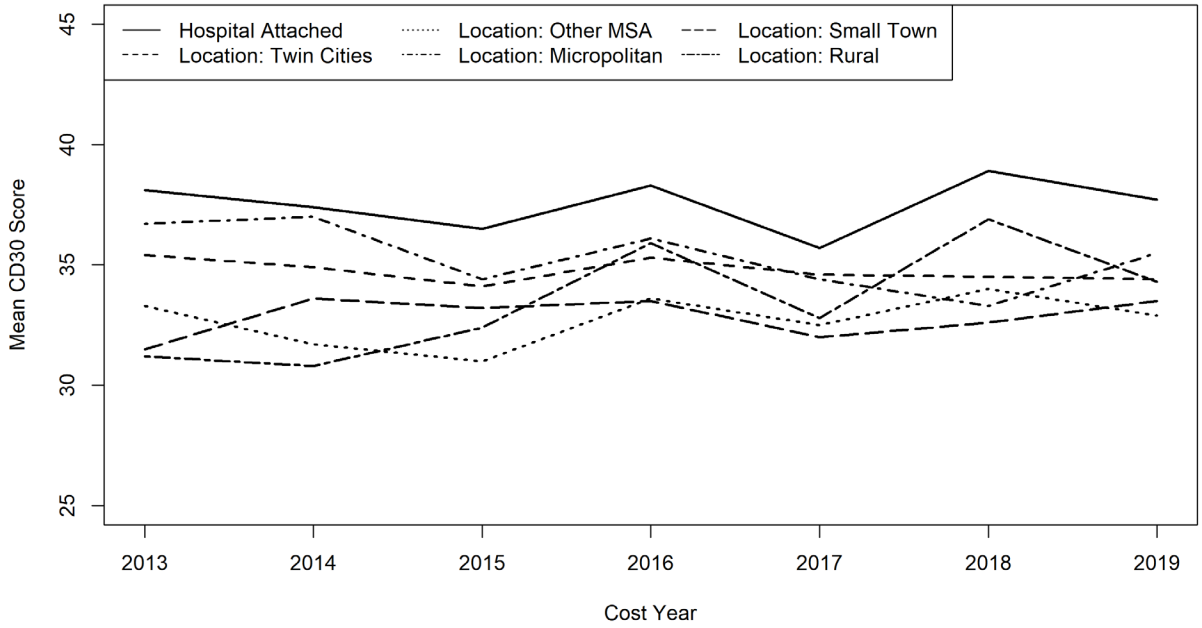


Figure 77. Adjusted Community Discharge Rate (3-30 Day) by Ownership Type

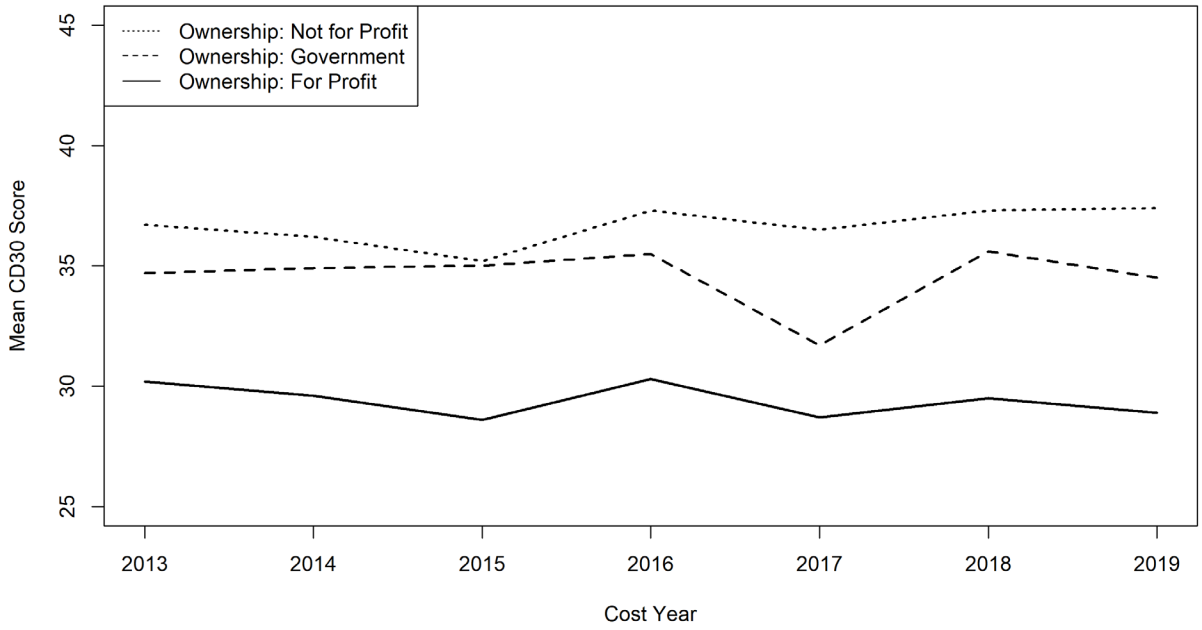


Figure 78. Adjusted Community Discharge Rate (3-30 Day) by Change in Ownership over Data Period

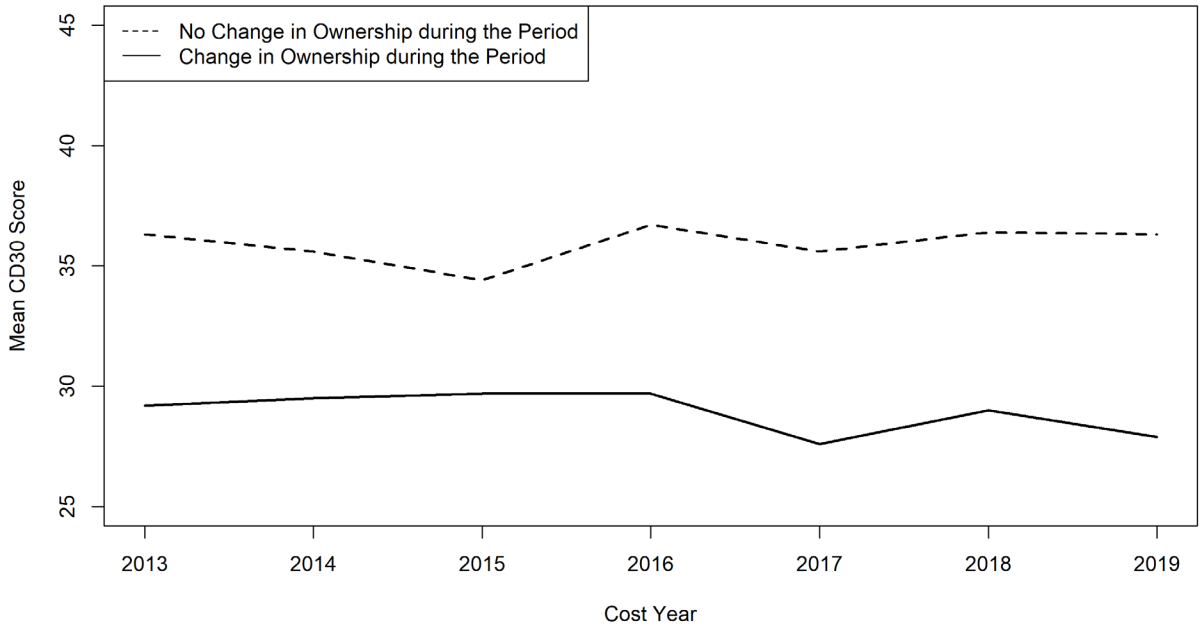


Figure 79. Adjusted Community Discharge Rate (3-30 Day) by Number of Beds Quartile

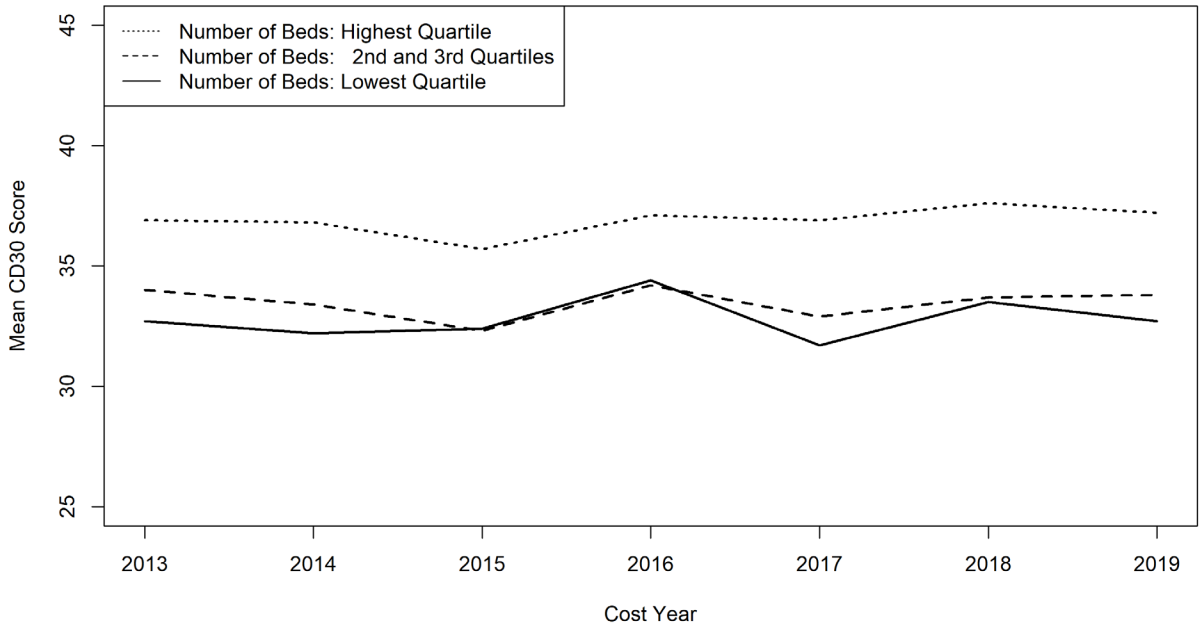


Figure 80. Adjusted Community Discharge Rate (3-30 Day) by Annual Admits per Bed Quartile

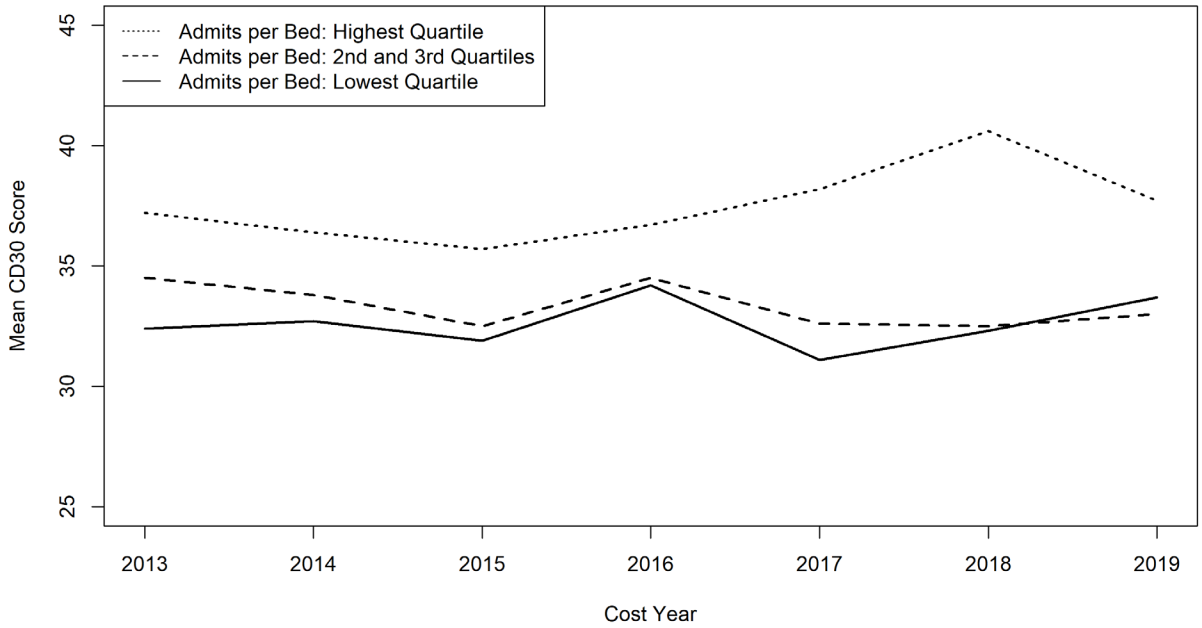


Figure 81. Adjusted Community Discharge Rate (3-30 Day) by Occupancy Rate Quartile

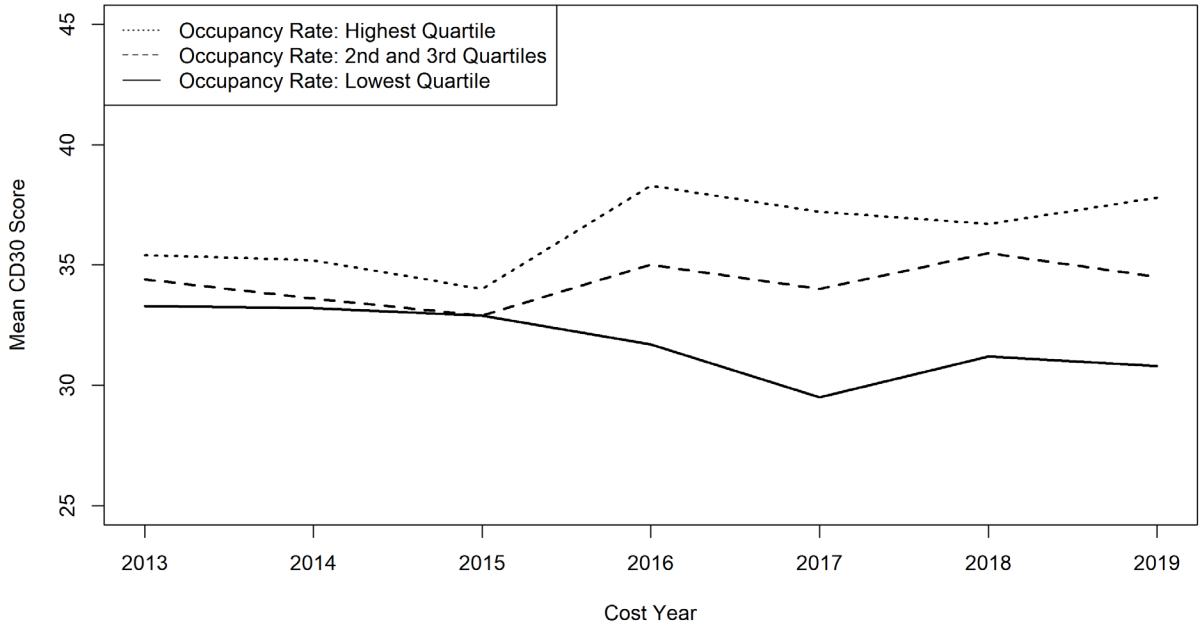


Figure 82. Adjusted Community Discharge Rate (3-30 Day) by Percentage of Revenue from Medicaid Quartile

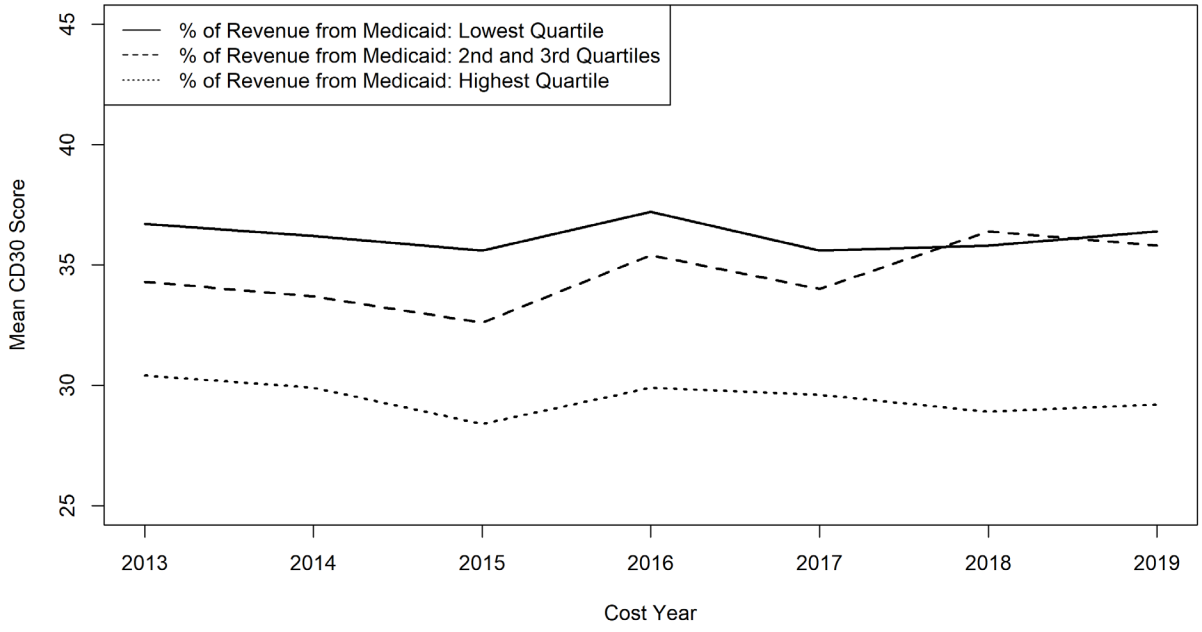


Figure 83. Adjusted Community Discharge Rate (3-30 Day) by Percentage of Revenue from Medicare Quartile

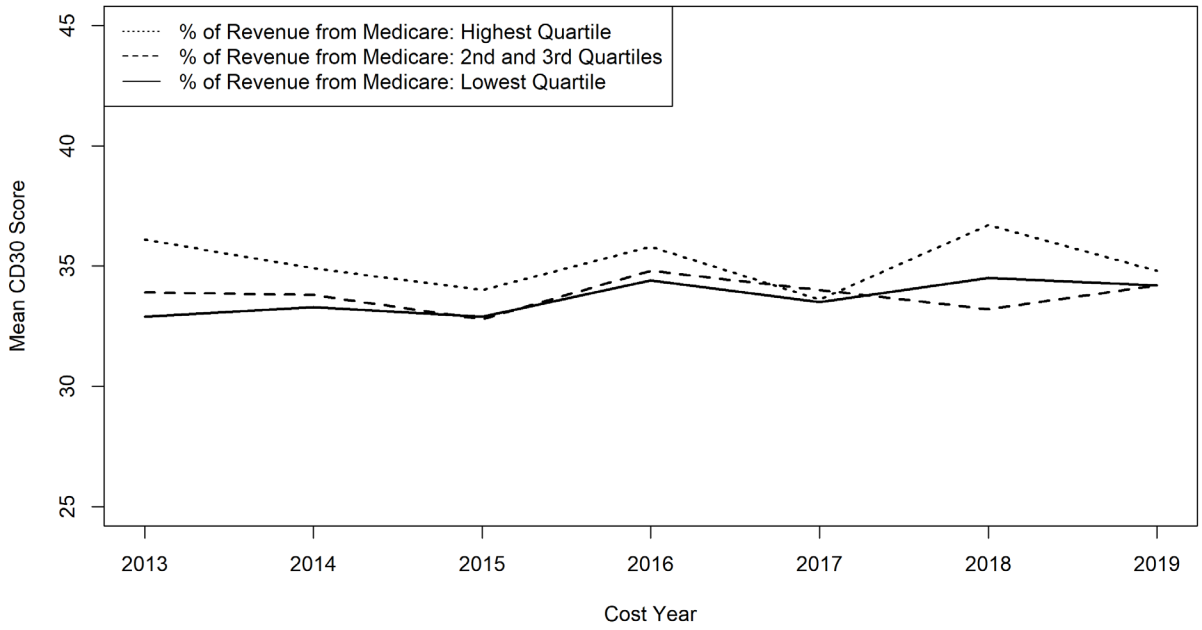
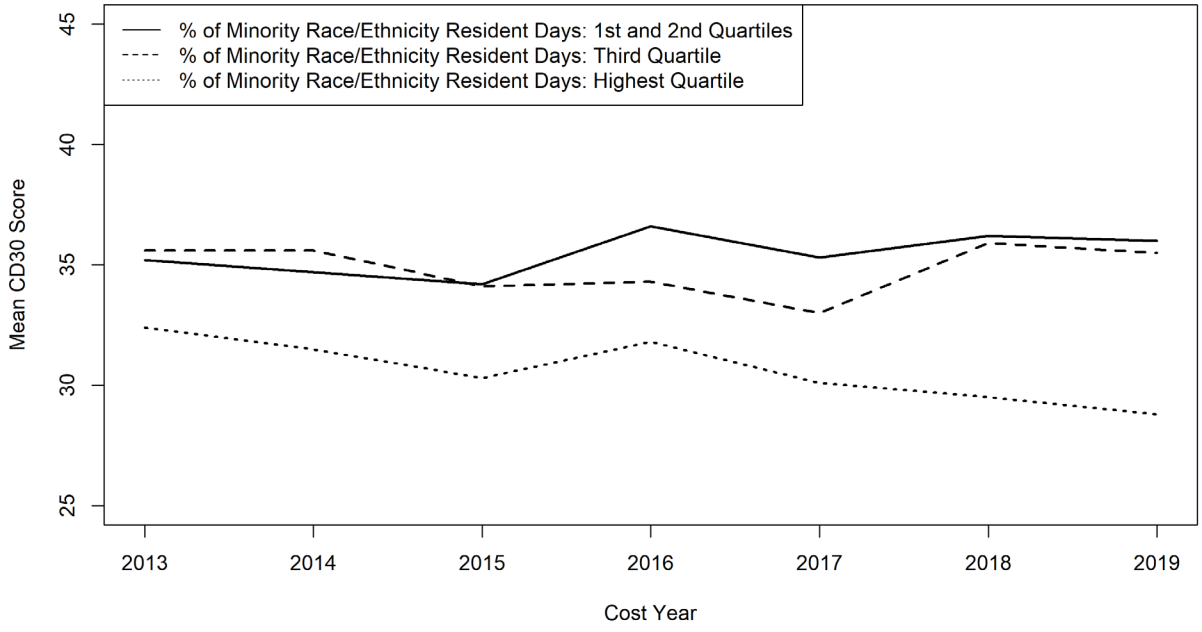


Figure 84. Adjusted Community Discharge Rate (3-30 Day) by Percentage of Minority Race/Ethnicity Resident Day Quartile



F. Subgroup Analysis: Adjusted Community Discharge Rates (31-90 Day)

Table *19* displays the annual means in adjusted community discharge rates for days 31-90 of a resident's stay (CD90) by each variable's sub-group (row titles) and cost year (column titles). Generally separation among the rates across subgroups is moderate (less than for CD30), and rates show fair stability over the period. Facilities with the highest care related spending in 2015 had the highest mean CD90 rates (mean 2.2% higher than lowest quartile in 2019, Figure *85*). For location/hospital affiliation, the rates are volatile over the period such that no subgroup distinguishes itself (Figure *86*). For-profit owned facilities had the lowest CD90 rates, with a mean 2.6% lower than Non-Profit facilities in 2019 (Figure *87*). Facilities that did not change ownership over the period had higher CD90 rates (mean 3.0% higher in 2019, Figure *88*). Number of beds does not appear to be significantly related to CD90 rates (Figure *89*). Facilities with more annual admissions per bed had the highest CD90 rates (mean 3.7% higher than lowest quartile in 2019, Figure *90*). Facilities with the lowest occupancy rate had the lowest CD90 rates, the difference appearing in 2016 (mean 2.7% lower than highest occupancy quartile in 2019, Figure *91*). Facilities with the lowest percentage of revenue from Medicaid had the highest CD90 rates (mean 5.0% higher than the highest quartile in 2019, Figure *92*). Facilities with the highest percentage of their revenue coming from Medicare tended to have the highest CD90 rates (mean 4.1% higher than the lowest quartile in 2019, Figure *93*). The lowest 75% of facilities in terms of percentage of minority race/ethnicity resident days had highest CD90 rates (mean 2.1% higher than the upper 25% in 2019, Figure *94*).

Table 19. Average Adjusted Community Discharge Rates (31-90 Days) by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	31.7	31.9	32.4	32.5	32.6	31.5	31.6
Pre VBR (2015) Care Related Costs Middle Quartiles	32.1	32.6	32.5	32.7	33.7	32.4	32.7
Pre VBR (2015) Care Related Costs Highest Quartile	34.0	35.1	35.3	35.0	35.6	35.6	33.8
Hospital Attached	32.5	33.0	33.6	34.4	34.8	34.2	32.6
Location: Twin Cities	32.4	32.8	33.1	32.6	33.4	32.2	31.8
Location: Other MSA	32.6	33.1	33.0	33.0	33.9	33.1	32.4
Location: Micropolitan	32.9	34.3	34.4	34.1	34.1	32.8	34.5
Location: Small Town	32.0	32.8	32.0	33.3	34.0	32.7	33.3
Location: Rural	31.7	31.6	34.2	33.0	32.8	35.4	34.4
Ownership: For Profit	31.4	31.4	31.4	30.6	32.0	30.6	31.1
Ownership: Government	32.9	33.1	33.9	34.0	34.1	33.0	31.9
Ownership: Not for Profit	32.9	33.8	33.9	34.4	34.8	34.3	33.7
Change in Ownership during the Period	31.3	31.4	31.9	30.4	32.0	30.8	30.4
No Change in Ownership during the Period	32.8	33.5	33.6	34.1	34.4	33.7	33.4
Number of Beds: Lowest Quartile	32.1	31.8	32.4	33.0	33.6	32.9	32.4
Number of Beds: Middle Quartiles	32.4	33.2	33.6	33.6	34.2	32.8	32.8

Cost Year	2013	2014	2015	2016	2017	2018	2019
Number of Beds: Highest Quartile	32.8	33.6	33.1	32.8	33.5	33.5	32.9
Admits per Bed: Lowest Quartile	32.2	32.1	32.2	33.4	33.4	32.7	31.1
Admits per Bed: Middle Quartile	32.1	32.7	32.7	32.8	33.1	32.2	32.5
Admits per Bed: Highest Quartile	33.5	34.5	34.8	33.9	35.7	34.7	34.8
Occupancy Rate: Lowest Quartile	32.0	33.2	32.9	32.1	32.7	31.6	31.1
Occupancy Rate: Middle Quartiles	32.8	32.8	33.1	33.1	33.6	33.1	33.0
Occupancy Rate: Highest Quartile	32.2	33.2	33.5	34.6	35.4	34.3	33.8
% of Revenue from Medicaid: Lowest Quartile	33.8	34.2	34.7	35.2	35.9	34.9	34.6
% of Revenue from Medicaid: Middle Quartiles	31.9	32.5	32.6	33.1	33.8	33.3	33.2
% of Revenue from Medicaid: Highest Quartile	30.7	31.3	30.3	30.0	30.4	29.5	29.6
% of Revenue from Medicare: Lowest Quartile	31.5	31.8	32.7	32.3	33.2	31.9	30.9
% of Revenue from Medicare: Middle Quartiles	31.4	32.6	32.1	32.4	33.5	32.3	32.5
% of Revenue from Medicare: Highest Quartile	33.9	34.0	34.4	34.9	34.6	34.5	35.0
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	32.8	33.0	33.6	34.4	34.8	33.7	33.3
% of Minority Race/Ethnicity Resident Days: Third Quartile	32.9	34.5	33.8	33.1	34.0	34.0	33.6
% of Minority Race/Ethnicity Resident Days: Highest Quartile	31.2	31.8	31.5	30.4	31.3	30.2	30.2

Figure 85. Adjusted Community Discharge Rate (31-90 Day) by 2015 Care Related Cost Quartiles

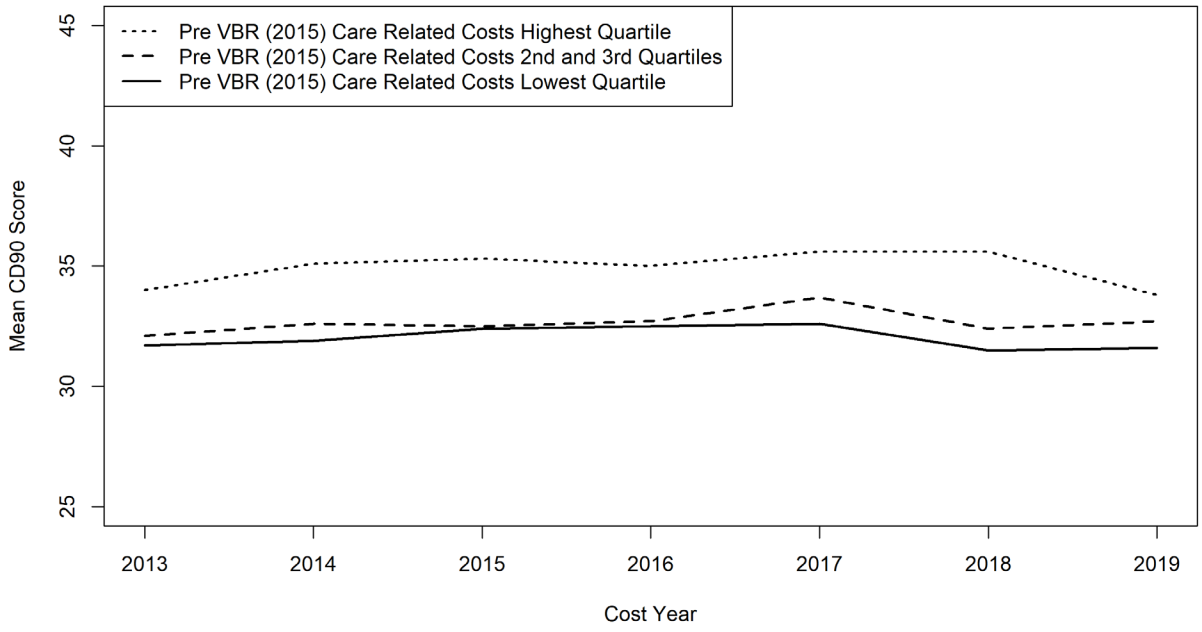


Figure 86. Adjusted Community Discharge Rate (31-90 Day) by Location/Hospital Affiliation

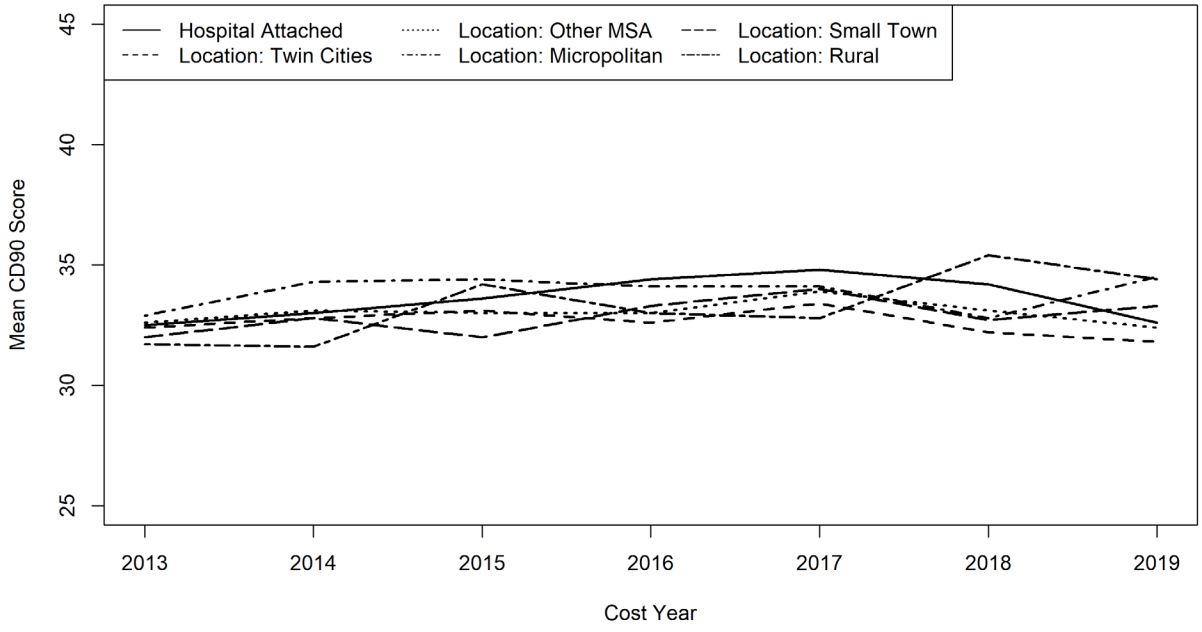


Figure 87. Adjusted Community Discharge Rate (31-90 Day) by Ownership Type

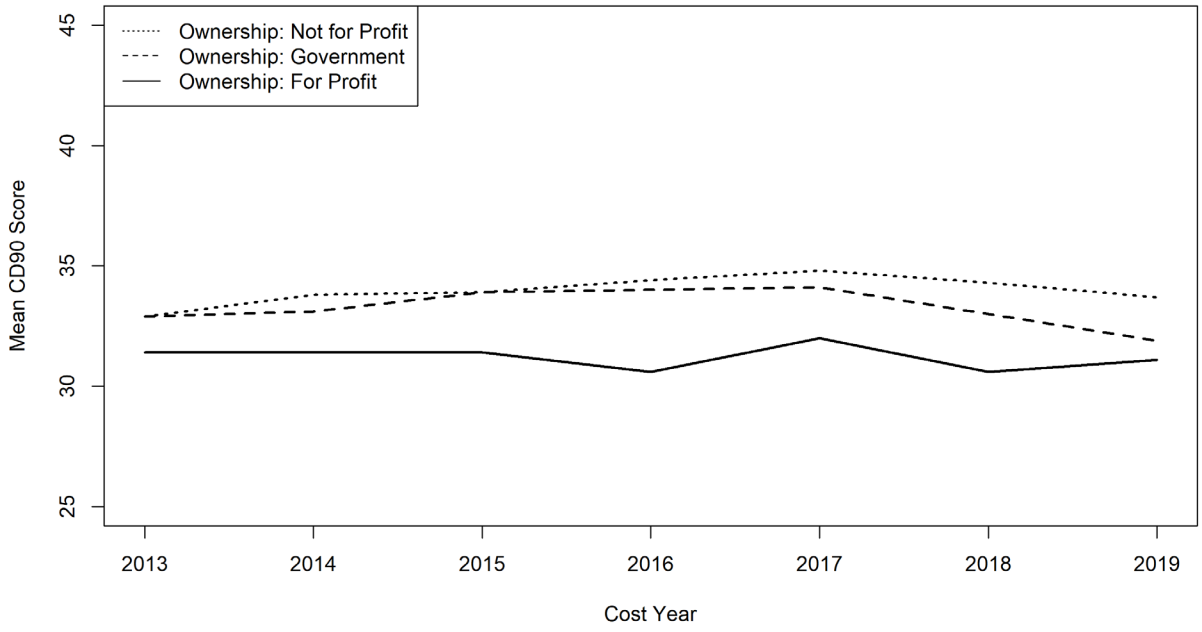

Ownership: Not for Profit
Ownership: Government
Ownership: For Profit
Mean CD90 Score
45
40
35
30
25
2013
2014
2015
2016
2017
2018
2019
Cost Year

Figure 88. Adjusted Community Discharge Rate (31-90 Day) by Change in Ownership over Data Period

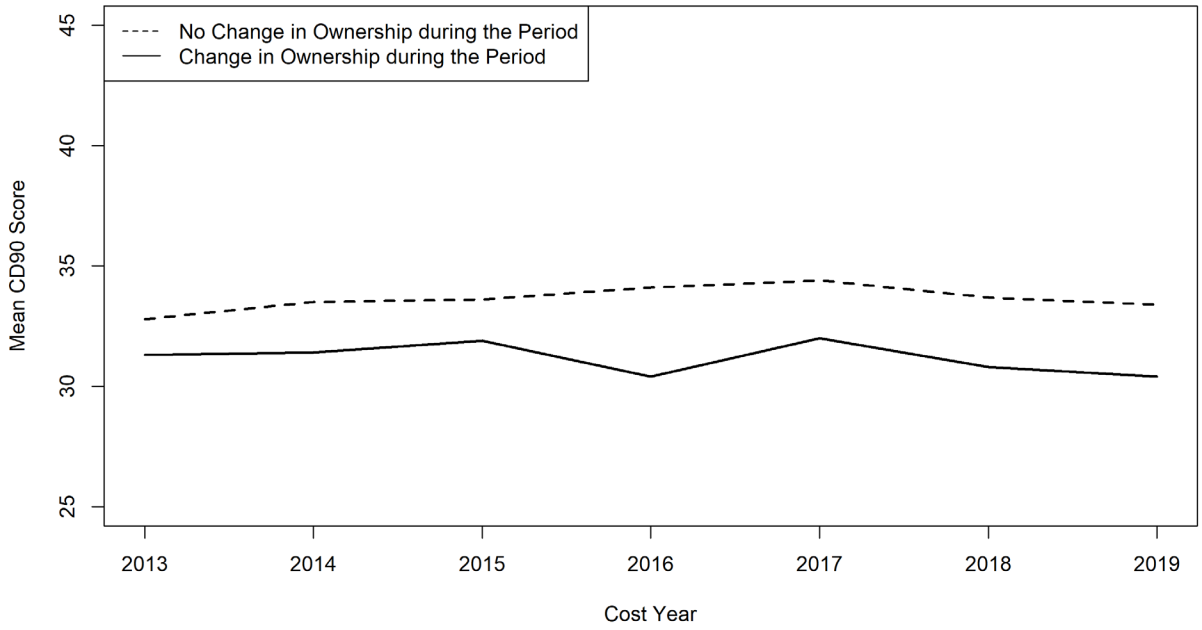


Figure 89. Adjusted Community Discharge Rate (31-90 Day) by Number of Beds Quartile

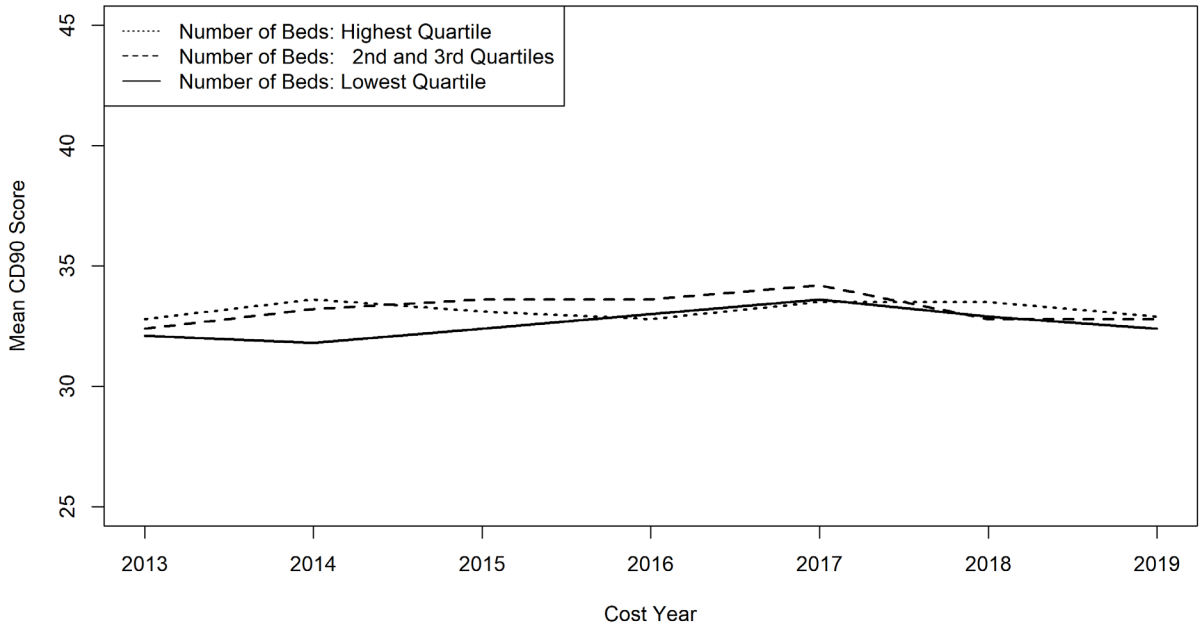


Figure 90. Adjusted Community Discharge Rate (31-90 Day) by Annual Admits per Bed Quartile

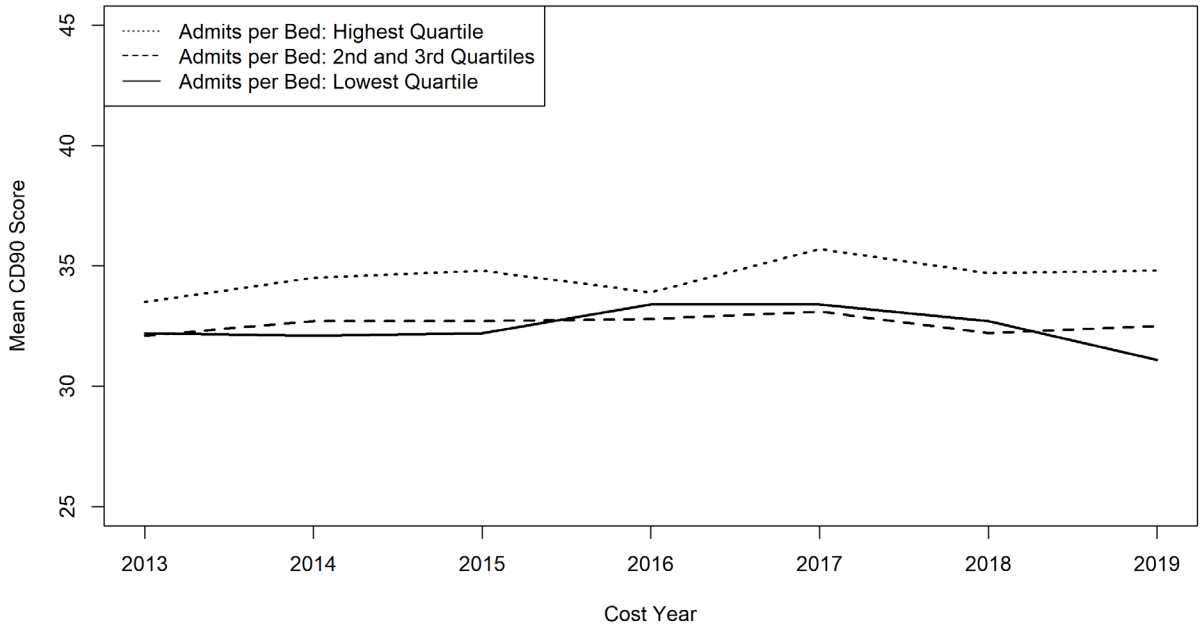


Figure 91. Adjusted Community Discharge Rate (31-90 Day) by Occupancy Rate Quartile

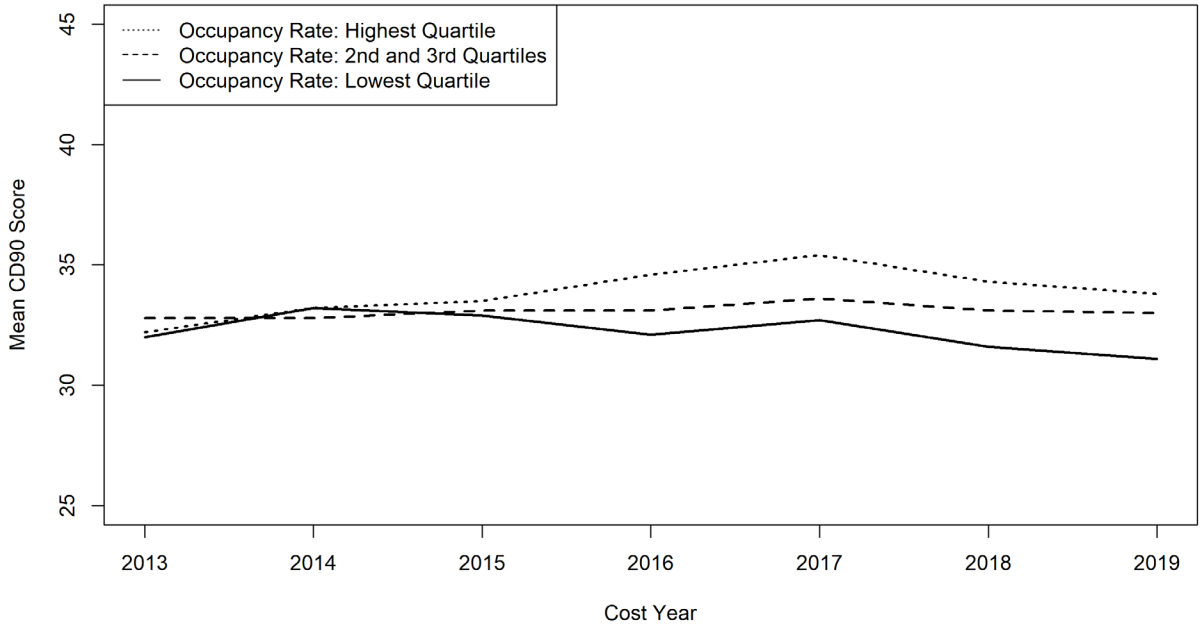


Figure 92. Adjusted Community Discharge Rate (31-90 Day) by Percentage of Revenue from Medicaid Quartile

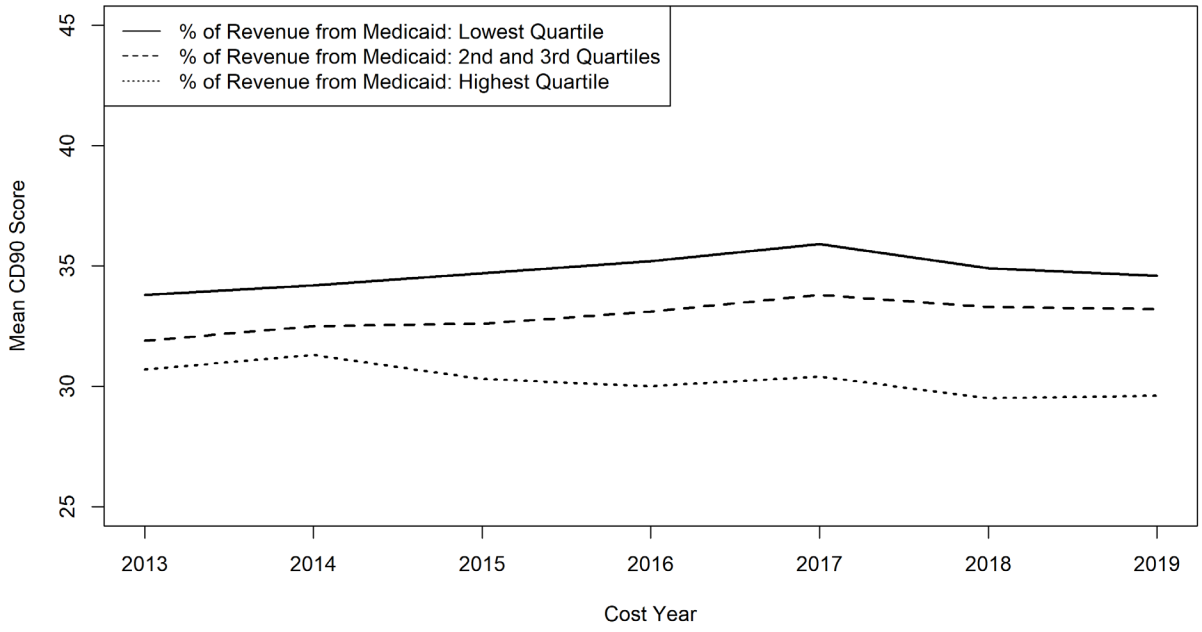


Figure 93. Adjusted Community Discharge Rate (31-90 Day) by Percentage of Revenue from Medicare Quartile

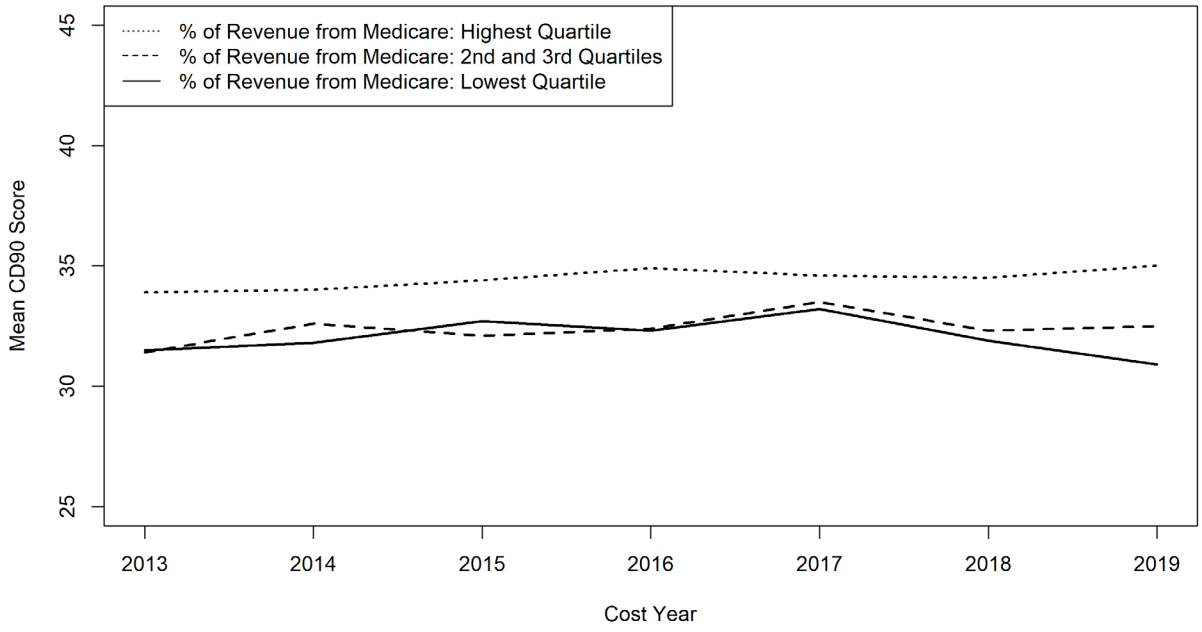
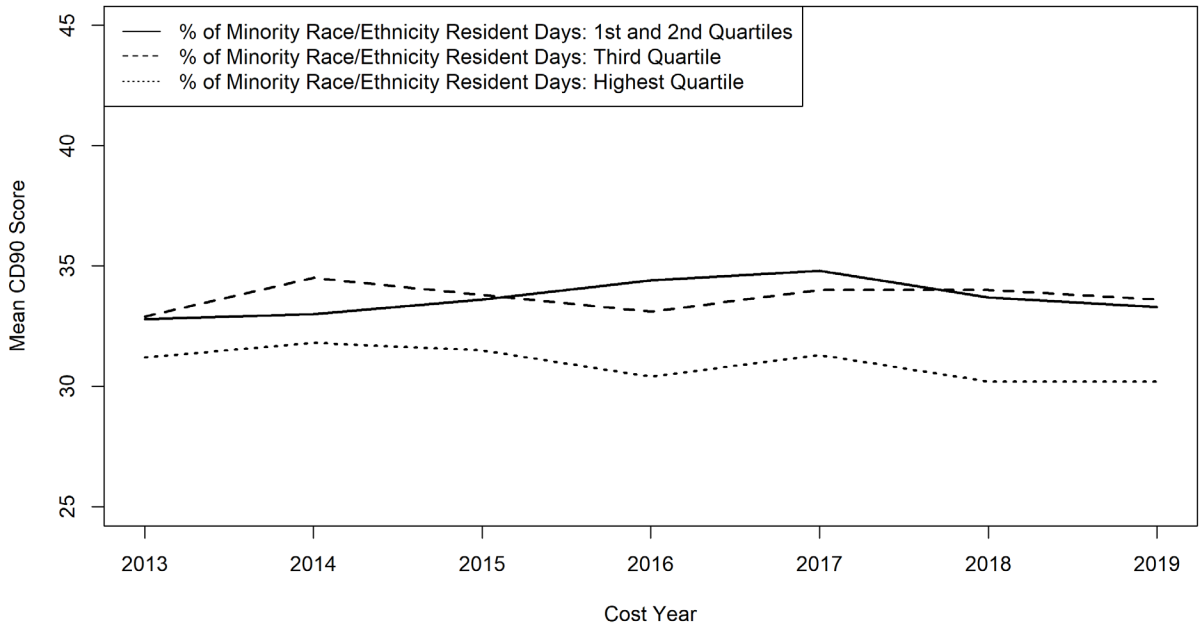


Figure 94. Adjusted Community Discharge Rate (31-90 Day) by Percentage of Minority Race/Ethnicity Resident Day Quartile



G. Subgroup Analysis: Adjusted Hospitalization Rate (3-30 Day)

Table *20* displays the annual means in adjusted hospitalization rates for days 3-30 of a resident's stay (HOSP30) by each variable's sub-group (row titles) and cost year (column titles). Absolute differences in this metric tend to be slight, but some separation among the rates across subgroups is still present. Care-related spending does not appear to be related to HOSP30 rates (Figure *95*). For location/hospital affiliation, the rates are volatile over the period, but free standing facilities in small towns tend to have slightly higher (worse) HOSP30 rates over the period (Figure *96*). For-profit owned facilities had the highest HOSP30 rates, with a mean 1.0% higher than Non-Profit facilities in 2019 (Figure *97*). Facilities that did not change ownership over the period had lower HOSP30 rates (mean 2.2% lower in 2019, Figure *98*). Number of beds does not appear to be significantly related to HOSP30 rates (Figure *99*). Facilities with less annual admissions per bed tended to have the lowest HOSP30 rates (mean 0.3% lower than highest quartile in 2019, Figure *100*). Facilities with the lowest occupancy rate had the highest HOSP30 rates, the difference appearing in 2016 (mean 0.8% higher than highest occupancy quartile in 2019, Figure *101*). Facilities with the lowest percentage of revenue from Medicaid had the lowest HOSP30 rates (mean 0.8% lower than the highest quartile in 2019, Figure *102*). Facilities with the highest percentage of their revenue coming from Medicare tended to have the highest HOSP30 rates (mean 0.2% higher than the lowest quartile in 2019, Figure *103*). The lowest 75% of facilities in terms of percentage of minority race/ethnicity resident days had the lowest HOSP30 rates (mean 1.1% lower than the upper 25% in 2019, Figure *104*).

Table 20. Average Adjusted Hospitalization Rates (3-30 Days) by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	11.6	12.1	12.1	12.0	12.6	12.2	12.2
Pre VBR (2015) Care Related Costs Middle Quartiles	12.0	12.1	12.1	12.2	12.5	12.6	12.4
Pre VBR (2015) Care Related Costs Highest Quartile	11.8	12.1	12.0	11.8	12.3	12.0	12.3
Hospital Attached	11.7	12.0	12.0	11.8	12.4	12.1	12.3
Location: Twin Cities	12.3	12.3	12.2	12.4	12.6	12.8	12.6
Location: Other MSA	12.0	12.3	12.4	12.2	12.8	12.3	12.4
Location: Micropolitan	11.5	11.6	11.5	11.5	11.9	12.3	12.0
Location: Small Town	11.4	11.9	11.8	11.7	11.8	11.9	11.8
Location: Rural	11.1	12.0	11.8	11.6	12.9	11.5	12.0
Ownership: For Profit	12.5	12.7	12.5	12.4	13.1	12.9	13.0
Ownership: Government	12.0	11.9	11.8	11.8	12.4	12.1	11.9
Ownership: Not for Profit	11.6	11.9	12.0	11.9	12.2	12.1	12.0
Change in Ownership during the Period	12.6	12.7	12.6	12.5	13.3	13.0	13.2
No Change in Ownership during the Period	11.6	11.9	11.9	11.9	12.2	12.2	12.0
Number of Beds: Lowest Quartile	11.6	12.1	11.8	11.8	12.5	12.3	12.1
Number of Beds: Middle Quartiles	12.0	12.2	12.2	12.1	12.5	12.3	12.2
Number of Beds: Highest Quartile	11.7	12.0	12.1	12.1	12.4	12.5	12.6
Admits per Bed: Lowest Quartile	11.8	11.9	11.8	11.7	12.2	12.1	12.1
Admits per Bed: Middle Quartile	11.7	12.0	12.0	12.1	12.7	12.5	12.4
Admits per Bed: Highest Quartile	12.3	12.5	12.4	12.2	12.3	12.3	12.4
Occupancy Rate: Lowest Quartile	11.7	12.3	11.8	12.5	12.8	12.6	12.8
Occupancy Rate: Middle Quartiles	12.0	12.1	12.2	11.9	12.6	12.3	12.2
Occupancy Rate: Highest Quartile	11.7	12.1	12.1	11.8	12.0	12.1	12.0
% of Revenue from Medicaid: Lowest Quartile	11.8	11.9	12.0	11.8	12.3	12.1	12.0
% of Revenue from Medicaid: Middle Quartiles	11.8	12.3	12.2	12.0	12.5	12.3	12.3
% of Revenue from Medicaid: Highest Quartile	12.0	12.3	12.2	12.6	12.8	12.8	12.8
% of Revenue from Medicare: Lowest Quartile	11.3	11.5	11.5	11.6	12.1	12.0	12.3
% of Revenue from Medicare: Middle Quartiles	11.8	12.3	12.1	12.1	12.4	12.4	12.2
% of Revenue from Medicare: Highest Quartile	12.1	12.1	12.3	12.2	12.8	12.5	12.5
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	11.7	12.0	12.0	11.9	12.3	12.1	12.0
% of Minority Race/Ethnicity Resident Days: Third Quartile	11.7	12.1	12.1	12.0	12.5	12.1	12.2

Cost Year	2013	2014	2015	2016	2017	2018	2019
% of Minority Race/Ethnicity Resident Days: Highest Quartile	12.5	12.4	12.4	12.6	13.0	13.2	13.2

Figure 95. Adjusted Hospitalization Rate (3-30 Day) by 2015 Care Related Cost Quartiles

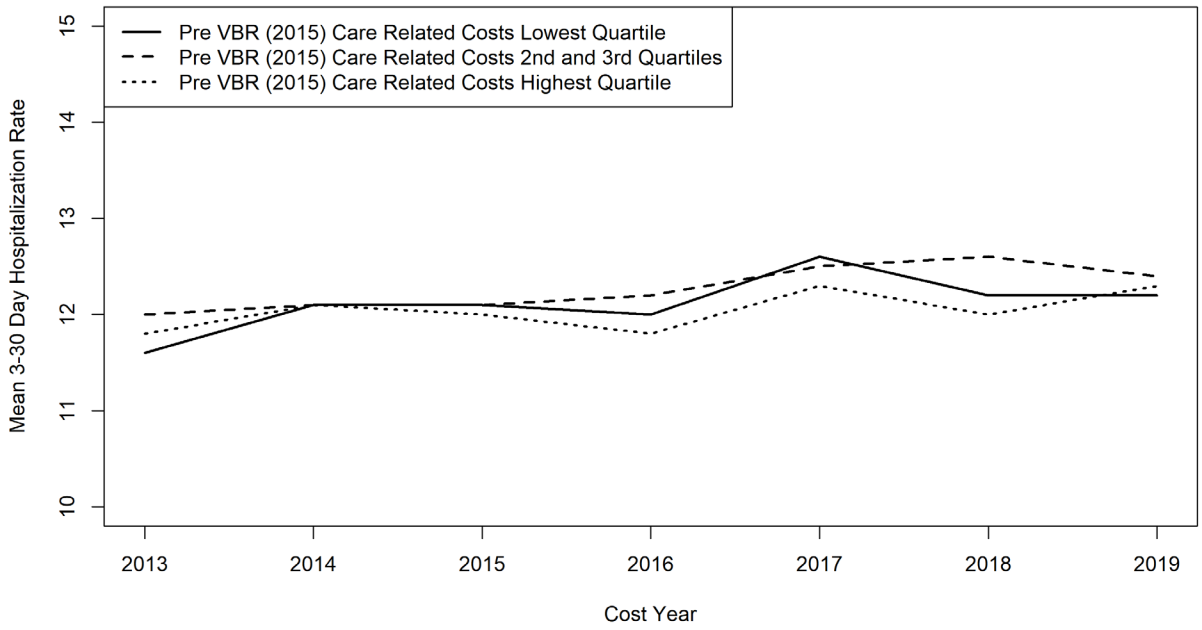


Figure 96. Adjusted Hospitalization Rate (3-30 Day) by Location/Hospital Affiliation

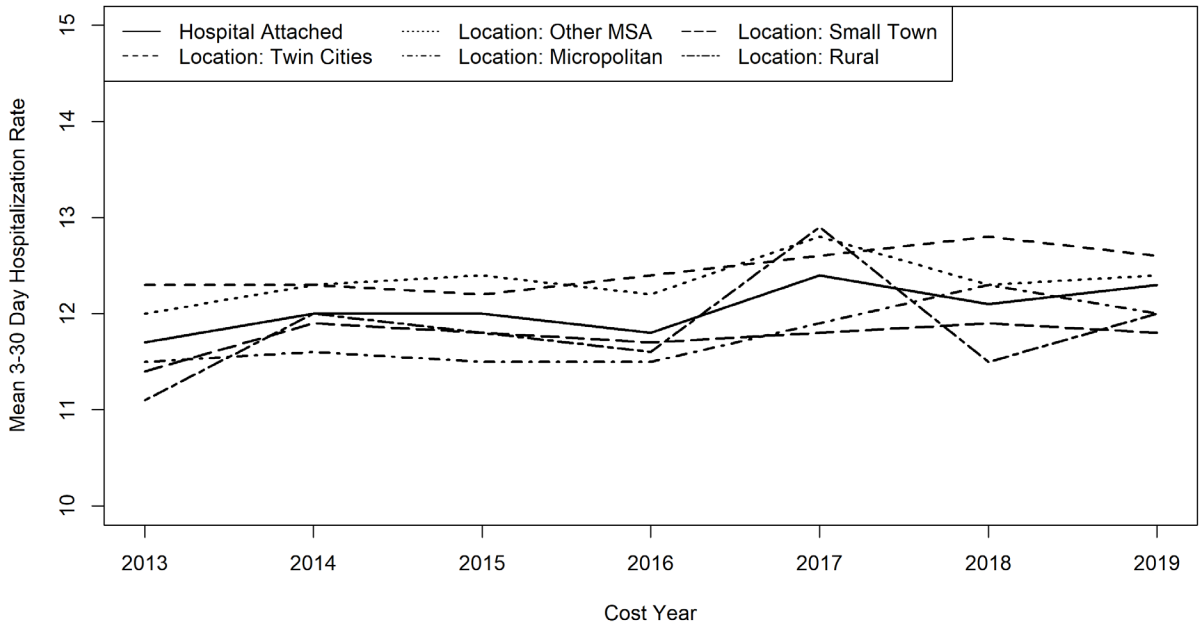


Figure 97. Adjusted Hospitalization Rate (3-30 Day) by Ownership Type

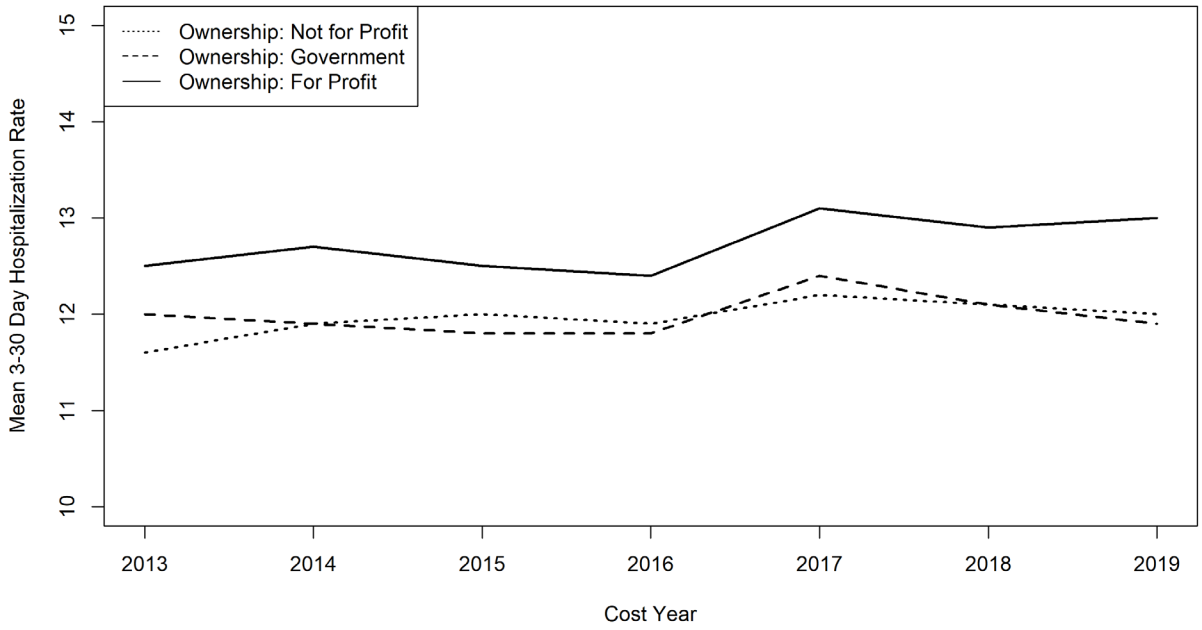


Figure 98. Adjusted Hospitalization Rate (3-30 Day) by Change in Ownership over Data Period

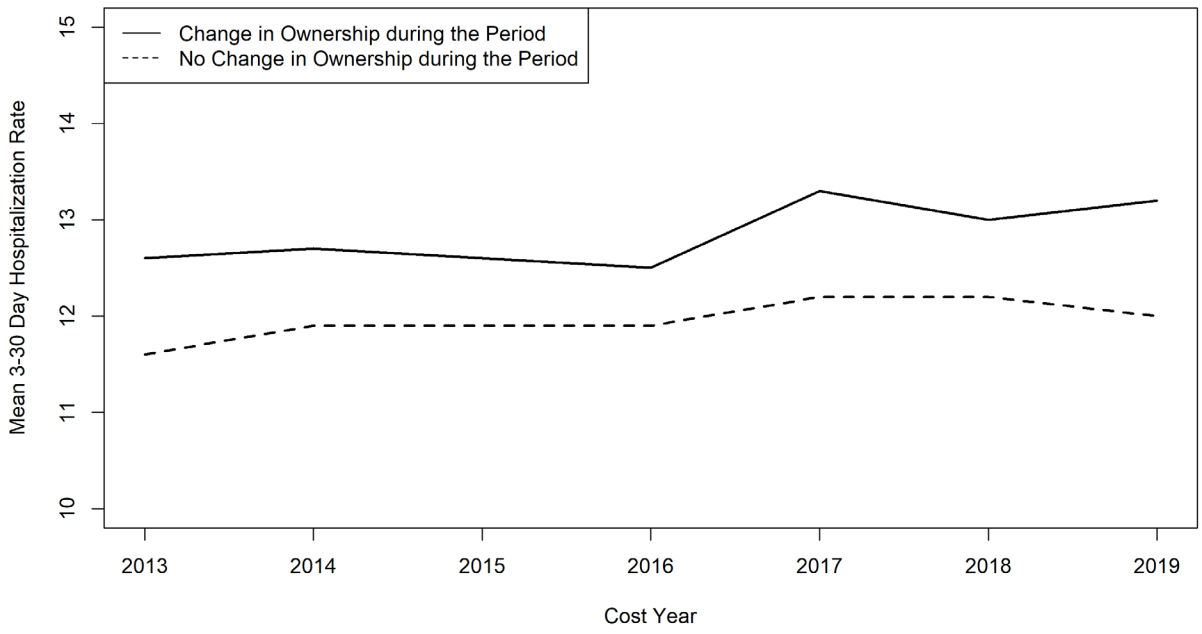


Figure 99. Adjusted Hospitalization Rate (3-30 Day) by Number of Beds Quartile

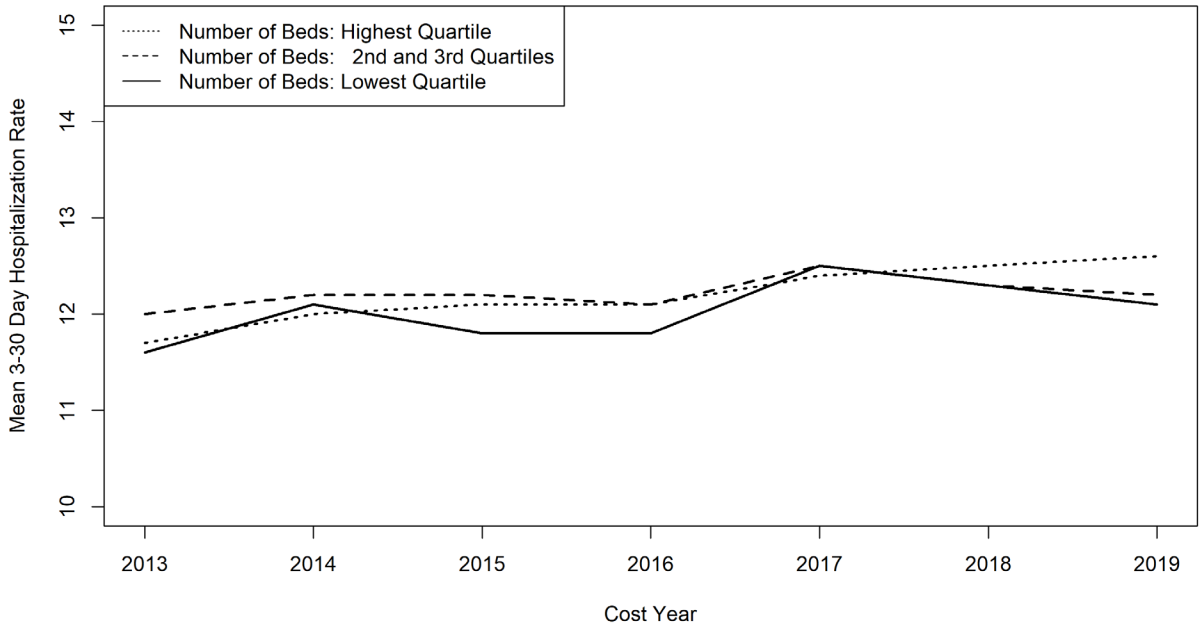


Figure 100. Adjusted Hospitalization Rate (3-30 Day) by Annual Admits per Bed Quartile

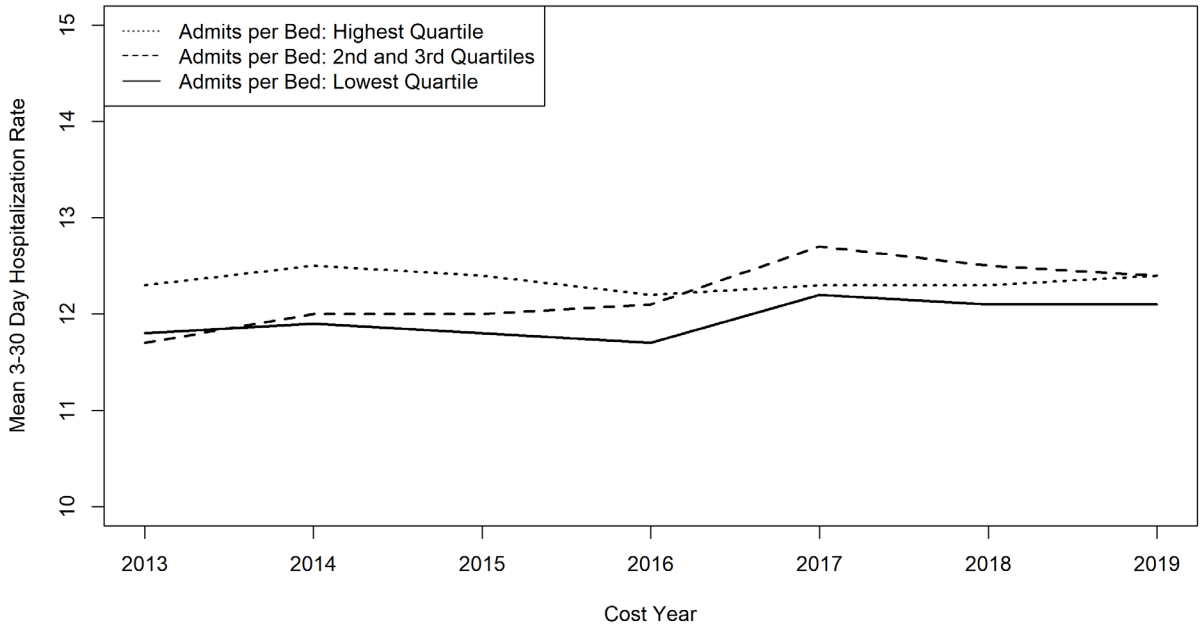


Figure 101. Adjusted Hospitalization Rate (3-30 Day) by Occupancy Rate Quartile

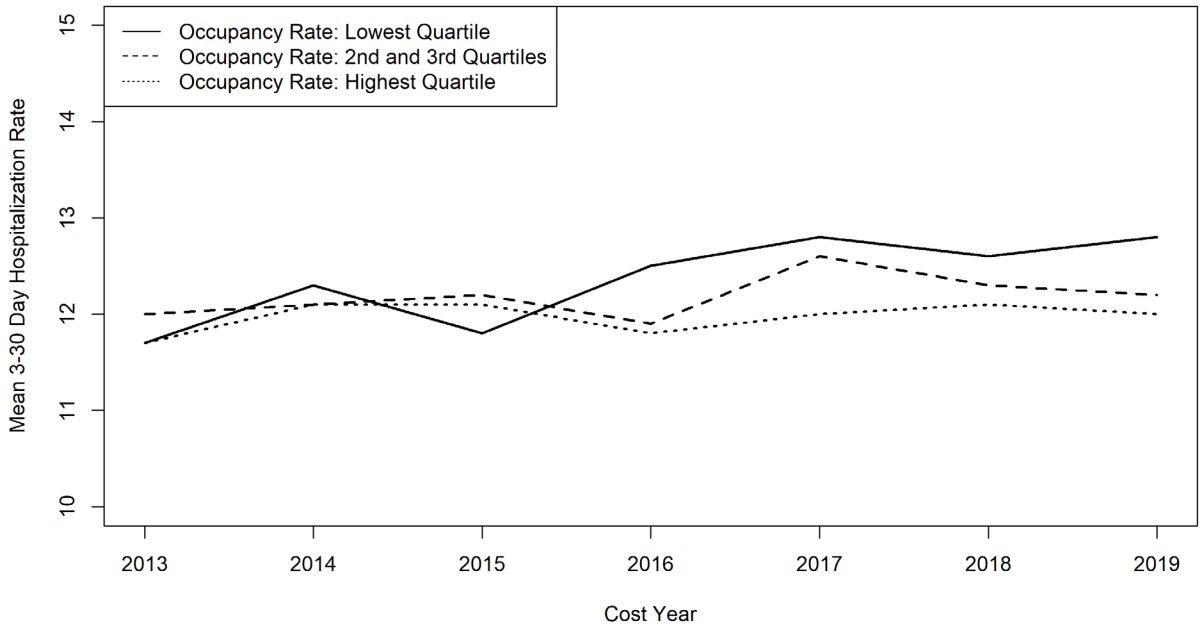


Figure 102. Adjusted Hospitalization Rate (3-30 Day) by Percentage of Revenue from Medicaid Quartile

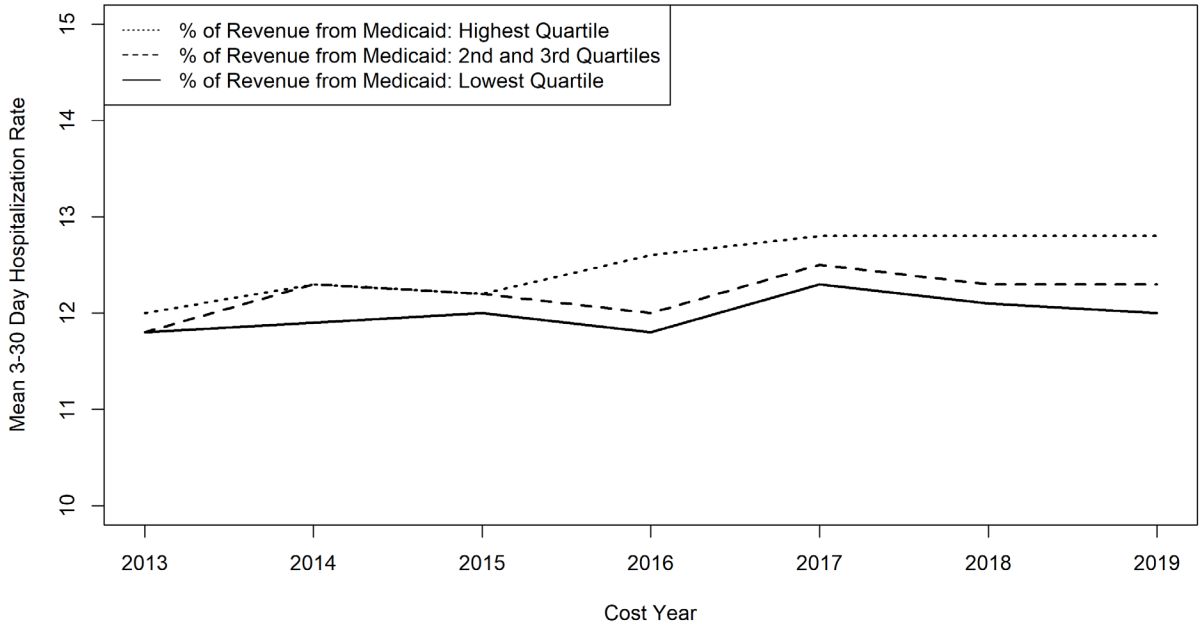


Figure 103. Adjusted Hospitalization Rate (3-30 Day) by Percentage of Revenue from Medicare Quartile

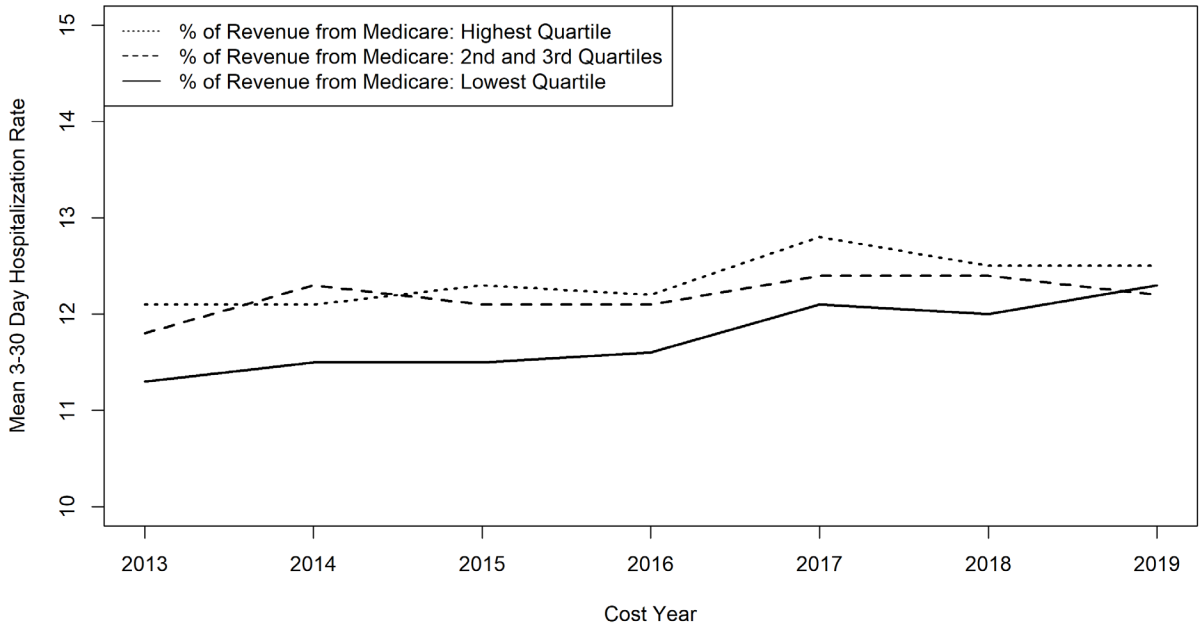
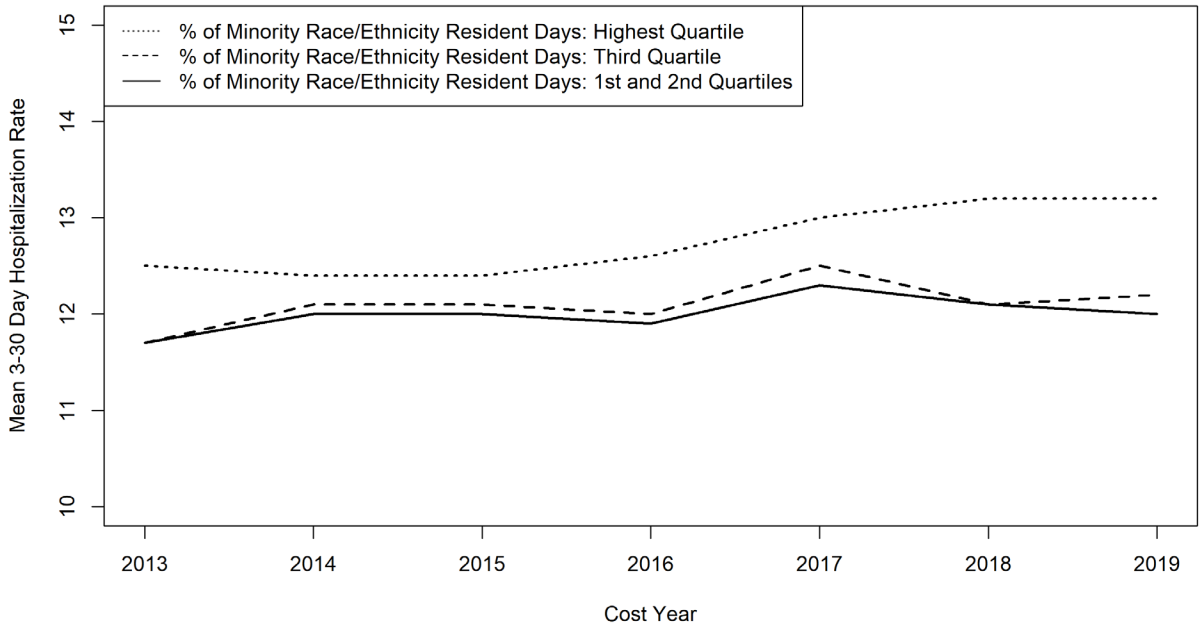


Figure 104. Adjusted Hospitalization Rate (3-30 Day) by Percentage of Minority Race/Ethnicity Resident Day Quartile



H. Subgroup Analysis: Hospitalizations per 1000 Resident Days (Low Risk Period)

Table 21 displays the annual means in unadjusted hospitalization rates per 1000 residents for the low risk period (after day 30) of a resident's stay (HOSP LRP) by each variable's sub-group (row titles) and cost year (column titles). Absolute differences in this metric tend to be slight, but some clear separation exists across certain subgroups. Care-related spending does not appear to be related to HOSP LRP rates (Figure 105). For location/hospital affiliation, the rates are volatile over the period, but hospital attached facilities have the lowest HOSP LRP rates over the period (Figure 106). For-profit owned facilities had the highest HOSP LRP rates, with a mean 0.54 hospitalizations higher than Non-Profit facilities in 2019 (Figure 107). Facilities that did not change ownership over the period had lower HOSP LRP rates (mean 1.67 hospitalizations lower in 2019, Figure 108). Number of beds does not appear to be related to HOSP LRP rates (Figure 109. Facilities with less annual admissions per bed tended to have the highest HOSP LRP rates (mean 0.52 hospitalizations more than the highest quartile in 2019, Figure 110). Facilities with the lowest occupancy rate had the highest HOSP LRP rates (mean 0.61 hospitalizations higher than highest occupancy quartile in 2019, Figure 111). Facilities with the highest percentage of revenue from Medicaid had the highest HOSP LRP rates (mean 0.28 hospitalizations higher than the lowest quartile in 2019,Figure 112). Facilities with the highest percentage of their revenue coming from Medicare had the highest HOSP LRP rates (0.5 hospitalizations higher than the lowest quartile in 2019, Figure 113). The highest 25% of facilities in terms of percentage of minority race/ethnicity resident days had the highest HOSP LRP rates (mean 0.63 hospitalizations higher than the lower 75% in 2019, Figure 114).

Table 21. Average Hospitalizations per 1000 Resident Days (Low Risk Period) by Subgroup

Cost Year	2013	2014	2015	2016	2017	2018	2019
Pre VBR (2015) Care Related Costs Lowest Quartile	1.36	1.27	1.47	1.37	1.40	1.49	1.53
Pre VBR (2015) Care Related Costs Middle Quartiles	1.38	1.33	1.42	1.45	1.58	1.61	1.61
Pre VBR (2015) Care Related Costs Highest Quartile	1.31	1.20	1.34	1.32	1.40	1.41	1.45
Hospital Attached	1.11	0.99	1.08	1.09	1.14	1.17	1.14
Location: Twin Cities	1.45	1.32	1.53	1.53	1.66	1.72	1.82
Location: Other MSA	1.43	1.41	1.48	1.50	1.54	1.61	1.57
Location: Micropolitan	1.36	1.32	1.48	1.36	1.50	1.44	1.47
Location: Small Town	1.33	1.18	1.34	1.27	1.32	1.35	1.46
Location: Rural	1.05	1.17	1.19	1.13	1.48	1.40	1.35
Ownership: For Profit	1.68	1.65	1.80	1.84	1.95	1.94	2.07
Ownership: Government	1.21	1.18	1.26	1.28	1.14	1.37	1.34
Ownership: Not for Profit	1.23	1.16	1.26	1.22	1.33	1.37	1.38
Change in Ownership during the Period	1.68	1.65	1.80	1.84	1.95	1.94	2.07
No Change in Ownership during the Period	1.26	1.17	1.30	1.26	1.35	1.40	1.40
Number of Beds: Lowest Quartile	1.40	1.21	1.35	1.36	1.37	1.51	1.44
Number of Beds: Middle Quartiles	1.37	1.33	1.45	1.40	1.53	1.53	1.55
Number of Beds: Highest Quartile	1.31	1.25	1.39	1.42	1.51	1.54	1.67
Admits per Bed: Lowest Quartile	1.15	1.14	1.28	1.20	1.26	1.34	1.28

Cost Year	2013	2014	2015	2016	2017	2018	2019
Admits per Bed: Middle Quartile	1.34	1.24	1.39	1.39	1.55	1.55	1.57
Admits per Bed: Highest Quartile	1.59	1.51	1.56	1.57	1.60	1.64	1.80
Occupancy Rate: Lowest Quartile	1.45	1.50	1.55	1.68	1.73	1.81	1.82
Occupancy Rate: Middle Quartiles	1.43	1.36	1.46	1.42	1.50	1.49	1.57
Occupancy Rate: Highest Quartile	1.24	1.12	1.28	1.10	1.24	1.31	1.21
% Revenue from Medicaid: Lowest Quartile	1.35	1.25	1.36	1.27	1.35	1.38	1.47
% Revenue from Medicaid: Middle Quartiles	1.35	1.31	1.43	1.42	1.49	1.54	1.50
% Revenue from Medicaid: Highest Quartile	1.40	1.26	1.54	1.58	1.75	1.71	1.75
% Revenue from Medicare: Lowest Quartile	1.17	1.02	1.14	1.13	1.19	1.24	1.28
% Revenue from Medicare: Middle Quartiles	1.27	1.24	1.34	1.37	1.42	1.51	1.58
% Revenue from Medicare: Highest Quartile	1.51	1.42	1.59	1.59	1.71	1.71	1.77
% of Minority Race/Ethnicity Resident Days: Lowest Quartiles	1.31	1.24	1.33	1.29	1.35	1.39	1.37
% of Minority Race/Ethnicity Resident Days: Third Quartile	1.24	1.18	1.28	1.31	1.45	1.51	1.58
% of Minority Race/Ethnicity Resident Days: Highest Quartile	1.59	1.50	1.76	1.75	1.91	1.90	2.00

Figure 105. Hospitalizations per 1000 Resident Days (Low Risk Period) by 2015 Care Related Cost Quartiles

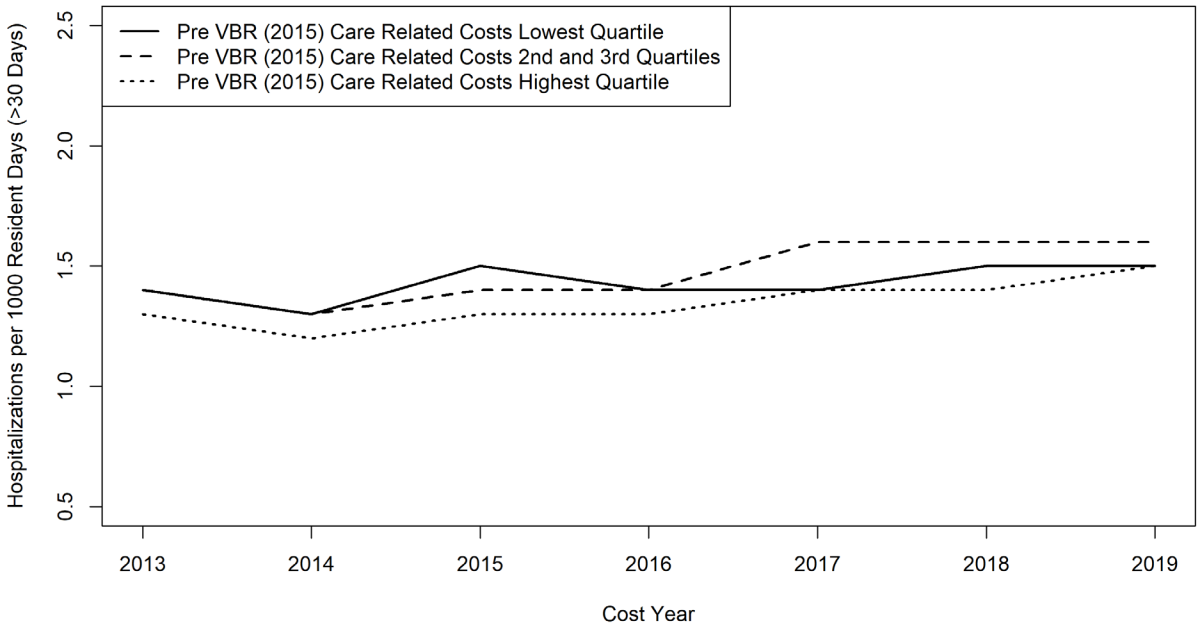


Figure 106. Hospitalizations per 1000 Resident Days (Low Risk Period) by Location/Hospital Affiliation

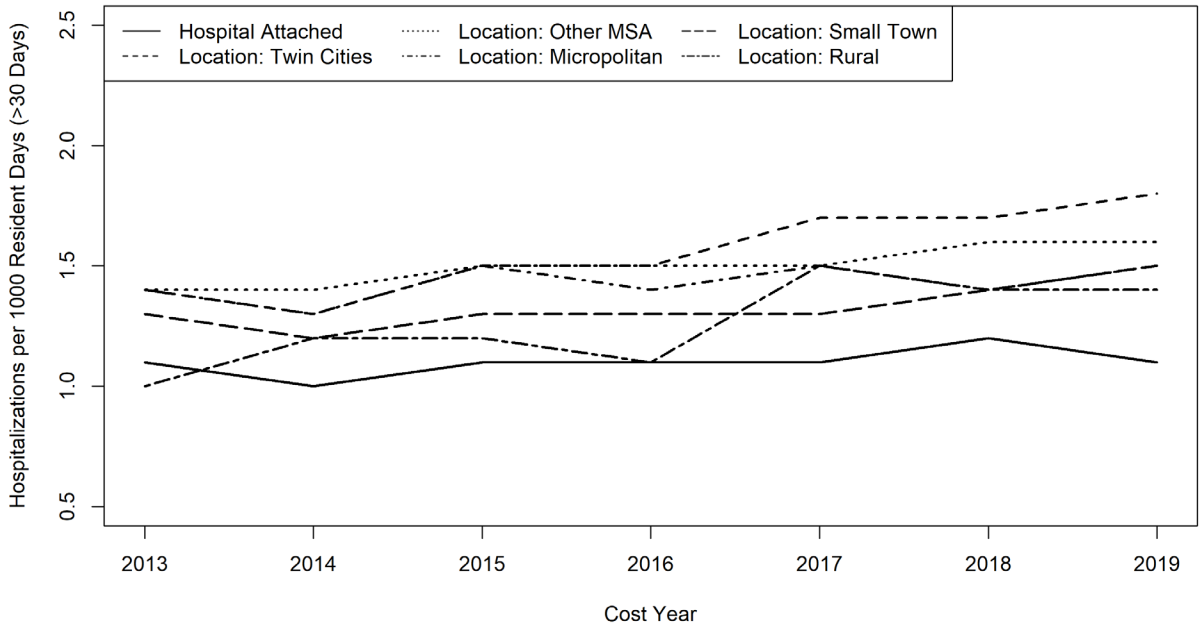


Figure 107. Hospitalizations per 1000 Resident Days (Low Risk Period) by Change in Ownership over Data Period

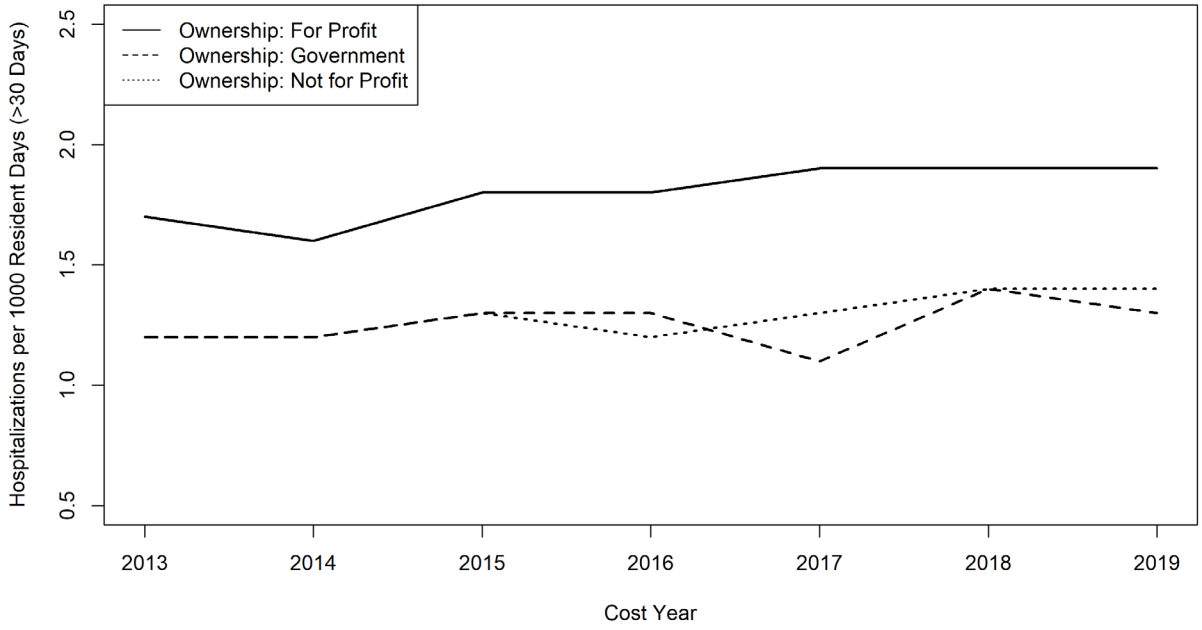


Figure 108. Hospitalizations per 1000 Resident Days (Low Risk Period) by Ownership Type

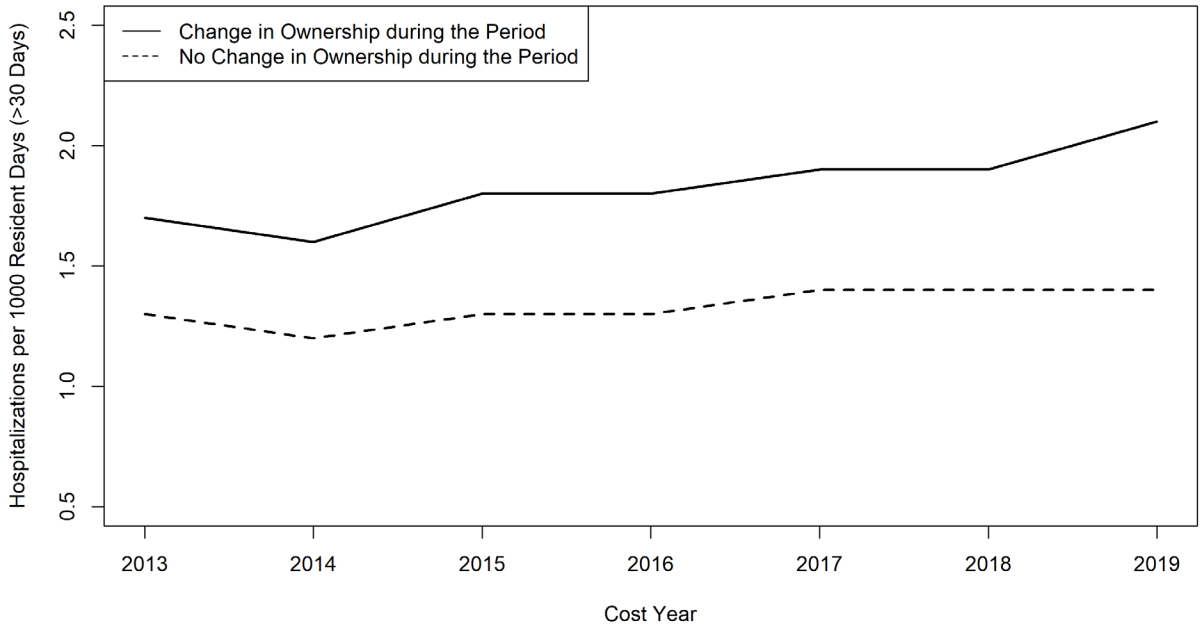


Figure 109. Hospitalizations per 1000 Resident Days (Low Risk Period) by Number of Beds Quartile

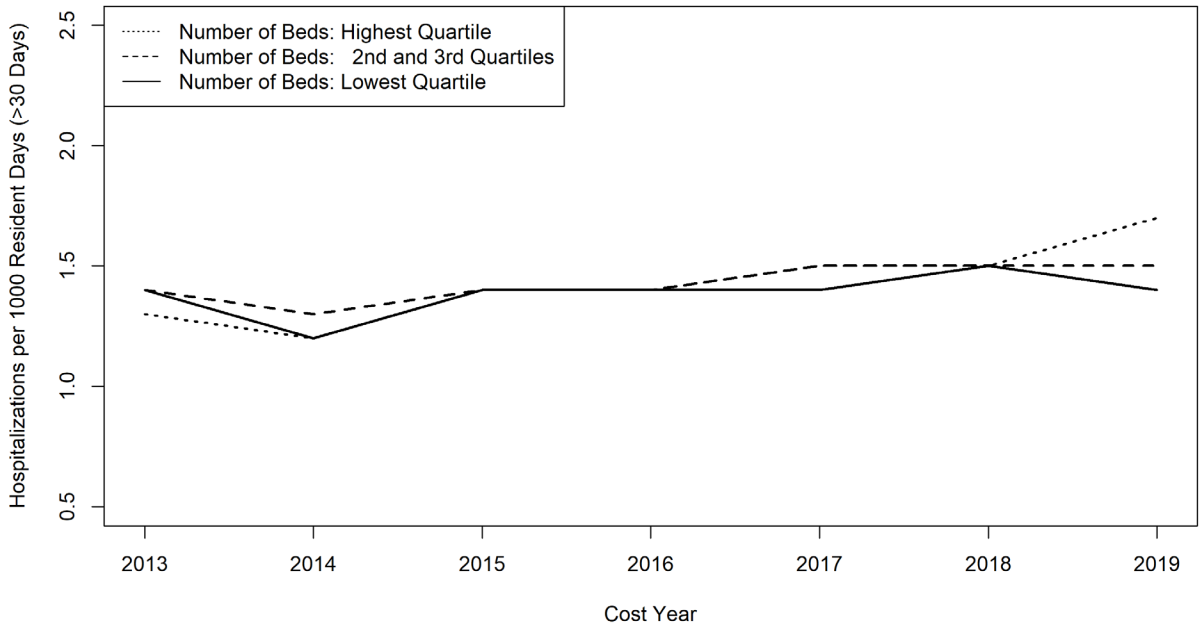


Figure 110. Hospitalizations per 1000 Resident Days (Low Risk Period) by Annual Admits per Bed Quartile

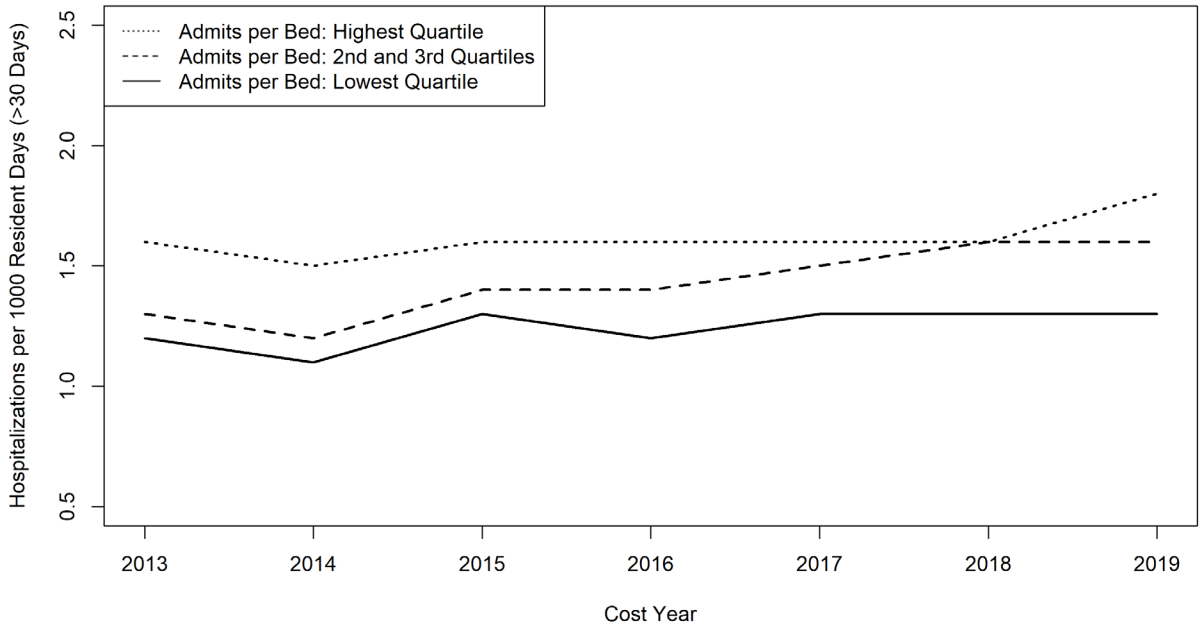


Figure 111. Hospitalizations per 1000 Resident Days (Low Risk Period) by Occupancy Rate Quartile

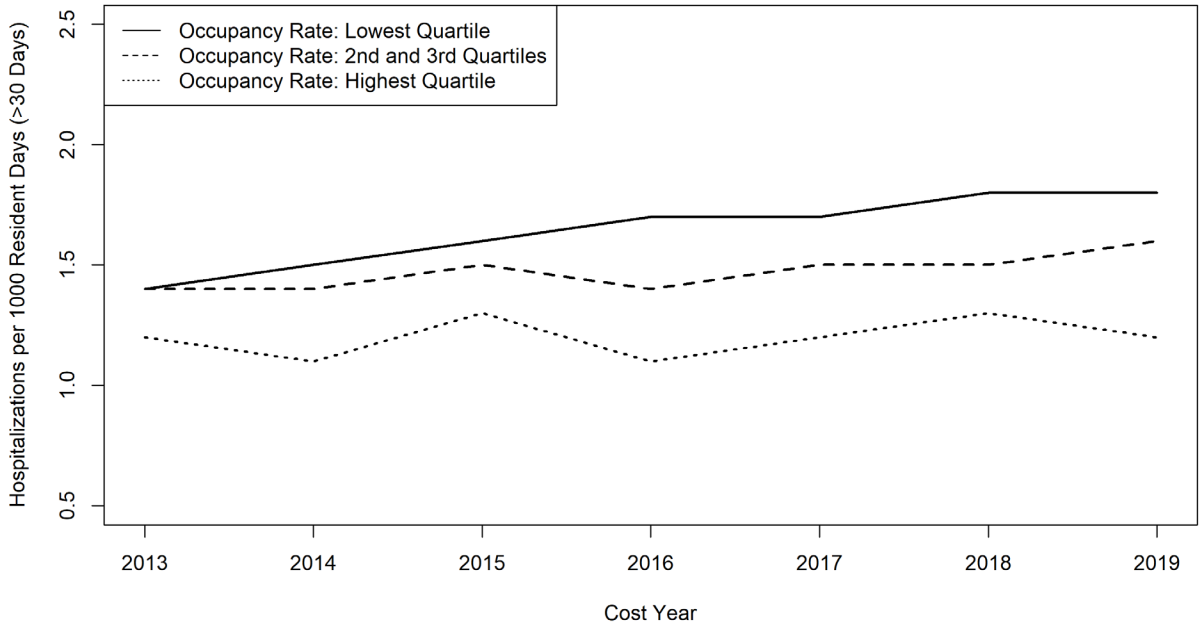


Figure 112. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Revenue from Medicaid Quartile

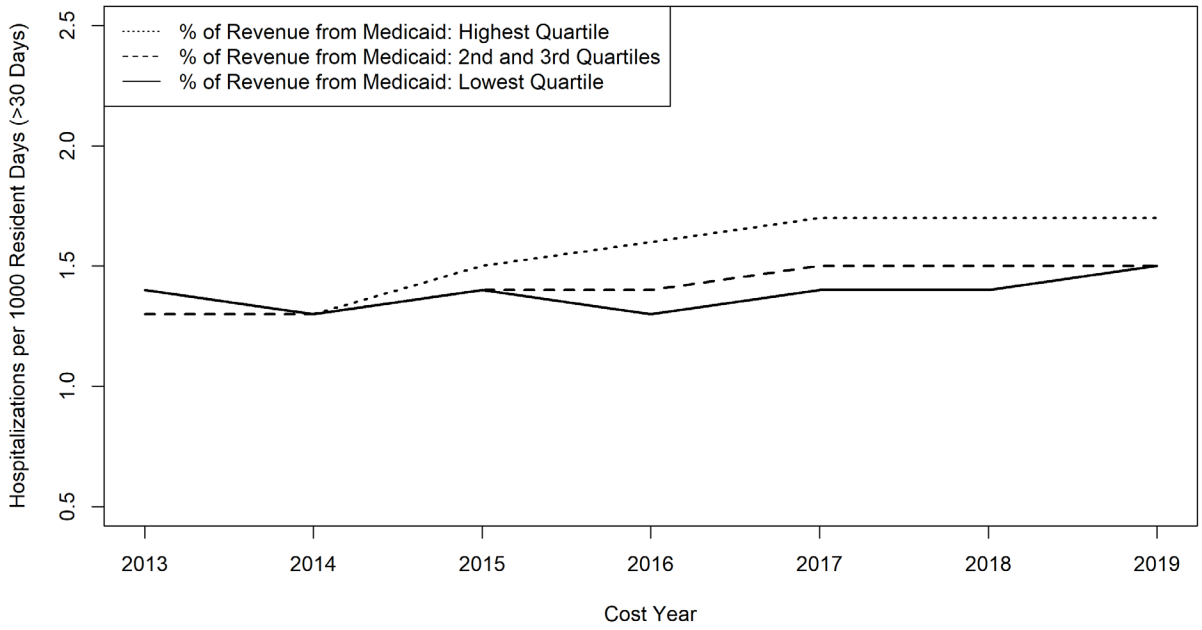


Figure 113. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Revenue from Medicare Quartile

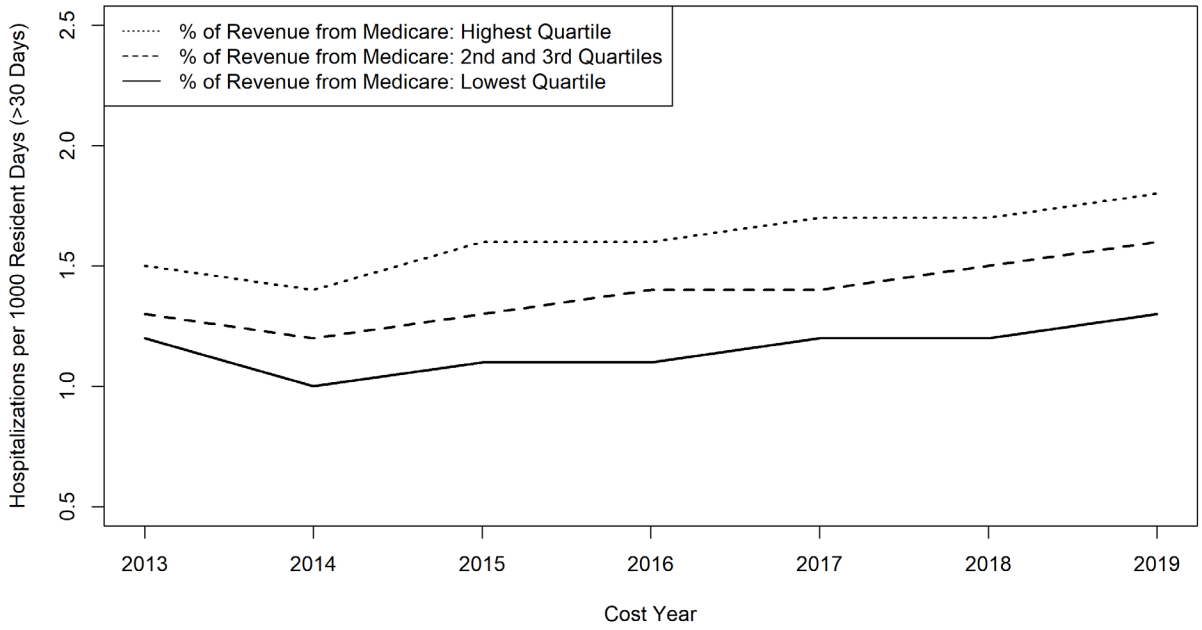
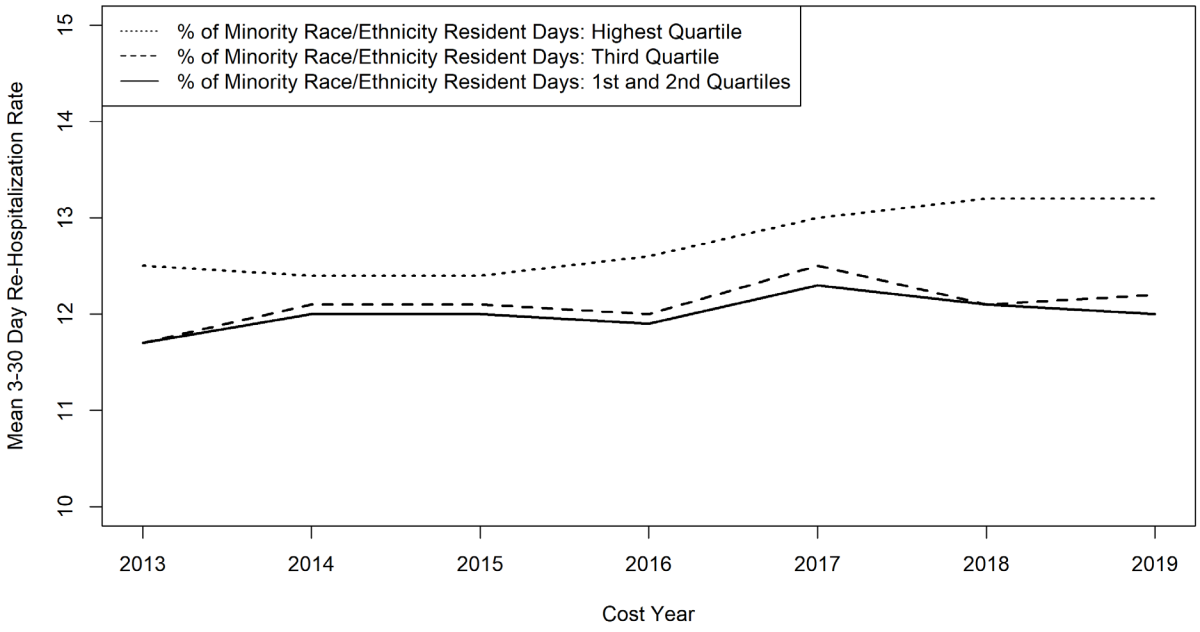


Figure 114. Hospitalizations per 1000 Resident Days (Low Risk Period) by Percentage of Minority Race/Ethnicity Resident Day Quartile



I. Quality Measures Cross Sectional Models

For the general description of the model purpose and interpretation, please see page 39. Table *22* displays the output for the cross sectional model with quality indicator scores as the outcome and subgroups variables as independent variables. Total variability in QI scores explained by the model is very low at 2.9%. Only change of ownership and occupancy rate accounted for more than 1% of the variability in QI scores and none of the variables were statistically significantly related to QI scores

Table *23* displays the cross sectional model with quality of life scores as the outcome and the subgroup variables as independent variables. Total variability in quality of life scores explained by the variables is 25.2%. Ownership type, change of ownership, percent minority resident days, and occupancy rate all accounted for more than 5% of the variability when taken alone. Percent minority resident days accounted for the most unique variability at 5% (Type 3 SS). For profit ownership was associated with a 0.51 point drop in quality of life relative to non-profit status in 2018. Change in ownership was not significantly related to quality of life after accounting for the other variables. A one standard deviation increase in the number of beds (45.68) was associated with a 0.26 point drop in quality of life. Similarly, a 9% increase in occupancy rate (one standard deviation) was associated with an increase in quality of life scores of 0.14. An increase of 9% in the percentage of minority race/ethnicity resident days was associated with a 0.42 drop in the quality of life scores.

Table 24 displays the cross sectional model with Minnesota Department of Health inspection scores as the outcome and the subgroup variables as independent variables. Total variability in MDH scores explained by these variables is 13.3%. Only change of ownership and percentage of minority resident days explained more than 5% of the variance in MDH scores (Type 1 SS) and most of this overlapped with other variables (Type 3 SS). Facilities with a change of ownership over the period had an estimated 1.73 points (0-10 scale) lower inspection score. A 9% increase in the percentage of minority race/ethnicity resident days was associated with a 0.55 point drop in MDH inspection scores.

Table *25*Table *25* displays the cross sectional model with direct care staff retention rates as the outcome. Total variability explained by the model is 17.4%. Ownership status, change of ownership, and occupancy rate all explained more than 5% of the variability by themselves (Type 1 SS), but of these only occupancy rate was statistically significant after accounting for the other variables. Although none of the individual levels are different from rural location, location/hospital affiliation was significantly related to retention rates, with free standing Twin City metro facilities estimated as having the highest retention rates (7% higher than other metro MSA and small town facilities). Annual admits per bed and occupancy rates were also significantly related to direct care staff retention rates in 2018. An increase of 1.52 admits per bed (one standard deviation) was associated with a 3% drop in retention and a 9% increase in occupancy with a 2% higher rate in retention.

Table *26* displays the cross sectional model with adjusted community discharge 3-30 day rates (CD30) as the outcome and the subgroup variables as the independent variables. The model accounted for 38.7% of the variability in CD30 rates. 2015 care related spending, ownership status, change of ownership, annual admits per bed, and percentage of minority resident days all accounted for more than 5% of the variability in CD30 when considered alone (Type 1 SS). Minority resident days explained the most unique variability at 7.2% (Type 3 SS). Care related spending, location, change of ownership, annual admits per bed, and percent minority resident days were all significantly related to CD30 in the full model. An increase of $21.15 in 2015 per resident day care-related spending (one standard deviation) was associated with a 2% higher CD30 rate in 2018. Free standing rural facilities were estimated to have the highest CD30 rates after accounting for the other variables. Facilities with a change in ownership over the period were estimated to have a 3% lower CD30 rate in 2018. An increase in 1.52 admits per bed was associated with a 2% increase in CD30 rates. A 9% increase in the percentage of minority race/ethnicity resident days was associated with a 4% drop in CD30 rates.

Table *27* displays the cross sectional model with adjusted community discharge 31-90 day rates (CD90) as the outcome and the subgroup variables as the independent variables. The model accounted for 19.5% of the variability in CD90 rates (about half as much as the model for CD30). Only ownership type and percentage of minority resident days explained more than 5% of the variability in CD90 when considered alone (Type 1 SS). Only percent of minority race/ethnicity resident days was a statistically significant predictor of CD90 when accounting for other variables. A 9% increase in the percent of minority resident days was associated with a 2% drop in the CD90 rate.

Table *28* displays the cross sectional model with adjusted hospitalization 3-30 day rates (HOSP30) as the outcome and the subgroup variables as the independent variables. The model accounted for 11.9% of the variability in HOSP30 rates. Only 2015 care related spending was significantly related to HOSP30 rates. A $21.15 per resident day spending increase in care related spending in 2015 (one standard deviation) was associated with a 0.4% drop in HOSP30 rates.

Table *29* displays the cross sectional model with unadjusted hospitalizations per 1000 resident days (HOSP LRP) as the outcome and the subgroup variables as the independent variables. The model accounted for 32.6% of the variability in HOSP LRP. Location/hospital affiliation, ownership status, change of ownership, occupancy rate, and percent minority resident days all explained more than 5% of the variance when considered alone (Type 1 SS). When controlling for other variables, location/hospital affiliation, occupancy, percentage of revenue from Medicaid and from Medicare, and percent minority resident days were all significantly correlated with HOSP LRP. Hospital attached facilities were estimated to have the lowest HOSP LRP rates (0.31 lower than the highest group, free standing facilities in other metro MSAs). A 9% increase in occupancy rate (one standard deviation) was associated with 0.12 less hospitalizations per 1000 resident days during the low risk period. An increase of 18% of total revenue from Medicaid (one standard deviation) was associated with a 0.13 rise in HOSP LRP. Similarly, a 14% increase in the amount of total revenue from Medicare was associated with a 0.10 rise in HOSP LRP. Taken together, these two revenue findings suggest facilities with a greater portion of revenue from private pay and other sources have lower HOSP LRP rates. Lastly, an increase in 9% of minority race/ethnicity resident days was associated with a HOSP LRP rate of 0.16 points higher.

Table 22. 2018 Cross Sectional Model of Quality Indicator Scores

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	30.26	<.0001			
2015 Care Related Cost	0.00	0.9222	-0.04	0%	0%
Hospital Attached	-0.46	0.7919		0%	0.0%
Free Standing: Twin City MSA	-0.21	0.9046			
Free Standing: Other Metro MSA	-0.19	0.9011			
Free Standing: Micropolitan	-0.18	0.9144			
Free Standing: Small Town	-0.06	0.9711			
Baseline: Free Standing Rural		.			
Ownership: For Profit	0.86	0.3566		0%	0.5%
Ownership: Government	-0.97	0.4065			
Baseline: Non-Profit Ownership		.			
Change of Ownership	-1.57	0.1029		1.3%	0.8%
Number of Beds	0.00	0.6898	-0.14	0%	0.0%
Annual Admits per Bed	0.06	0.8053	0.10	0%	0.0%
Occupancy Rate	5.53	0.1187	0.52	1.7%	0.7%
% of Annual Revenue from Medicaid	-0.19	0.9479	-0.03	0%	0.0%
% of Annual Revenue from Medicare	0.70	0.7744	0.10	0%	0.0%
% of Minority Race/Ethnicity Resident Days	0.77	0.8713	0.07	0.0%	0.0%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Quality Indicators Scores explained by the variation in the independent variable alone. Type III SS is the amount of variability in Quality Indicators Scores additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Quality Indicators Scores explained by the model (R^2) is 2.9%.

Table 23. 2018 Cross Sectional Model of Quality of Life Scores

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	31.93	<.0001			
2015 Care Related Cost	0.00	0.8343	-0.02	0%	0%
Hospital Attached	0.14	0.692		2%	2.0%
Free Standing: Twin City MSA	0.62	0.0778			
Free Standing: Other Metro MSA	0.06	0.8462			
Free Standing: Micropolitan	0.07	0.8334			
Free Standing: Small Town	0.05	0.8926			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	-0.51	0.0075		13%	1.8%
Ownership: Government	0.07	0.7730			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	-0.24	0.2217		11.4%	0.4%
Number of Beds	-0.01	0.0005	-0.26	3%	2.9%
Annual Admits per Bed	-0.01	0.9182	-0.01	0%	0.0%
Occupancy Rate	1.45	0.0451	0.14	6.2%	0.9%
% of Annual Revenue from Medicaid	0.23	0.6947	0.04	3%	0.0%
% of Annual Revenue from Medicare	0.39	0.4372	0.05	0%	0.1%
% of Minority Race/Ethnicity Resident Days	-4.48	<.0001	-0.42	13.3%	5.0%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Quality of Life Scores explained by the variation in the independent variable alone. Type III SS is the amount of variability Quality of Life Scores additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Quality of Life Scores explained by the model (R^2) is 25.2%.

Table 24. 2018 Cross Sectional Model of Minnesota Department of Health Scores

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	10.24	<.0001			
2015 Care Related Cost	0.00	0.7443	0.07	0%	0%
Hospital Attached	-0.18	0.8515		2%	0.7%
Free Standing: Twin City MSA	0.03	0.9759			
Free Standing: Other Metro MSA	-0.71	0.4109			
Free Standing: Micropolitan	-0.50	0.5981			
Free Standing: Small Town	-0.78	0.4048			
Baseline: Free Standing Rural		.			
Ownership: For Profit	0.34	0.5047		4%	0.3%
Ownership: Government	0.61	0.3457			
Baseline: Non-Profit Ownership		.			
Change of Ownership	-1.73	0.0012		8.4%	2.9%
Number of Beds	-0.01	0.1704	-0.27	2%	0.5%
Annual Admits per Bed	-0.07	0.6243	-0.11	0%	0.1%
Occupancy Rate	-0.16	0.9340	-0.02	0.9%	0.0%
% of Annual Revenue from Medicaid	-2.01	0.2062	-0.36	2%	0.4%
% of Annual Revenue from Medicare	-0.94	0.4867	-0.13	0%	0.1%
% of Minority Race/Ethnicity Resident Days	-5.91	0.0253	-0.55	6.0%	1.4%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Minnesota Department of Health Scores explained by the variation in the independent variable alone. Type III SS is the amount of variability Minnesota Department of Health Scores additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Minnesota Department of Health Scores Direct Care explained by the model (R^2) is 13.3%.

Table 25. 2018 Cross Sectional Model of Direct Care Staff Retention Rates

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	0.60	<.0001			
2015 Care Related Cost	0.00	0.4116	0.01	1%	0%
Hospital Attached	-0.01	0.8383		4%	3.6%
Free Standing: Twin City MSA	0.04	0.2265			
Free Standing: Other Metro MSA	-0.03	0.3990			
Free Standing: Micropolitan	0.02	0.6169			
Free Standing: Small Town	-0.03	0.4212			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	-0.02	0.2630		5%	0.4%
Ownership: Government	0.01	0.5905			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	-0.03	0.1737		7.0%	0.5%
Number of Beds	0.00	0.0777	0.01	2%	0.8%
Annual Admits per Bed	-0.02	0.0018	-0.03	0%	2.5%
Occupancy Rate	0.18	0.0120	0.02	6.4%	1.6%
% of Annual Revenue from Medicaid	-0.10	0.0806	-0.02	0%	0.8%
% of Annual Revenue from Medicare	-0.07	0.1689	-0.01	0%	0.5%
% of Minority Race/Ethnicity Resident Days	-0.11	0.2723	-0.01	0.2%	0.3%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Direct Care Staff Retention Rates explained by the variation in the independent variable alone. Type III SS is the amount of variability Direct Care Staff Retention Rates additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Direct Care Staff Retention Rates explained by the model (R^2) is 17.4%.

Table 26. 2018 Cross Sectional Model of Adjusted Community Discharge Rates (3-30 Days)

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	0.23	0.0004			
2015 Care Related Cost	0.00	0.001	0.02	14%	2%
Hospital Attached	-0.02	0.376		3%	2.6%
Free Standing: Twin City MSA	-0.03	0.2024			
Free Standing: Other Metro MSA	-0.06	0.014			
Free Standing: Micropolitan	-0.07	0.0066			
Free Standing: Small Town	-0.05	0.0516			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	0.00	0.8938		11%	0.0%
Ownership: Government	0.00	0.8955			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	-0.03	0.0222		9.0%	1.0%
Number of Beds	0.00	0.0623	0.01	2%	0.7%
Annual Admits per Bed	0.02	<.0001	0.03	13%	3.9%
Occupancy Rate	0.02	0.7308	0.00	4.6%	0.0%
% of Annual Revenue from Medicaid	0.02	0.6003	0.00	2%	0.1%
% of Annual Revenue from Medicare	-0.03	0.4690	0.00	0%	0.1%
% of Minority Race/Ethnicity Resident Days	-0.45	<.0001	-0.04	13.6%	7.2%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Adjusted Community Discharge Rates (3-30 Days) explained by the variation in the independent variable alone. Type III SS is the amount of variability Adjusted Community Discharge Rates (3-30 Days) additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Adjusted Community Discharge Rates (3-30 Days) explained by the model (R^2) is 38.7%.

Table 27. 2018 Cross Sectional Model of Adjusted Community Discharge Rates (31-90 Days)

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	0.31	<.0001			
2015 Care Related Cost	0.00	0.1035	0.01	4%	1%
Hospital Attached	-0.03	0.2179		1%	1.1%
Free Standing: Twin City MSA	-0.03	0.1618			
Free Standing: Other Metro MSA	-0.03	0.0671			
Free Standing: Micropolitan	-0.04	0.0558			
Free Standing: Small Town	-0.03	0.1156			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	0.00	0.6686		6%	0.0%
Ownership: Government	0.00	0.8820			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	0.00	0.8579		3.1%	0.0%
Number of Beds	0.00	0.3104	0.00	0%	0.3%
Annual Admits per Bed	0.01	0.0806	0.01	6%	0.8%
Occupancy Rate	0.04	0.348	0.00	2.6%	0.2%
% of Annual Revenue from Medicaid	-0.05	0.1756	-0.01	6%	0.5%
% of Annual Revenue from Medicare	-0.02	0.4496	0.00	2%	0.1%
% of Minority Race/Ethnicity Resident Days	-0.20	0.0003	-0.02	10.3%	3.4%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Adjusted Community Discharge Rates (3-30 Days) explained by the variation in the independent variable alone. Type III SS is the amount of variability in Adjusted Community Discharge Rates (3-30 Days) additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Adjusted Community Discharge Rates (3-30 Days) explained by the model (R^2) is 19.5%.

Table 28. 2018 Cross Sectional Model of Adjusted Hospitalization Rates (3-30 Days)

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	0.13	<.0001			
2015 Care Related Cost	0.00	0.0044	0.00	1%	2%
Hospital Attached	0.01	0.0419		4%	2.1%
Free Standing: Twin City MSA	0.01	0.0595			
Free Standing: Other Metro MSA	0.01	0.1198			
Free Standing: Micropolitan	0.01	0.1407			
Free Standing: Small Town	0.00	0.6828			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	0.00	0.6460		4%	0.1%
Ownership: Government	0.00	0.6825			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	0.00	0.1396		4.0%	0.6%
Number of Beds	0.00	0.2437	0.00	1%	0.4%
Annual Admits per Bed	0.00	0.6782	0.00	0%	0.0%
Occupancy Rate	0.00	0.7098	0.00	1.0%	0.0%
% of Annual Revenue from Medicaid	0.01	0.5155	0.00	0%	0.1%
% of Annual Revenue from Medicare	0.01	0.271	0.00	0%	0.3%
% of Minority Race/Ethnicity Resident Days	0.02	0.1802	0.00	5.3%	0.5%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11). Type I SS is the amount of variability in Adjusted Hospitalizations (3-30 Day) explained by the variation in the independent variable alone. Type III SS is the amount of variability in Adjusted Hospitalizations (3-30 Day) additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Adjusted Hospitalizations (3-30 Day) explained by the model (R^2) is 11.9%.

Table 29. 2018 Cross Sectional Model of Hospitalizations per 1000 Resident Days (Low Risk Period)

Model Term	Coefficient	P-Value	STD Impact	Type 1 SS	Type 3 SS
Intercept	1.96	<.0001			
2015 Care Related Cost	0.00	0.5815	-0.02	0%	0%
Hospital Attached	-0.18	0.2996		9%	2.4%
Free Standing: Twin City MSA	-0.03	0.8435			
Free Standing: Other Metro MSA	0.13	0.3845			
Free Standing: Micropolitan	-0.01	0.9548			
Free Standing: Small Town	-0.10	0.536			
Baseline: Free Standing Rural	0.00	.			
Ownership: For Profit	0.13	0.1519		15%	0.4%
Ownership: Government	0.05	0.6753			
Baseline: Non-Profit Ownership	0.00	.			
Change of Ownership	0.12	0.1856		13.2%	0.4%
Number of Beds	0.00	0.5165	-0.02	0%	0.1%
Annual Admits per Bed	0.04	0.0739	0.07	0%	0.7%
Occupancy Rate	-1.28	0.0002	-0.12	10.6%	2.9%
% of Annual Revenue from Medicaid	0.75	0.0073	0.13	1%	1.5%
% of Annual Revenue from Medicare	0.71	0.0031	0.10	1%	1.9%
% of Minority Race/Ethnicity Resident Days	1.77	0.0001	0.16	14.6%	3.1%

STD Impact is the estimated marginal impact on care related costs for a one standard deviation increase in the independent variable (given only for continuous variables, see Table 11 Type I SS is the amount of variability in Hospitalizations per 1000 Resident Days (Low Risk Period) explained by the variation in the independent variable alone. Type III SS is the amount of variability in Hospitalizations per 1000 Resident Days (Low Risk Period) additionally explained by the variation in the independent variable given all other variables were already in the model (variability not yet explained by all other variables). Total variation in Hospitalizations per 1000 Resident Days (Low Risk Period) explained by the model (R^2) is 32.6%.

J. Quality Measure Growth Models

This section describes the results from the growth models with the eight quality measures as outcomes. For more description on the purpose and interpretation of these models, please see page 44. Table *30* displays the growth models with Quality Indicator (QI) and Quality of Life (QOL) scores as the outcomes. The VBR period was associated with a 1.62 point increase to QI scores and a 0.37 point drop in QOL scores. No relationships between independent and dependent variables were altered by the VBR period (change of slope).

Table *31* gives the results from the growth models with Minnesota Department of Health (MDH) inspection scores and direct care retention rates as outcomes. VBR was not associated with a significant change in MDH scores or with Retention rates. Facilities with a change in ownership suffered much lower retention rates during the VBR period (an additional 3% lower rate). This is likely due to the fact that the majority of ownership changes over the data period happened after the implementation of VBR.

Table *32* displays the growth model results with the two adjusted community discharge rates as the outcomes (CD30 and CD90). The effect of occupancy rate on CD30 appears to have been negated during the VBR period, but the lower rates for facilities with larger percentages of minority residents appears to have worsened. The VBR years are associated with a slight increase to CD90 rates (2%). The positive association for Medicare heavy facilities appears to have been dampened during the VBR period and rates have worsened for facilities with larger proportions of minority residents.

Table *33* gives the results for the growth models with adjusted 30 day hospitalization rates (CD30) and unadjusted hospitalizations per 1000 resident days during the low risk period (HOSP LRP). The VBR implementation is not associated with a direct change to either metric. For HOSP30, there appears to be a rise in the rate for facilities with a larger proportion of minority residents. For HOSP LRP, larger facilities appear to have seen a slight rise while facilities with larger proportions of revenue from Medicare have seen a drop in the metric, after accounting for other factors.

Table 30. Growth Model Results for Quality Indicator and Quality of Life Scores

	QI Score (Max 50)		QOL Score (Max 40)	
	Pre-VBR Effect	VBR Effect	Pre-VBR Effect	VBR Effect
Base Value	37.54		33.06	
Year	**(0.17)**		**(0.05)**	
VBR Years (2016-2019)		**1.62**		**(0.37)**
2015 Care Related Cost	**(0.02)**		0.00	
Hospital Attached	(0.63)		(0.01)	
Free Standing: Twin City MSA	(0.73)		0.31	
Free Standing: Other Metro MSA	(0.50)		(0.30)	
Free Standing: Micropolitan	(0.97)		**(0.36)**	
Free Standing: Small Town	(0.60)		(0.25)	
Free Standing: Rural				
Ownership: For Profit	(0.47)		**(0.31)**	
Ownership: Government	(0.32)		0.19	
Baseline: Non-Profit Ownership				
Change of Ownership	**(1.31)**		(0.16)	
Number of Beds	0.01		**(0.00)**	
Annual Admits per Bed	0.21		0.02	
Occupancy Rate	0.88		**0.86**	
% of Annual Revenue from Medicaid	(2.07)		(0.11)	
% of Annual Revenue from Medicare	(1.06)		0.08	
% of Minority Race/Ethnicity Resident Days	2.63		**(4.37)**	

Bolded figures indicate statistical significance at the 5% level. [&]Regression coefficients. *Interaction term with VBR years indicator. [#]Regression intercept.

Table 31. Growth Model Results for Minnesota Department of Health Inspection Scores and Direct Care Staff Retention Rates

	MDH Score (Max 10)		Retention (Max 100%)	
	Pre-VBR Effect	VBR Effect	Pre-VBR Effect	VBR Effect
Base Value	9.54		0.57	
Year	**(0.29)**		(0.00)	
VBR Years (2016-2019)		0.22		0.03
2015 Care Related Cost	(0.01)		0.00	
Hospital Attached	0.07		0.04	(0.02)
Free Standing: Twin City MSA	0.14		0.04	(0.02)
Free Standing: Other Metro MSA	(0.52)		(0.03)	0.00
Free Standing: Micropolitan	(0.22)		(0.00)	0.02
Free Standing: Small Town	(0.26)		0.01	(0.02)
Free Standing: Rural^				
Ownership: For Profit	(0.20)		(0.00)	
Ownership: Government	0.09		**0.03**	
Baseline: Non-Profit Ownership				
Change of Ownership	**(0.52)**		**(0.04)**	**(0.03)**
Number of Beds	**(0.01)**		0.00	
Annual Admits per Bed	(0.01)		**(0.01)**	
Occupancy Rate	**2.24**		**0.18**	
% of Annual Revenue from Medicaid	(1.00)		**(0.06)**	
% of Annual Revenue from Medicare	(0.23)		(0.05)	
% of Minority Race/Ethnicity Resident Days	**(2.79)**		(0.06)	

Bolded figures indicate statistical significance at the 5% level. &Regression coefficients. *Interaction term with VBR years indicator. #Regression intercept. ^Significant differences exist among location/hospital affiliation for both outcomes, but not relative to the baseline of free standing rural facilities.

Table 32. Growth Model Results for Adjusted Community Discharge Rates

	3-30 Day CD Rate (Max 100%)		31-90 Day CD Rate (Max 100%)	
	Pre-VBR Effect	VBR Effect	Pre-VBR Effect	VBR Effect
Base Value	0.38		0.34	
Year	**(0.00)**		0.00	
VBR Years (2016-2019)		(0.05)		**0.02**
2015 Care Related Cost	**0.00**		0.00	
Hospital Attached	0.01		(0.00)	
Free Standing: Twin City MSA	0.02		0.00	
Free Standing: Other Metro MSA	(0.02)		(0.01)	
Free Standing: Micropolitan	(0.00)		0.00	
Free Standing: Small Town	(0.01)		(0.01)	
Free Standing: Rural^				
Ownership: For Profit	**(0.02)**		(0.01)	
Ownership: Government	(0.01)		0.00	
Baseline: Non-Profit Ownership				
Change of Ownership	**(0.03)**		**(0.01)**	
Number of Beds	**0.00**		(0.00)	
Annual Admits per Bed	**0.01**		**0.01**	
Occupancy Rate	**(0.09)**	**0.08**	(0.00)	
% of Annual Revenue from Medicaid	**(0.05)**		**(0.03)**	
% of Annual Revenue from Medicare	**(0.07)**		**0.04**	**(0.05)**
% of Minority Race/Ethnicity Resident Days	**(0.32)**	**(0.09)**	**(0.10)**	**(0.09)**

Bolded figures indicate statistical significance at the 5% level. &Regression coefficients. *Interaction term with VBR years indicator. #Regression intercept. ^Significant differences exist among location/hospital affiliation for 30 Day Community Discharge Rate, but not relative to the baseline of free standing rural facilities.

Table 33. Growth Model Results for Hospitalization Rates

	Adjusted Hospitalization Rate (3-30 Days, Max 100%)		Hospitalizations per 1000 Resident Days (> 30 Days)	
	Pre-VBR Effect	VBR Effect	Pre-VBR Effect	VBR Effect
Base Value	0.110		1.37	
Year	**0.001**		**0.03**	
VBR Years (2016-2019)		(0.002)		(0.05)
2015 Care Related Cost	(0.000)		(0.00)	
Hospital Attached	0.005		(0.05)	
Free Standing: Twin City MSA	0.002		(0.03)	
Free Standing: Other Metro MSA	0.005		**0.21**	
Free Standing: Micropolitan	0.000		0.14	
Free Standing: Small Town	(0.001)		0.09	
Free Standing: Rural^				
Ownership: For Profit	**0.004**		**0.19**	
Ownership: Government	0.001		0.05	
Baseline: Non-Profit Ownership				
Change of Ownership	**0.004**		**0.19**	
Number of Beds	0.000		**(0.00)**	**0.00**
Annual Admits per Bed	0.000		**0.07**	
Occupancy Rate	0.003		**(0.76)**	
% of Annual Revenue from Medicaid	0.007		**0.31**	
% of Annual Revenue from Medicare	**0.013**		**0.95**	**(0.52)**
% of Minority Race/Ethnicity Resident Days	0.013	**0.017**	**1.99**	

Bolded figures indicate statistical significance at the 5% level. &Regression coefficients. *Interaction term with VBR years indicator. #Regression intercept. ^Significant differences exist among location/hospital affiliation for both outcomes, but not relative to the baseline of free standing rural facilities.

IV. Summary

All results presented in this report were for the 340 skilled nursing facility with data for all years from 2013-2019. Some observations of note are collected here for convenience:

- Overall the period saw a decline in nursing home use (resident days and occupancy rates). Acuity levels have also declined.

- Since 2016, Medicaid revenue has increased as a total share of facility revenue, replacing Medicare share of revenue, a shift of about 4% of total revenue.

- The jump in revenue for Medicaid and Private pay revenue was large in 2016. The annual growth in revenue from these sources is higher than pre-VBR, but lower than the initial jump.

- Annual care related spending increases, particularly direct care spending, have been larger during the VBR period.

- Medical and scholarship benefits have increased substantively during the VBR period.

- Other operating costs have grown steadily during the VBR period with annual increase between 4-5%. Laundry costs have increased the least since 2015 (10%), while administrative costs have increased the most (29%).

- There appears to be a substituting of RN hours for LPN hours over the period, as well as some CNA hours replacing licensed nursing hours. Overall, total hours across RN, LPN, and CNA PRD increased by 1% since 2015.

- Retention rates by nursing position do not show clear patterns over the period.

- The strongest predictor of care-related spending under VBR is care related spending just prior to VBR implementation. Previous spending accounts for 67% of the variability in current spending, just under half of which was not explainable by other factors in the cross sectional model. Additionally, 2015 care-related spending was significantly and positively correlated with the adjusted 30 day community discharge rates.

- Location/hospital affiliation was not correlated with care-related spending after other factors were accounted for, but hospital attached facilities report much higher other operating costs. Retention rates, CD30 rates, and low risk period hospitalizations varied by location/hospital affiliation. After accounting for other factors, retention rates were highest in free standing Twin City metro facilities, CD30 rates were highest in free standing rural facilities, and HOSP LRP rates were lowest in hospital attached facilities.

- Ownership status was significantly related to care-related and other operating spending,

and QOL scores. After accounting for other factors, for-profit care-related spending was estimated to be $7.92 lower than non-profit facilities PRD, and quality of life scores about a half point lower. The spending gap between for-profit and non-profit facilities appears to have widened during the VBR period after accounting for other factors.

- Although for-profit facilities appear to be visually worse on most quality metrics, much of this variability overlaps with other factors including the change of ownership (CHOW) variable. After controlling for other factors, CHOW facilities had worse MDH inspection scores (-1.73) and CD30 rates (-3%).

- Number of beds was significantly correlated with other operating costs PRD and QOL scores (both lower for larger facilities).

- Annual resident admissions per bed was significantly correlated with care-related and other operating spending, direct care staff retention rates and CD30 rates. Costs were higher for greater volume as was the CD30 rate, while retention rates were lower.

- Occupancy rates were significantly related to care-related and other operating costs, QOL scores, retention rates, and hospitalizations during the low risk period. Costs PRD were lower for facilities with higher occupancy, an effect which was strengthened during the VBR period, quality of life scores and retention rates were higher, and HOSP LRP rates were better.

- Percentage of total revenue from Medicaid and from Medicare were only related to hospitalizations per 1000 resident days during the low risk period, after controlling for the other factors. A greater proportion of revenue from Medicaid or from Medicare (lower proportion of revenue from private pay or other sources) were associated with worse rates of hospitalization.

- Proportion of minority race/ethnicity resident days was associated with QOL scores, MDH scores, CD30 rates, CD90 rates, and HOSP LRP rates, after accounting for other factors. A greater proportion of minority resident days was associated with lower QOL and MDH scores, worse CD30, CD90, and HOSP LRP rates. Spending on care-related and other operating costs appears to have grown more slowly for facilities with higher proportions of minority resident days and community discharge rates appear to have declined and 30 day hospitalization rates appear to have risen during the VBR period.

- After controlling for other factors, growth models indicate the implementation of VBR is associated with greater spending on care-related ($19.43 PRD) and other operating costs ($11.16 PRD), improved quality indicator scores (1.62), lower quality of life scores (-0.37), and improved community discharge rates in the 31-90 period (2%).