JOURNAL OF HEALTH CARE FINANCE

Spring 2017

PEER GROUP FACTORS RELATED TO THE FINANCIAL PERFORMANCE OF CRITICAL ACCESS HOSPITALS

Walter L. Hawkins, MBA, MHA, MSPH
Graduate Student
Department of Health Policy and Management
Gillings School of Global Public Health
University of North Carolina at Chapel Hill USA

Kristin L. Reiter, PhD
Associate Professor
Department of Health Policy and Management
Gillings School of Global Public Health
University of North Carolina at Chapel Hill USA

George H. Pink, PhD
Humana Distinguished Professor
Department of Health Policy and Management
Gillings School of Global Public Health
University of North Carolina at Chapel Hill USA

Abstract

Context: The Flex Monitoring Team created the Critical Access Hospital (CAH) peer grouping methodology ten years ago. The methodology has proven successful over time, but the operating environment has changed.

Purpose: To assess whether the factors used in the current CAH peer grouping methodology continue to be associated with hospital performance, and evaluate whether new factors such as geographic or community characteristics should be considered when developing peer groups.

Methods: This was a retrospective cross-sectional study to determine whether there was evidence suggesting that geographic factors, community factors, or hospital factors may need to be added to the current CAH peer grouping methodology and whether the current factors are still associated with CAH performance. Using data from fiscal years 2011-2014, multivariate regression analysis was utilized to determine which factors were most relevant for CAH peer groups.

Findings: As a group, hospital factors were the most influential on hospital performance. All four of the current factors used in creating CAH peer groups were still relevant. Geographic factors, especially region, demonstrated relevancy in CAH peer grouping. The most rural CAHs stood out in this study, and rurality influenced all five revenue indicators. The top two peer group factors, based on statistical significance at $p < .05$, were net patient revenue and region.

Conclusions: The hospital factors used in the current CAH peer grouping methodology are still associated with hospital performance and should be used for establishing CAH peer groups. Geographic characteristics should be considered when formulating peer groups, especially region.

Background

The Balanced Budget Act of 1997 established the Medicare Rural Hospital Flexibility Program (Flex Program) (National Rural Health Resource Center, 2016). As part of the effort to improve access to care for rural populations, the Flex Program established the Critical Access Hospital (CAH) designation (National Rural Health Resource Center, 2016). In order to receive this designation, a hospital must meet Medicare's conditions of participation. The conditions of participation include having 25 inpatient beds or less; being located in a rural area (some exceptions); providing 24-hour emergency care; being located at least 35 miles from another hospital (some exceptions); and maintaining an annual average length of stay 96 hours or less for acute care (Department of Health & Human Services, 2016). Under CAH designation, Medicare provides cost-based reimbursement for the reasonable costs of care instead of reimbursement under a prospective payment system (Department of Health and Human Services, 2016). As of April 6, 2016, there were 1,332 CAHs in 45 states across the United States (U.S.) (Flex Monitoring Team, 2016).

The Flex Monitoring Team (FMT) was established to evaluate and support the Flex Program, and it is comprised of rural health research centers sponsored by three universities: University of Minnesota, University of North Carolina, and University of Southern Maine (Flex Monitoring Team, 2016). The Federal Office of Rural Health Policy funds the team, and their collaborative efforts focus on community engagement, quality, and finance (Flex Monitoring Team, 2016). One of the main goals of the Flex Program and FMT is to improve hospital financial and operational performance, and this is the focus of the FMT staff located at the University of North Carolina (UNC) (Flex Monitoring Team, 2016).

Hospitals commonly use benchmark metrics to evaluate their performance against others and to identify areas for improvement (Byrne et al., 2009; Sower, 2007). Comparing performance to other, similar organizations allows users of benchmark data to assess an organization's risk of financial difficulty, identify organizational strengths and weaknesses, and target areas for operational and financial performance improvement (Hughes, 2008; Hermann & Provost, 2003; Kelessidis, 2000). Therefore, creating relevant peer groups is important when utilizing benchmark metrics to make appropriate comparisons and effectively analyze performance (Hofrichter & Williams, 2012; Zodet & Clark, 1996; California Health Facilities Commission, 1982). Relevant peer groups improve comparability and the usefulness of information when making assessments based upon similar organizations.

While benchmarking data are widely available for the population of hospitals in the U.S., these data are generally not appropriate for evaluating the performance of CAHs, which are considerably different from other hospitals. Because these hospitals differ from hospitals paid under the Inpatient Prospective Payment System and are usually much smaller, maintaining relevant peer groupings within the population of CAHs is essential for making comparisons of hospital performance (Pink, Holmes, Thompson, & Slifkin, 2007). In response to the lack of relevant benchmarking data for CAHs, in 2004, the FMT staff at UNC's Rural Health Research & Policy Analysis Center developed the Critical Access Hospital Financial Indicators Report (CAHFIR). This report is compiled annually for every CAH across the U.S. and has metrics and assessments for 22 financial indicators (e.g., operating margin and days cash on hand). Each financial indicator falls under one of six financial performance categories: profitability, liquidity,

capital structure, revenue, cost, and utilization. Initially, the CAHFIR enabled CAH executives and personnel to evaluate their financial and operational performance against other CAHs—instead of heterogeneous hospitals—but not necessarily against peers (i.e., similar CAHs).

In 2006, as part of the CAHFIR effort, the team at UNC established peer groups for CAHs. In order to create these peer groups, the team obtained suggestions from CAH executives, identified peer grouping methodologies through a literature review, received advice from technical advisors, and conducted statistical analysis (Pink, Holmes, Thompson, & Slifkin, 2007). Statistical analysis identified which factors significantly influenced financial indicators found in the CAHFIR, and this led to the use of net patient revenue (proxy for CAH size), government ownership, operating a rural health clinic (RHC), and providing long-term care (LTC) to formulate CAH peer groups. Establishing relevant peer groups enhanced the utility of the CAHFIR and allowed CAHs to compare performance against peers instead of national averages and/or hospitals that are not similar.

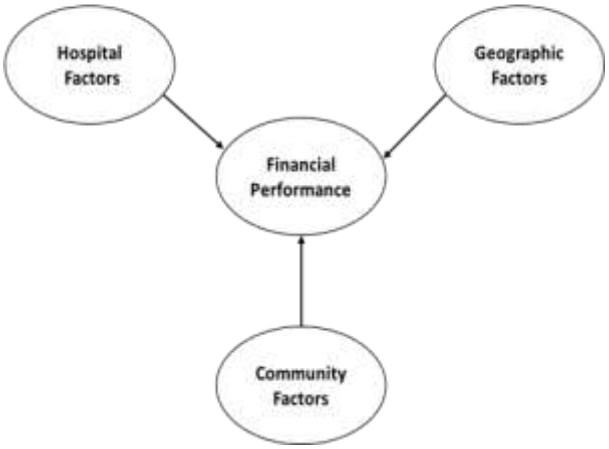
While the current factors have proven useful in creating comparable benchmarking data over time, the peer grouping methodology was created ten years ago. In the past ten years, significant changes have occurred in the U.S. health system and economy that have changed the operating environment for CAHs and may have changed the factors having the greatest influence on CAH performance. For instance, the effects of the U.S. Great Recession from 2007-2009 are still being realized. The two-part Affordable Care Act was signed into law in 2010—this has significantly affected the U.S health system, to include the expansion of Medicaid benefits to millions of people. The Medicare Improvements for Patients and Providers Act of 2008 and the American Recovery and Reinvestment Act of 2009 affect CAHs (e.g., incentives and changes to reimbursement). The number of CAHs has grown by approximately 480 since 2004 and 150 since 2006. The provision of LTC services by CAHs has declined (Gale, Race, & Coburn, 2011). Therefore, research is needed to understand whether the four factors used in the current CAH peer grouping methodology continue to be relevant and sufficient for creating reasonable benchmarking comparisons.

This study assesses whether the factors used in the current CAH peer grouping methodology continue to be associated with hospital performance, and evaluates whether new factors such as geographic or community characteristics should be considered when developing peer groups. For example, health service researchers have identified that geographic and community factors are beneficial when forming peer groups for hospitals and nursing homes (Byrne et al., 2013; Byrne et al., 2009; Zodet & Clark, 1996). Evaluations of hospitals in the U.S. indicate there are distinct differences among regions when analyzing hospital performance in areas such as operational efficiency, quality of care, and financial stability (Truven Health Analytics, 2015). Similarly, analyses of Urban Influence Codes have shown significant differences in rural areas regarding community-related characteristics and have recognized the need to look at degrees of rurality when conducting health services research (Larson & Fleishman, 2003). Findings will inform the future development of CAH peer groups, ensuring that the FMT, State Offices of Rural Health, and CAH executives have the necessary data to be able to make relevant comparisons and informed decisions.

Conceptual Framework

The development of CAH peer groups for benchmarking purposes requires knowledge of the factors that influence hospital operational and financial performance. Drawing on previous literature examining determinants of hospital performance, this study examines three categories of factors—hospital characteristics, geographic characteristics, and community characteristics—that have the potential to influence hospital operational and financial outcomes (Figure 1).

Figure 1. Conceptual Model



First, hospital characteristics such as ownership, size and scope of services have been shown to influence performance. The three primary categories of hospital ownership include private for-profit, private not-for-profit, and public (i.e., government-owned). Ownership affects performance by influencing a hospital's primary objectives, and by determining its available sources of financing (Horwitz & Nichols, 2009; Horwitz & Nichols, 2011). Previous studies have shown that for-profit hospitals are more profitable than not-for-profit hospitals (Foster, Zrull, & Chenoweth, 2013; Younis, Rice, & Barkoulas, 2001; Sear, 1991; Ferrier & Valdmanis, 1996; Herzlinger & Krasker, 1987; Watt et al., 1986), and that public hospitals are less profitable than other not-for-profit hospitals (Foster, Zrull, & Chenoweth, 2013; Horwitz, 2005). Large hospitals have been shown to be more efficient than smaller hospitals due to economies of scale, and therefore have superior financial performance when compared with smaller hospitals (Watcharasriroj & Tang, 2004; Younis, 2003). The services a hospital offers have been shown to be important determinants of hospital performance (Gapenski, Vogel, & Langland-Orban, 1993; Horwitz, 2005). Providing specialty services and surgical procedures (e.g., cardiac surgeries) enhances financial performance (Robinson, 2011; Horwitz, 2005).

Second, geographic factors such as region, rurality, and distance to other hospitals have been shown to influence hospital performance. For example, researchers have found that hospitals in the Northeast perform worse than hospitals in other regions of the U.S. on measures of clinical quality, extended outcomes, efficiency, patient assessments of care, and financial health (Truven Health Analytics, 2015), and they are the least profitable (Younis, Rice, & Barkoulas, 2001). Distance to other hospitals influences competition and market share (Gresenz, Rogowski, & Escarce, 2004); hospitals are affected financially (e.g., increased costs) by the level of competition (Jiang, Friedman, & Jiang, 2013). In 1997, Succi, Lee, and Alexander found that

rural hospitals located further away from the nearest hospital had a reduced risk of closure. A 2015 study, by Casey et al., discovered that CAHs, with a hospital in closer proximity, treat more patients and perform better on quality and financial measures than CAHs with hospitals further away from their locations. Analyses of Urban Influence Codes have shown significant differences in rural areas and have shown the need to look at degrees of rurality when conducting health services research (Larson & Fleishman, 2003). Additionally, research has shown that rural hospitals are less profitable and perform worse financially when compared to urban hospitals (Younis, 2003).

Finally, community factors such as the percent of elderly in a population, employment rate, and poverty rate have been shown to affect hospitals' performance. An elderly population increases demand for services and increases the number of patients covered by public health insurance (Schneider & Guralnik, 1990). Unemployment increases the number of uninsured among the non-elderly population (Kaiser Family Foundation, 2015) and decreases the consumption of health services (Tefft & Kageleiry, 2014; Quinn, Catalano, & Felber, 2009). Poverty also increases the number of uninsured in an area, decreases health care utilization, and can increase a hospital's proportion of Medicaid patients (Frick & Bopp, 2005). Furthermore, poverty has been linked to increases in morbidity and mortality (Bennett, Probst, & Pumkam, 2011; Chaufan et al., 2015; Sturm & Wells, 2001).

Methods

Data

The dataset used in this study was comprised of four fiscal years (FYs) of data (2011-2014). There were 5,096 CAH observations across the four FYs. Forty-five observations were excluded because reporting was for a partial year (e.g., less than 360 days), data were missing (e.g., net patient revenue), or the hospital was not a CAH—leaving 5,051 observations for analysis. Analyses also excluded erroneous or implausible values (e.g., negative values for various financial indicators) and extreme outliers (e.g., greater than $6 million for average salary per FTE). All financial and operational data came from the Center for Medicare and Medicaid Services' Healthcare Cost Report Information System (HCRIS). Geographic and community data came from the U.S. Census Bureau, Nielsen Pop-Facts, and the Area Health Resource File (AHRF).

Analysis

This was a retrospective cross-sectional study to determine whether there is evidence suggesting that geographic factors, community factors, or hospital factors may need to be added to the current CAH peer grouping methodology and whether the current factors are still associated with CAH performance. The definitions for the dependent variables (financial indicators) used in this study are in Table 1, and the definitions for the control variables (peer group factors) are in Table 2. The analysis was an iterative process that occurred in three stages.

Table 1. Dependent Variables

	Definition		2010 Medicare Cost Report Accounts	
Financial Indicator	**Numerator**	**Denominator**	**Numerator**	**Denominator**
Operating margin	(Net patient revenue + operating income) - total operating	(Net patient revenue + other revenue)	Worksheet G-3 (Line 3 + Lines 8 to 22 + Line 24) - (Line 4)	Worksheet G-3 (Line 3 + Lines 8 to 22 + Line 24)
Total margin	Net income	Total revenues	Worksheet G-3, line 29	Worksheet G-3, lines 3 + 25
Cash flow margin	Net income - (contributions, investments, and appropriations) + (depreciation expense + interest expense)	(Net patient revenue + other income) - (contributions, investments, and appropriations)	Worksheet G-3, line 29 - (6 + 7 + 23) + Worksheet A, col. 3, line 1 + 2 + 113	Worksheet G-3, line 3 + 25 - (6 + 7 + 23)
Return on equity	Net income	Net assets	Worksheet G-3, line 29	Worksheet G, col. 1-4, line 59
Current ratio	Current assets	Current liabilities	Worksheet G, col. 1-4, line 11	Worksheet G, col. 1-4, line 45
Days cash on hand	Cash + temporary investments + investments	(Total expenses - depreciation) / days in period	Worksheet G, col. 1-4, lines 1 + 2 + 31	(Worksheet A, col. 3, line 200 -1 - 2) / Days in Period
Days revenue in accounts receivable	Net patient accounts receivable	Net patient revenue / days in period	(Worksheet G, col. 1, line 4 - (Worksheet G, col. 1, line 6	Worksheet G-3, line 3 / days in period
Equity financing	Net assets	Total assets	Worksheet G, col. 1-4, line 59	Worksheet G, col. 1-4, line 36
Debt service coverage	Net income + depreciation + interest expense	Notes and loans payable (short term) * (DIP/365) + interest expense where DIP means days in period	Worksheet G-3, line 29 + Worksheet A, col. 3, lines 1 + 2 + 113	Worksheet G, col. 1-4, line 40 * (365/DIP) + Worksheet A, col. 3, line 113
Long-term debt to capitalization	Long-term debt	Long-term debt + net assets	Worksheet G, col. 1-4, line 40 + 46 + 47 + 48	Worksheet G, col. 1-4, line 40 + 46 + 47 + 48 + 59

Table 1 (cont).

Outpatient revenues to total revenues	Total outpatient revenue	Total patient revenue	Worksheet G-2, col. 2, line 28	Worksheet G-2, col. 3, line 28
Patient deductions	Contractual allowances + discounts	Gross total patient revenue	Worksheet G-3, line 2	Worksheet G-3, line 1
Medicare inpatient payer mix	Medicare inpatient days	Total inpatient days - nursery bed days - NF swing bed days	Worksheet S-3, col. 6, line 14	Worksheet S-3, col. 8, line 14 - 6 - 13
Medicare outpatient payer mix	Hospital outpatient Medicare charges	Hospital total outpatient charges	Worksheet D, Part V, Title XVIII, (Hospital), col. 2-4, line 202	Worksheet C, Part I, col. 7, line 200 - (88 + 89 + 94 to 117)
Medicare outpatient cost to charge	Hospital Medicare outpatient costs	Hospital Medicare outpatient charges	Worksheet D, Part V, Title XVIII, (Hospital), col. 5-7, line 202	Worksheet D, Part V, Title XVIII, (Hospital), col. 2-4, line 202
Medicare acute inpatient cost per day	Medicare acute inpatient cost	Medicare inpatient days (excluding HMO)	Worksheet E-3, Part V, line 4	Worksheet S-3, col. 6, line 1
Salaries to net patient revenue	Salary expense	Net patient revenue	Worksheet A, col. 1, line 200	Worksheet G-3, line 3
Average age of plant	Accumulated depreciation	Depreciation expense * (365/DIP)	Worksheet G, col. 1-4, line 14 + 16 + 18 + 20 + 22 + 24 + 26 + 28	Worksheet A, col. 3, line (1 + 2) * (365/DIP)
FTEs per adjusted occupied bed	Number of FTEs	(Inpt days - NF swing days - nursery days) * (total patient rev / (total inpt rev - inpt NF rev - other LTC rev)) / days in period	Worksheet S-3, col. 1, line 27	(S-3, col. 8, line 14 - 6 - 13) * (G-2, col. 3, line 28 / (G-2, col 1., line 28 - 6 - 8 - 9)) / days in period
Average salary per FTE	Salary expense	Number of FTEs	Worksheet A, col. 1, line 201	Worksheet S-3, col. 10, line 27
Average daily census-swing/SNF beds	Inpatient swing bed & SNF days	Days in period	Worksheet S-3, col. 8, line 5	Days in period
Average daily census-acute beds	Inpatient acute care bed days	Days in period	Worksheet S-3, col. 8, line 14 - 5 - 6 - 13	Days in period

Table 2. Control Variables

Peer Group Category	Factor	Data Source	Definition
Hospital	Government-owned	HCRIS	CAH owned by government Binary variable (yes/no)
	Operates a rural health clinic	HCRIS	CAH operates a rural health clinic Binary variable (yes/no)
	Provides long-term care	HCRIS	CAH provides long-term care Binary variable (yes/no)
	Net patient revenue	HCRIS	CAH annual net patient revenue Categorical variable (< $10 million, $10-20 million, > $20 million)
	Surgery	HCRIS	Surgery charges > 1% of total CAH charges Binary variable (yes/no)
	Hospice	HCRIS	Hospice days ≥ 1 Binary variable (yes/no)
	HHA	HCRIS	HHA visits ≥ 1 Binary variable (yes/no)
	Obstetrics	HCRIS	Obstetrics charges > 1% of total CAH charges Binary variable (yes/no)
	ER	HCRIS	ER charges > 10% of total CAH charges Binary variable (yes/no)
Geographic	Region	Census Bureau	Census region where the CAH is located Categorical variable (Northeast, Midwest, South, West)
	Rurality	Census Bureau	Core based statistical area where CAH is located - identified by the Office of Management & Budget as metropolitan, micropolitan, or neither Categorical variable (metro, micro, neither)
	100-bed hospital distance	AHRF	Straight-line distance from CAH to nearest hospital with 100 beds (miles) Continuous variable
	Distance to nearest hospital	AHRF	Straight-line distance from CAH to nearest hospital (miles) Continuous variable
	Nearest hospital drive	AHRF	Driving distance from CAH to nearest hospital (miles) Continuous variable
	Nearest non-CAH drive	AHRF	Driving distance from CAH to nearest non-CAH (miles) Continuous variable
Community	Total population	Nielsen	Total population in CAH market area Continuous variable
	Unemployment rate	Nielsen	Unemployment rate CAH market area Continuous variable
	Poverty rate	Nielsen	Poverty rate in the CAH market area Continuous variable

Stage 1

The purpose of stage 1 was to identify a subset of the 22 financial indicators that were most influenced by the four factors currently used to establish peer groups. The financial indicators identified in this stage would then be used in subsequent analyses to test additional factors for consideration in the development of peer groups. The variables used in this stage are in Table 3. The dependent variables were the 22 financial indicators found in the CAHFIR; these indicators provide measures of profitability, liquidity, capital structure, revenue, cost, and utilization. The control variables are the four hospital factors currently used for peer grouping CAHs, which represent ownership (i.e., owned by a government entity); presence of specific service lines (i.e., operates a rural health clinic or provides long-term care); and size as measured by net patient revenue (i.e., less than $10 million, $10-20 million, or more than $20 million). FY 2014 data were used in this stage to identify relationships among variables with the most recent CAH data.

Table 3. Variables for Stage 1

Dependent Variables	
Profitability	***Revenue***
Operating margin	Outpatient revenues to total revenues
Total margin	Patient deductions
Cash flow margin	Medicare inpatient payer mix
Return on equity	Medicare outpatient payer mix
Liquidity	Medicare outpatient cost to charge
Current ratio	Medicare acute inpatient cost per day
Days cash on hand	***Cost***
Days revenue in accounts receivable	Salaries to net patient revenue
Capital Structure	Average age of plant
Equity financing	FTEs per adjusted occupied bed
Debt service coverage	Average salary per FTE
Long-term debt to capitalization	***Utilization***
	Average daily census-swing/SNF beds
	Average daily census-acute beds

Independent Variables
Government-owned (*Govt*)
Operates a rural health clinic (*RHC*)
Provides long-term care (*LTC*)
Net patient revenue (*NetPtRev*)

Multivariate ordinary least squares (OLS) regression analysis was used to identify which financial indicators were most affected by the current CAH peer group factors. The model for Stage 1 is presented in Equation (1):

$$FI = \beta_0 + \beta_1 Govt + \beta_2 RHC + \beta_3 LTC + \beta_4 NetPtRev + \varepsilon \quad (1)$$

In Equation (1) and future equations, *FI* represents financial indicators from the CAHFIR (e.g., current ratio). Each of the independent variables is described in Table 3 above. Separate regressions were run for each of the dependent variables (i.e., financial indicators), and all

variables were measured contemporaneously. Decisions to retain financial indicators for further analysis were based on statistical significance of the independent variables ($p < 0.05$) and the goodness-of-fit (e.g., coefficient of determination). In addition, I ensured that I included at least one financial indicator from each of the six financial performance categories from the CAHFIR (e.g., utilization). The analysis in stage 1 resulted in retention of 12 of the 22 financial indicators for subsequent analysis.

Stage 2

The variables used in this stage are in Table 4. The dependent variables were 12 of the 22 financial indicators found in the CAHFIR, and each of the six financial performance categories (e.g., liquidity) were still represented. The control variables were comprised of 18 variables representing hospital, geographic, and community factors. FY 2014 data were used in this stage.

Table 4. Variables for Stage 2

Dependent Variables	Independent Variables
Profitability	***Hospital Factors***
Operating margin	Government-owned (*Govt*)
Cash flow margin	Operates a rural health clinic (*RHC*)
Liquidity	Provides long-term care (*LTC*)
Days cash on hand	Net patient revenue (*NetPtRev*)
Capital Structure	Provides surgery (*Surgery*)
Long-term debt to capitalization	Provides hospice (*Hospice*)
Revenue	Provides HHA (*HHA*)
Outpatient revenues to total revenues	Provides obstetrics (*OB*)
Patient deductions	ER services (charges > 10% total charges) (*ER*)
Medicare inpatient payer mix	**Geographic Factors**
Medicare outpatient payer mix	Region (*Region*)
Medicare outpatient cost to charge	Rurality (*Rurality*)
Cost	Miles to nearest hospital with 100 beds (*Dist*)
Salaries to net patient revenue	Miles to nearest hospital (*NearHos*)
Average salary per FTE	Nearest hospital drive (miles) (*NearHosDr*)
Utilization	Nearest non-CAH drive (miles) (*NonCAHDr*)
Average daily census-acute beds	***Community Factors***
	Total population (*TotPop*)
	Unemployment rate (*UnempRt*)
	Poverty rate (*PovRt*)

Stage 2 used multivariate OLS regression analysis to identify which control variables (i.e., potential peer group factors) consistently demonstrated statistical significance within the regression models (i.e., across financial indicators). Goodness-of-fit was also examined to assess the ability of the factors to explain the variation in the financial indicators. Hundreds of different regression models were run using varied combinations of hospital, geographic, and community factors on the 12 financial indicators. The regressions were run in a progressive fashion to decide which control variables to retain. For example, after the first iteration of regressions, I dropped

poverty rate and all distance variables, except for distance to the nearest 100-bed hospital, based on statistical significance and goodness-of-fit analysis. After the second iteration, I dropped unemployment rate, hospice, HHA, obstetrics, and ER from my regression models because there was evidence of collinearity with other independent variables and/or results suggested they did not independently explain variation in the financial indicators.

Equation (2) shows the regression model with <u>all</u> control variables included, but not all variables were included in each of the regression models for this stage of the analysis (e.g., a particular model may have excluded community factors during an iteration):

$$FI = \beta_0 + \beta_1 Govt + \beta_2 RHC + \beta_3 LTC + \beta_4 NetPtRev + \beta_5 Surgery + \beta_6 Hospice + \beta_7 HHA + \beta_8 OB + \beta_9 ER + \beta_{10} Region + \beta_{11} Rurality + \beta_{12} Dist + \beta_{13} NearHos + \beta_{14} NearHosDr + \beta_{15} NonCAHDr + \beta_{16} TotPop + \beta_{17} UnempRt + \beta_{18} PovRt + \varepsilon \quad (2)$$

The variables used in equation 2 are described in Table 4 above. By the end of Stage 2, the progressive process allowed me to exclude nine control variables; remaining variables were carried forward to Stage 3.

Stage 3

The variables used in this stage are in Table 5. The dependent variables were the 12 financial indicators from Stage 2. The control variables were comprised of nine variables representing hospital, geographic, and community factors. The study methodology did not require retention of a representative variable for each peer-factor category (i.e., hospital, community, geographic) at this stage of the study, but the process in Stage 2 resulted in representation from each of the three categories. Data from all FYs (i.e., 2011-2014) were used in stage 3. Each FY was analyzed separately to assess the stability of coefficients over time.

Table 5. Variables for Stage 3

Dependent Variables	Independent Variables
Profitability	***Hospital Factors***
Operating margin	Government-owned (*Govt*)
Cash flow margin	Operates a rural health clinic (*RHC*)
Liquidity	Provides long-term care (*LTC*)
Days cash on hand	Net patient revenue (*NetPtRev*)
Capital Structure	Provides surgery (*Surgery*)
Long-term debt to capitalization	***Geographic Factors***
Revenue	Region (*Region*)
Outpatient revenues to total revenues	Rurality (*Rurality*)
Patient deductions	Miles to nearest hospital with 100 beds (*Dist*)
Medicare inpatient payer mix	***Community Factors***
Medicare outpatient payer mix	Total population (*TotPop*)
Medicare outpatient cost to charge	
Cost	
Salaries to net patient revenue	
Average salary per FTE	
Utilization	
Average daily census-acute beds	

In this stage of the study, I used multivariate regression analysis to identify which of the nine remaining control variables were the most influential on the 12 financial indicators. Additionally, I examined the influence of control variables on the six financial performance categories (e.g., revenue) to identify any noticeable patterns. Decisions in this stage were made based on statistical significance within the models and identifiable patterns. The model is presented in Equation (3) and each of the variables is described in Table 5:

$$FI = \beta_0 + \beta_1 Govt + \beta_2 RHC + \beta_3 LTC + \beta_4 NetPtRev + \beta_5 Surgery + \beta_6 Region + \beta_7 Rurality + \beta_8 Dist + \beta_9 TotPop + \varepsilon \quad (3)$$

Results

Summary statistics for the variables in this study are presented in Table 6. The medians of the financial indicators (i.e., dependent variables) remained stable through all four FYs, with average salary per FTE having small increases every year. The number of government-owned CAHs were fewer than CAHs not owned by the government through all four FYs. The number of CAHs operating an RHC exceeded those that did not from FY 12-14. The number of CAHs providing LTC were much lower than CAHs not providing LTC, by approximately 50%, across all FYs. During all four FYs, larger CAHs (as measured by net patient revenue) outnumbered medium CAHs, and medium CAHs outnumbered small CAHs. CAHs providing surgery outnumbered those not providing surgery by over 50% across all four FYs. The Midwest consistently had the most CAHs, followed by the South, then the West, and finally the Northeast. The most rural CAHs outnumbered those found in metropolitan and mircropolitan areas—even when combining metro and micro CAH numbers.

Table 6. Summary Statistics

Fiscal year	2011				2012				2013				2014			
Observations	1,230				1,305				1,289				1,227			
Dependent variables	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**
Operating margin	1,208	0.7%	-47.5%	48.4%	1,295	1.0%	-46.1%	48.8%	1,274	1.0%	-48.5%	49.0%	1,213	0.7%	-50.0%	37.7%
Cash flow margin	1,211	6.3%	-48.6%	49.1%	1,295	6.9%	-42.8%	43.8%	1,278	6.6%	-46.6%	44.7%	1,219	6.5%	-50.0%	43.4%
Days cash on hand	1,188	68.6	0	735.5	1,259	69.4	0	956.6	1,241	68.9	0	954.4	1,185	72.4	0	963.9
Long-term debt to capitalization	1,117	26.7%	0.0%	100.0%	1,179	26.0%	0.0%	100.0%	1,169	26.0%	0.0%	100.0%	1,118	25.4%	0.0%	100.0%
Outpatient revenues to total revenues	1,230	72.8%	0.0%	100%	1,305	74.1%	0.0%	99.6%	1,289	74.3%	0.0%	99.7%	1,227	75.7%	10.5%	99.6%
Patient deductions	1,195	38.4%	0.0%	79.5%	1,273	39.4%	0.0%	82.8%	1,258	40.3%	0.0%	82.2%	1,197	40.8%	0.0%	81.9%
Medicare inpatient payer mix	1,229	73.1%	7.1%	100.0%	1,305	73.4%	0.0%	100.0%	1,289	72.9%	4.8%	99.9%	1,227	72.4%	10.3%	100%
Medicare outpatient payer mix	1,230	37.4%	0.0%	85.8%	1,305	37.6%	0.0%	75.5%	1,289	37.9%	7.3%	72.6%	1,227	37.3%	2.6%	82.3%
Medicare outpatient cost to charge	1,228	46.9%	9.9%	170.8%	1,302	46.9%	12.0%	149.0%	1,287	47.3%	10.5%	174.9%	1,225	46.5%	12.1%	173.5%
Salaries to net patient revenue	1,227	44.6%	3.0%	94.6%	1,299	44.9%	0.0%	98.6%	1,282	45.6%	2.5%	96.5%	1,218	45.6%	2.7%	97.4%
Average salary per FTE	1,217	$48,002	$21,030	$96,188	1,297	$49,478	$19,027	$93,116	1,282	$50,859	$17,784	$99,723	1,216	$52,226	$22,532	$99,427
Average daily census-acute beds	1,230	3.8	0.0	24.4	1,305	3.4	0.0	24.9	1,289	3.2	0.0	19.1	1,227	2.9	0.0	17.8
Control variables (categorical)	**% (n)**				**% (n)**				**% (n)**				**% (n)**			
Government-owned	42% (512)				41% (530)				41% (524)				41% (501)			
Operates a rural health clinic	48% (594)				52% (673)				54% (696)				56% (681)			
Provides long-term care	28% (340)				27% (348)				26% (334)				25% (307)			
< $10M net patient revenue	28% (349)				27% (354)				26% (341)				25% (309)			
$10-20M net patient revenue	35% (429)				35% (452)				35% (445)				35% (427)			
>$20M net patient revenue	37% (452)				38% (499)				39% (503)				40% (491)			
Surgery > 1% of total charges	79% (967)				77% (1,011)				78% (1,003)				78% (961)			
Northeast region	5% (67)				5% (70)				5% (68)				5% (61)			
Midwest region	47% (579)				48% (626)				48% (615)				50% (611)			
South region	26% (317)				26% (335)				26% (338)				26% (320)			
West region	22% (267)				21% (274)				21% (268)				19% (235)			
Metropolitan	20% (246)				19% (254)				19% (249)				20% (240)			
Micropolitan	17% (207)				17% (217)				17% (214)				16% (201)			
Neither metropolitan nor micropolitan	63% (777)				64% (834)				64% (826)				64% (786)			
Control variables (continuous)	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**	**Obs**	**Median**	**Min**	**Max**
Distance in miles to nearest 100-bed hospital	1,227	34.6	1.3	674.1	1,301	35.1	0	673.4	1,286	35.9	1.2	673.9	1,223	35.7	1.2	673.9
Total population	1,227	20,740	790	367,815	1,301	20,864	533	521,570	1,286	20,912	989	660,898	1,223	20,385	1,074	346,358

Regression output for the final multivariate regression model, from Stage 3, is presented in Tables 7a and 7b. The output shows coefficients, statistical significance, and t-statistics. Only regression output for FY 14 is provided because it is representative of the other fiscal years (i.e., the output remained mostly consistent for all four fiscal years).

Table 7a. Fiscal Year 2014 Regression Output from Stage 3

	Operating margin	Cash flow margin	Days cash on hand	Long-term debt to capitalization	Outpatient revenues to total revenues	Patient deductions
Hospital Factors						
Government-owned (not govt-owned)	-0.0360***	-0.0313***	17.9285**	0.0283*	-0.0028	-0.0438***
	-5.80	-5.06	2.14	1.72	-0.45	-5.68
Operates a rural health clinic (no RHC)	-0.0168***	-0.0208***	-30.2158***	0.0391**	0.0195***	-0.0104
	-2.76	-3.42	-3.66	2.41	3.16	-1.38
Provides long-term care (no LTC)	-0.0359***	-0.0343***	-17.2719*	0.0254	-0.1209***	-0.0442***
	-5.09	-4.85	-1.81	1.38	-16.85	-5.01
$10-20M net patient revenue (< $10M)	0.0438***	0.0519***	6.7321	0.0455**	0.0338***	0.0761***
	5.16	6.14	0.59	1.99	3.95	7.21
> $20M net patient revenue (< $10M)	0.0796***	0.0764***	50.8148***	0.0228	0.0548***	0.1196***
	8.29	7.98	3.94	0.89	5.65	10.06
Surgery > 1% of total charges (≤ 1%)	0.0058	0.0214**	1.8926	0.0478**	0.0468***	0.0522***
	0.66	2.43	0.16	1.99	5.25	4.74
Geographic Factors						
Midwest region (Northeast)	0.0544***	0.0497***	25.9417	-0.0939**	-0.0009	-0.0154
	3.84	3.50	1.36	-2.57	-0.07	-0.88
South region (Northeast)	0.0448***	0.0337**	-13.6053	-0.1091***	-0.0153	0.1254***
	2.97	2.23	-0.67	-2.76	-1.00	6.75
West region (Northeast)	0.0272*	0.0283*	-8.0543	-0.0916**	-0.0347**	0.0077
	1.76	1.83	-0.39	-2.30	-2.21	0.40
Micropolitan (metro)	-0.0133	-0.0108	13.3596	-0.0313	-0.0385***	0.0044
	-1.34	-1.09	0.99	-1.18	-3.82	0.36
Neither metropolitan nor micropolitan (metro)	-0.0095	-0.0022	4.2868	-0.0232	-0.0299***	-0.0378***
	-1.16	-0.27	0.39	-1.06	-3.62	-3.76
Distance in miles to nearest 100-bed hospital	-0.0001	-0.0002**	0.0545	-0.0005***	-0.0002***	-0.0006***
	-1.36	-2.29	0.56	-2.80	-2.82	-6.69
Community Factors						
Total population	-0.0000	-0.0000***	-0.0001	0.0000	-0.0000***	0.0000***
	-0.36	-2.73	-0.85	0.26	-6.57	4.86
Observations	1,203	1,209	1,175	1,108	1,216	1,186
R^2	0.18	0.17	0.06	0.04	0.31	0.43

Base for categorical variables in parentheses. *p < .10, **p < .05, ***p < .01. t-statistic is underneath the coefficients.

Table 7b. Fiscal Year 2014 Regression Output from Stage 3

	Medicare inpatient payer mix	Medicare outpatient payer mix	Medicare outpatient cost to charge	Salaries to net patient revenue	Average salary per FTE	Average daily census-acute beds
Hospital Factors						
Government-owned (not govt-owned)	0.0129	0.0144***	0.0549***	0.0293***	-2827.49***	-0.0607
	1.64	2.74	5.78	5.47	-5.19	-0.44
Operates a rural health clinic (no RHC)	0.0324***	0.0249***	-0.0273***	0.0355***	-236.55	-0.0989
	4.17	4.82	-2.93	6.74	-0.44	-0.73
Provides long-term care (no LTC)	0.0314***	0.0104*	0.0115	0.0394***	-6250.39***	-0.5305***
	3.48	1.72	1.06	6.44	-10.08	-3.35
$10-20M net patient revenue (< $10M)	-0.0466***	-0.0272***	-0.1189***	-0.0568***	3491.28***	0.9327***
	-4.33	-3.79	-9.21	-7.75	4.70	4.94
> $20M net patient revenue (< $10M)	-0.1521***	-0.0653***	-0.1727***	-0.0858***	8806.46***	4.0402***
	-12.50	-8.04	-11.82	-10.37	10.48	18.93
Surgery > 1% of total charges (≤ 1%)	-0.0173	0.0281***	-0.0837***	-0.0290***	419.66	1.3188***
	-1.55	3.76	-6.23	-3.81	0.54	6.72
Geographic Factors						
Midwest region (Northeast)	-0.0445**	0.0185	-0.0153	-0.0782***	-3626.74***	-1.4003***
	-2.46	1.53	-0.70	-6.37	-2.91	-4.40
South region (Northeast)	-0.0995***	-0.0367***	-0.1082***	-0.0614***	-7274.12***	0.0097
	-5.16	-2.86	-4.68	-4.70	-5.49	0.03
West region (Northeast)	-0.1378***	-0.0365***	0.0109	-0.0444***	3126.01**	-1.0403***
	-6.99	-2.78	0.46	-3.33	2.30	-3.01
Micropolitan (metro)	-0.0186	0.0082	0.0020	-0.0001	2200.14**	1.5653***
	-1.47	0.97	0.13	-0.02	2.53	7.05
Neither metropolitan nor micropolitan (metro)	0.0299***	0.0492***	0.0327***	-0.0023	-2340.15***	1.0104***
	2.88	7.11	2.63	-0.32	-3.26	5.55
Distance in miles to nearest 100-bed hospital	-0.0001	-0.0000	0.0006***	0.0001	27.00***	-0.0007
	-1.18	-0.45	5.71	1.42	3.92	-0.40
Community Factors						
Total population	-0.0000***	-0.0000	-0.0000***	-0.0000**	-0.0064	0.0000***
	-4.19	-0.89	-4.01	-2.30	-0.71	10.97
Observations	1,216	1,216	1,215	1,208	1,207	1,216
R^2	0.35	0.25	0.39	0.32	0.37	0.56

Base for categorical variables in parentheses. *p < .10, **p < .05, ***p < .01. t-statistic is underneath the coefficients.

As a group, hospital factors significantly influenced all financial indicators and thus all six financial performance categories. Notably, results suggested that the four factors currently used to develop CAH peer groups—net patient revenue, provision of long-term care, operation of a rural health clinic, and government ownership—continue to be statistically significantly and associated with most of the financial indicators.

Net patient revenue influenced the financial indicators through all analytical stages and, in Stage 3, was statistically significant for all 12 financial indicators at $p < .01$ except for one instance that was $p < .05$. The differences among CAH sizes (indicated by net patient revenue) can be seen in Table 7, as well as the influence on financial indicators and financial performance categories.

Government ownership was statistically significant for 9 of the 12 financial indicators and all financial performance categories minus utilization. This factor had a negative influence on profitability and a positive influence on liquidity, and was statistically significant for both cost indicators.

RHC was statistically significant for 10 of the 12 financial indicators and all financial performance categories minus utilization. This factor had a negative influence on profitability and liquidity. RHC was the only factor in the current CAH peer grouping methodology that was not statistically significant for average salary per FTE and patient deductions. Some of RHC's coefficients were strong (e.g., days cash on hand).

LTC was statistically significant for 10 of the 12 financial indicators and all financial performance categories minus capital structure. This factor had a negative influence on profitability and liquidity, and it was statistically significant for both cost indicators. LTC was the third most influential factor on financial performance when comparing all control variables in the final model. The factor exhibits strong coefficients in Table 7.

Surgery was statistically significant for 8 of the 12 financial indicators and all financial performance categories except liquidity. The coefficients for this factor were mostly positive (e.g., cash flow margin and average daily census for acute beds). The only negative coefficients for surgery were for Medicare outpatient cost to charge and salaries to net patient revenue.

There was mixed evidence with regard to the association of financial indicators with geographic and community measures. As a group, geographic factors influenced all financial indicators except for days cash on hand (liquidity). Region was statistically significant in many regression models throughout the study—second overall to net patient revenue. In the final regression model, region was statistically significant for every financial indicator minus days cash on hand (i.e., 11 of 12). Table 7 shows there are distinct differences among regions, and strong positive and negative coefficients affecting financial performance.

Rurality stood out in the revenue category as the only control variable, other than net patient revenue, to be statistically significant for all five revenue indicators. Moreover, the coefficients were statistically significant at $p < .01$ for the five revenue indicators. The most rural CAHs (i.e., neither metro nor micro) were particularly noticeable, and these CAHs had negative coefficients for outpatient revenues to total revenues and patient deductions—the other three revenue indicators had positive coefficients. In addition, rurality significantly influenced average daily census for acute beds (positive direction for micro and for "neither") and average salary per FTE (positive direction for metro and negative direction for "neither").

Distance to the nearest 100-bed hospital was statistically significant for 50% of the financial indicators, but the coefficients were small. A substantial change in distance would be needed to show a strong influence on the financial indicators. The statistically significant coefficients for distance were positive for average salary per FTE and Medicare outpatient cost to charge—they were negative for the other four indicators.

Community factors did not influence the financial indicators like hospital and geographic factors. Total population was the only community variable in the final regression model. Total population was statistically significant for 7 of the 12 financial indicators, but the coefficients were very small and would require significant changes in population to show noticeable changes.

Discussion

The current hospital factors (i.e., net patient revenue, RHC, LTC, and government ownership) are associated with financial performance and are still relevant when developing peer groups for CAHs. This is not surprising for several reasons. First, the FMT proved the utility of these characteristics when initially creating CAH peer groups, and these characteristics are still key aspects in the differentiation of CAHs. For instance, even though only 25% of CAHs provide LTC, these hospitals are often the only provider of LTC in some rural areas, and this particular distinction sets these hospitals apart from CAHs that do not offer LTC. Additionally, the government owns over 40% of CAHs, and more than 50% of CAHs operate RHCs, so these hospitals have significant differences when compared to those that do not share these characteristics. Government ownership influences CAH objectives, funding, and profitability (i.e., typically less profitable than other types of ownership). Operating an RHC extends the reach of a CAH and influences access to care within the community served (e.g., primary and preventive care services).

Second, hospital factors are the most adjustable of the factors in this study when decision-makers want to adapt to the operating environment, improve performance, or make any other changes. For example, leaders of for-profit hospitals regularly make adjustments to improve the bottom-line, whereas government-owned hospitals may take longer to adjust. Furthermore, even though the provision of LTC has recently declined across the CAH population (i.e., a decision that adjusts a significant identifier among CAH hospital factors), there are still CAHs providing those services—there must be a reason that they continue to do so. Therefore, this factor has continued to display its significance and usefulness for making comparisons in peer group analysis.

Finally, significant differences in hospitals, such as size and ownership, consistently show significant differences in financial performance. Size and ownership are regularly utilized to establish peer groups and benchmarking metrics because these characteristics are easily identifiable and show immediate similarity. These similarities are important when making comparisons among hospitals for a multitude of reasons. For instance, economies of scale in larger hospitals promote higher levels of efficiency when compared to smaller hospitals, which can demonstrate measurable differences in costs and outputs (Watcharasriroj & Tang, 2004; Younis, 2003). Net patient revenue is the proxy for size among CAH peer groups (i.e., instead of beds), and this factor continues to be overwhelmingly significant when comparing CAHs. In addition, government hospitals typically offer services that are not profitable—often due to set missions and objectives—but these hospitals also receive tax benefits not realized by for-profit hospitals (Horwitz, 2005).

Geographic factors, especially region, merit consideration when formulating peer groups for CAHs. The location of a CAH or other hospital is important for many reasons that include laws, taxes, policies, regulations, health system affiliation, politics, economics and other idiosyncratic differences. Medicaid expansion is a recent and good example of a significant difference among CAHs and geographic areas. Additionally, region and other geographic factors encompass other influential social and community factors (e.g., poorer areas of the U.S. and government influences). Furthermore, region and/or other geographic factors have been utilized for many years during comparability processes and peer group development (e.g., banking, health care, business, education, and so forth). Geographic factors certainly provide opportunities

for establishing groups with similarities, especially to account for the similarities that may not be obvious.

A distinct relationship exists between rurality and revenue for CAHs. The statistical results showed a clear difference between the most rural CAHs and those found in metropolitan areas, among all five revenue indicators. The results were reinforcing because the revenue indicators were chosen years ago as relevant financial indicators for CAH analysis and assessment, and the level of rurality was a key factor in the decision process. These results indicate that rurality is still important when analyzing CAHs and making key decisions.

Community factors were not significant contributors to CAH peer grouping. It is likely that other factors (e.g., net patient revenue) in the study capture the effects of community characteristics on financial performance. Expertise, experience, and common sense are recommended when making judgments regarding benchmarking and peer groups at the user-level.

Limitations

This study has several limitations that may have affected the results. First, peer grouping does not have an established set of rules and techniques; thus, peer grouping methodologies are by nature somewhat subjective. Considerable levels of prior research, judgment, and technical advice were utilized to analyze peer group factors in this study. Additionally, multivariate regression may not be the optimal process for analyzing peer group factors, although it is commonly used. For example, regression techniques only allow researchers to discover relationships among variables but cannot draw strict conclusions on causality. Furthermore, regression does not account for all potential variables, and the possibility exists that the "best" characteristics were not used in the study.

Second, all hospitals, to include CAHs, are different. This study does not account for hospital mission, strategy, and other factors that may strongly influence particular CAHs at the individual level. For instance, the provision of surgery has specific and different implications at individual CAHs. These implications can relate to costs, types of surgery, specialty staff, and other pertinent information relevant to hospital performance. Additionally, the inability to measure management at individual CAHs limits the study. For example, Chief Executive Officer turnover can significantly influence a CAH (Leibert & Leaming, 2010). However, this study does examine important hospital, geographic, and community factors across the population to draw generalized conclusions, and the study included over 5,000 observations for analysis.

Finally, reporting discrepancies and financial data quality affect this study. For example, Ozmeral et al. (2012) discovered significant variances in financial reporting, from CAHs, among audited financial statements, Medicare Cost Reports, and Internal Revenue Service Forms 990. Additionally, I found financial data errors reported by CAHs across all fiscal years in this study. I was able to mitigate the obvious errors for analytical purposes, but uncertainty in the accuracy of reported financial data remains.

Conclusions

This study demonstrated a method for analyzing hospital, geographic, and community characteristics that may be useful when creating peer groups for CAHs. The results indicate that the size, ownership, and service lines are still important when developing peer groups for CAHs. In addition, the results suggest that geographic factors (e.g., region) should be considered for CAH peer group analysis. This study contributes to the development of peer groups for CAHs, which can assist with performance analysis and potentially encourage better financial reporting across the CAH population.

Corresponding Author
Kristin L. Reiter, PhD
Department of Health Policy and Management
Gillings School of Global Public Health
The University of North Carolina at Chapel Hill
1104H McGavran - Greenberg Hall, Campus Box 7411
Chapel Hill, North Carolina 27599-7411
Phone: 919-843-8619; E-mail: reiter@email.unc.edu

Lead author contact information:
Walter Hawkins
(254) 462-6485
walter.l.hawkins6.mil@mail.mil
hawkinsw@live.unc.edu

References

Bennett, K. J., Probst, J. C., & Pumkam, C. (2011). Obesity among working age adults: The role of county-level persistent poverty in rural disparities. *Health and Place, 17*(5), 1174-1181.

Byrne, M. M., Daw, C. N., Nelson, H. A., Urech, T. H., Pietz, K., & Petersen, L. A. (2009). Method to develop health care peer groups for quality and financial comparisons across hospitals. *Health Services Research, 44*(2), 577-592.

Byrne, M., Daw, C., Pietz, K., Reis, B., & Petersen, L. (2013). Creating peer groups for assessing and comparing nursing home performance. *American Journal of Managed Care, 19*(11), 933-933.

California Health Facilities Commission. (1982). Hospital peer grouping for efficiency comparison. CHFC Report IV-82-16, 1-65.

Casey, M., Moscovice, I., Holmes, G., Pink, G., & Hung, P. (2015). Minimum-distance requirements could harm high-performing critical-access hospitals and rural communities. *Health Affairs, 34*(4), 627-635.

Chaufan, C., Yeh, J., Ross, L., & Fox, P. (2015). You can't walk or bike yourself out of the health effects of poverty: Active school transport, child obesity, and blind spots in the public health literature. *Critical Public Health, 25*(1), 32-47.

Ferrier, G. D., & Valdmanis, V. (1996). Rural hospital performance and its correlates. *Journal of Productivity Analysis, 7*(1), 63-80.

Flex Monitoring Team. (2016). Critical access hospital locations. Retrieved from http://www.flexmonitoring.org/data/critical-access-hospital-locations/

Foster, D., Zrull, L., & Chenoweth, J. (2013). Hospital differences by ownership. Truven Health Analytics Research Brief, 1-8.

Frick, K., & Bopp, A. (2005). Poverty: Insurance theory and the medically uninsured. *Atlantic Economic Journal, 33*(4), 451-459.

Gapenski, L. C., Vogel, W. B., & Langland-Orban, B. (1993). The determinants of hospital profitability. *Hospital & Health Services Administration, 38*(1), 63.

Gresenz, C. R., Rogowski, J., & Escarce, J. J. (2004). Updated Variable-Radius measures of hospital competition. *Health Services Research, 39*(2), 417-430.

Hermann, R. C., & Provost, S. (2003). Interpreting measurement data for quality improvement: Standards, means, norms, and benchmarks. *Psychiatric Services, 54*(5), 655-657.

Herlinger, R., & Krasker, W. (1987). Who profits from non-profits? *Harvard Business Review, 65*(1), 93-105.

Hofrichter, D. A., & Williams, T. (2012). Health care peer group assessment: The new "best practice" in performance and pay alignment. Aon Hewitt, 1-6.

Horwitz, J. R. (2005). Making profits and providing care: Comparing nonprofit, for-profit, and government hospitals. *Health Affairs, 24*(3), 790-801.

Horwitz, J. R., & Nichols, A. (2009). Hospital ownership and medical services: Market mix, spillover effects, and nonprofit objectives. *Journal of Health Economics, 28*(5), 924-937.

Horwitz, J. R., & Nichols, A. (2011). Rural hospital ownership: Medical service provision, market mix, and spillover effects. *Health Services Research, 46*(5), 1452-1472.

Hughes, R. G. (2008). Tools and strategies for quality improvement and patient safety. In R. G. Hughes (Ed.), *Patient Safety and Quality: An Evidence-Based Handbook for Nurses* (Chp. 44). Rockville, MD: Agency for Healthcare Research and Quality.

Jiang, H. J., Friedman, B., & Jiang, S. (2013). Hospital cost and quality performance in relation to market forces: An examination of U.S. community hospitals in the "post-managed care era". *International Journal of Health Care Finance and Economics, 13*(1), 53-71.

Kaiser Family Foundation. (2015). *Key facts about the uninsured population*. The Kaiser Commission on Medicaid and the Uninsured. Retrieved March 22, 2016, from http://files.kff.org/attachment/fact-sheet-key-facts-about-the-uninsured-population

Kelessidis, V. (2000). Benchmarking. InnoRegio Project Report for the European Commission, 1-32.

Larson, S. L., & Fleishman, J. A. (2003). Rural-urban differences in usual source of care and ambulatory service use: Analyses of national data using urban influence codes. *Medical Care, 41*(7), 65-74.

Leibert, M., & Leaming, L. E. (2010). Critical access hospital chief executive officer turnover: Implications and challenges for governing boards. *Health Care Manager, 29*(1), 22-28.

National Rural Health Resource Center. (2016). Flex program. Retrieved from https://www.ruralcenter.org/tasc/flex

Ozmeral, A. B., Reiter, K. L., Holmes, G. M., & Pink, G. H. (2012). A comparative study of financial data sources for critical access hospitals: Audited financial statements, the medicare cost report, and the internal revenue service form 990. *The Journal of Rural Health, 28*(4), 416-424.

Pink, G. H., Holmes, G. M., Thompson, R. E., & Slifkin, R. T. (2007). Variations in financial performance among peer groups of critical access hospitals. *The Journal of Rural Health, 23*(4), 299-305.

Plotzke, M. R., & Courtemanche, C. (2011). Does procedure profitability impact whether an outpatient surgery is performed at an ambulatory surgery center or hospital? *Health Economics, 20*(7), 817-830.

Quinn, B. C., Catalano, R. A., & Felber, E. (2009). The effect of community-level unemployment on preventive oral health care utilization. *Health Services Research, 44*(1), 162-181.

Race, M., Gale, J., & Coburn, A. (2011). Provision of long term care services by critical access hospitals: Are things changing? Flex Monitoring Policy Brief #19, 1-6.

Resnick, A. S., Corrigan, D., Mullen, J. L., & Kaiser, L. R. (2005). Surgeon contribution to hospital bottom line: Not all are created equal. *Annals of Surgery, 242*(4), 530-539.

Robinson, J. C. (2011). Variation in hospital costs, payments, and profitabilty for cardiac valve replacement surgery. *Health Services Research, 46*(6pt1), 1928-1945.

Sear, A.M. (1991). Comparison of efficiency and profitability of investor-owned multihospital systems with not-for-profit hospitals. *Health Care Management Review, 16*(2):31-37.

Schneider, E. L., & Guralnik, J. M. (1990). The aging of America: Impact on health care costs. *Jama, 263*(17), 2335-2340.

Sower, V. E. (2007). *Benchmarking in hospitals: More than a scorecard*. Milwaukee: American Society for Quality Control, Inc.

Sturm, R., & Wells, K. B. (2001). Does obesity contribute as much to morbidity as poverty or smoking? *Public Health, 115*(3), 229-235.

Succi, M. J., Lee, S. D., & Alexander, J. A. (1997). Effects of market position and competition on rural hospital closures. *Health Services Research, 31*(6), 679-700.

Tefft, N., & Kageleiry, A. (2014). State-Level unemployment and the utilization of preventive medical services. *Health Services Research, 49*(1), 186-205.

Truven Health Analytics. (2015). 100 top hospitals. Study overview, 22nd edition.

U.S. Department of Health and Human Services. (2016). What are critical access hospitals? Retrieved from http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/Introduction/critical.html

Watcharasriroj, B., & Tang, J. C. S. (2004). The effects of size and information technology on hospital efficiency. *Journal of High Technology Management Research, 15*(1), 1-16.

Watt, J., Renn, S., Hahn, J., Derzon, R., & Schramm, C. (1986). The effects of ownership and multi-hospital system membership on hospital functional strategies and economic performance. In *For-profit Enterprise in Health Care* (pp. 260-290). Washington, DC: National Academy Press.

Younis, M. (2003). A comparison study of urban and small rural hospitals financial and economic performance. *Online Journal of Rural Nursing and Health Care, 3*(1), 38-48.

Younis, M., Rice, J., & Barkoulas, J. (2001). An empirical investigation of hospital profitability in the post-PPS era. *Journal of Health Care Finance, 28*(2), 65-72.

Zodet, M. W., & Clark, J. D. (1996). Creation of hospital peer groups. *Clinical Performance and Quality Health Care, 4*(1), 51-57.