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Quality of Care in Appalachian Nursing Homes: Doing More with Less?

By

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Abstract: Despite comprising nearly 10% of the nation's nursing home population, little is known about the quality of care provided by nursing homes located in rural Appalachia. However, anecdotal evidences suggests that the economic disadvantages associated with the Appalachian region may lead to higher concentrations of certain structural and organizational attributes previously shown to affect nursing home quality. In response, this study sought to examine empirically whether nursing homes located in Appalachia differ in the number of deficiency citations received in comparison with nursing homes located elsewhere, and to explore the extent to which factors other than quality of care determine nursing home survey outcomes. A secondary-data analysis using the Online Survey Certification and Reporting System was conducted. The most recently available survey conducted between March 2000 and February 2003 were used, providing 16,439 facility-level observations for analysis. Robust regression and spatial analysis techniques were used to examine quality differences. Results indicate that wide variation across regions and even within states exist in the patterns of deficiency citation issued to nursing homes, and that a substantial proportion of this variation is associated with structural and organizational factors, rather than true quality of care differences. Before regional differences in nursing home quality of care can be understood and subsequently addressed, further effort is needed to investigate the extent to which regional differences in the survey process itself systematically affect conclusions about nursing home quality of care performance.

Quality of Care in Appalachian Nursing Homes: Doing More with Less?

INTRODUCTION

Little is known about the quality of care provided by nursing homes located in rural Appalachia. Although the Appalachian region, in comparison with the nation as a whole, has an older population,¹ spends a greater proportion of state Medicaid dollars for long-term care,² and has a higher percentage of older adults with disabling and chronic conditions,³ an exhaustive literature search failed to identify a single study investigating the quality of Appalachian nursing homes. However, given the lack of alternative long-term care services in rural communities,⁴ the out-migration of younger populations,⁵ and the higher rates of poverty^{6,7} which may prevent out-of-pocket payments for long-term care, Appalachian elders and their families may rely more heavily on nursing homes to meet their care needs. However, anecdotal evidence suggests that the quality of nursing home care in Appalachia may be compromised by the higher concentration of certain structural, organizational and market attributes that tend to be more commonly found in rural and/or economically disadvantaged areas. For example, previous research findings indicate that high Medicaid census rates,^{8,9} for-profit operating status,¹⁰ and low nurse staffing levels are strong predictors of poor nursing home quality of care,¹¹ all three of which, appear to be heavily concentrated in rural Appalachia.¹²

Although the Center for Medicare and Medicaid Services (CMS) is ultimately responsible for setting nursing home regulatory requirements and monitoring compliance among nursing homes that participate in the Medicare and/or Medicaid programs, CMS contracts with individual states to complete the annual survey and certification process. Under this arrangement, state agencies are expected to conduct annual inspections in accordance with CMS

protocol, report substandard care to CMS, and, when necessary, enforce compliance among nursing homes with federal standards.¹³ In order to evaluate whether a nursing home is providing acceptable levels of care, a team of surveyors, hired and trained by the state agency responsible for oversight, visits the facility and remains on-site for several days while conducting the annual inspection. During the inspection, 17 areas of care (e.g., resident rights; quality of life; resident quality of care; nursing services, etc.) are reviewed for potential quality of care problems. These 17 areas are further broken down into approximately 190 sub-areas of care, commonly referred to as *F-tags*, each of which can be cited when there is a failure to meet minimal levels of acceptable care.¹⁴ When a citation is issued, it conveys both the severity of harm that actually resulted or potentially could have resulted from the substandard care, as well as the scope of the threat the substandard care posed to the resident population.¹⁵

Although no formal estimates exist, extrapolations from publicly available data suggest that there are approximately 135,500 older adults residing in nursing homes located throughout Appalachia, representing roughly 26% of all nursing home residents living within the 13 Appalachian states, and nearly 10% of the nation's nursing home population overall.¹⁶ Despite the paucity of research exploring Appalachian nursing home care, findings from the broader literature investigating the effects of rurality on healthcare use and outcomes provides insight into the likely long-term care needs of Appalachian elders. For example, lower socioeconomic status, difficulty in accessing healthcare, and the lagging economic structures of the Appalachian region have long been associated with poorer health outcomes.¹⁷ In addition, the Appalachian region tends to be characterized by fewer healthcare providers per capita, including home health care, physicians, and nurses, as well as the number of hospital beds.¹⁸ While the lack of healthcare services and providers represents a considerable challenge to any resident of the area,

the effects may be more poignant for older adults, who tend to be heavy users of healthcare services, and whose ability to live independently may be more fragile should a healthcare crisis occur.¹⁹ Indeed, elders in rural areas tend to rely more heavily on nursing home care,²⁰ with estimates suggesting that among rurally-located adults aged 75 years and older, nursing home use may be as much as 50% higher in comparison with similarly aged elders residing in urban locations.²¹ At the same time however, sparsely populated areas are often served by a single provider. Without market competition to encourage quality of care, older adults may have little recourse for obtaining adequate nursing home care in remote areas.²² In response to the lack of information specific to a sizable portion of the nation's nursing home residents, this paper uses nationally representative data to examine whether nursing homes located in Appalachia differ in the quality of care provided to residents.

METHODS

Data

The Online Survey Certification and Reporting System (OSCAR), a federally administered database, served as the main data source for this study. OSCAR contains the annual survey results for all Medicare and/or Medicaid certified nursing homes in the U.S., including type and severity of citations. Participating nursing homes must undergo an initial inspection for certification purposes, and then annually (not to exceed 15 months between inspections) thereafter. Data elements in OSCAR include facility-level characteristics (e.g., number of beds, profit status, chain membership status, staffing intensity levels, special care units, etc.) and aggregate resident characteristics (e.g., mean levels of physical functioning among residents, percentage of residents whose stays are reimbursed by Medicaid, percentage of

residents with dementia, etc.), permitting adjustment for population and facility differences across nursing homes. For the purposes of this study, data from the most recently available scheduled inspection between the dates of March 2000 and February 2003 were used, resulting in 16,439 individual nursing home records. This facility-level file served as the main data file for all statistical procedures.

In a second file, the previously described data were geocoded, or assigned a geographical reference based on the county of location. Generally, geocoding is managed in one of two ways. Either point data (i.e., specific addresses) are assigned X,Y coordinates on a grid or geocodes are assigned to the center of the polygon representing an area (e.g., county). Because spatial patterns and clusters of deficiency citations across Appalachia are of interest here, rather than distances between citations, the later technique of polygonal spatial assignment was used.²³ Once assigned, geocodes are used to link previously prepared maps available in geographic information systems (GIS), allowing maps to be built both in terms of physical area (e.g., boundaries) and three-dimensional layers (e.g., regional boundaries stacked on county boundaries). After the geocodes were added, data were aggregated to the county-level for all GIS procedures.

Dependent Variables

Following conventional coding strategies, each of the 190 F-tags were grouped into one of 17 mutually exclusive categories of nursing home care.¹⁴ For each category of care, a facility-level count of the total number of deficiencies received was constructed. For GIS procedures, deficiency counts were then aggregated across facilities per county, and divided by the number of facilities in each county, to obtain the average number of deficiencies received per facility per county in each of the 17 areas of care. A similar approach was used to obtain a facility-level

count and the mean number of deficiency citations received per facility per county at level ‘G’ or higher for each of the 17 areas of care. Deficiency citations indicate the severity of the substandard care on a 12-point scale, increasing from ‘A’ through ‘L’. Deficiencies issued below ‘G’ indicate that potential harm may result from the substandard care, whereas deficiencies issued at level ‘G’ or higher indicate that actual harm occurred.¹⁵ Lastly, a count of total deficiencies (facility-level) and the mean number of deficiency citations (county-level) issued for any reason and at any level of severity was calculated, following the same strategy as previously described.

Independent Variables

Several facility-level variables were constructed to capture resident population and nursing home operational differences across facilities. Average physical functioning levels among residents were measured on a five-point scale indicating limitations in performing activities of daily living (ADL). The percentage of residents in a given facility identified as bedfast, diagnosed with dementia, who exhibited difficult behavioral symptoms, who had pressure sores or who had urinary incontinence was specified as well. Dichotomous (dummy) variables were constructed to indicate whether facilities held nonprofit status, held chain membership, or operated as a government-run facility. Dummy variables were also constructed to identify homes with beds designated for Alzheimer’s disease care and hospice care. A continuous variable of the number of beds was used to measure facility size. Nurse staffing intensity levels were measured using two variables, full-time equivalent registered nursing hours (FTE-RN) per resident and full-time equivalent certified nursing assistant hours (FTE-CNA) per resident. Five variables were specified to explore potential differences in care strategies across nursing homes, including the percent of residents: with urinary catheters, with feeding tubes,

receiving psychotropic medications, placed in physical restraints and receiving continence training assistance. Lastly, two variables were used to identify facility location. A dichotomous variable was used to identify whether a facility was located in one of the 410 counties included in the Appalachian region, versus otherwise. Because much of Appalachia is rural, a separate measure of rurality was not specified. Rather, an urban location indicator was included to distinguish facilities located in metropolitan versus other, less densely populated areas.

Estimation Procedures

Descriptive statistics were used to compare resident population characteristics, facility operating characteristics, and nursing home care strategies between facilities located within and outside Appalachia. Multivariate regression models were estimated to examine the effect of Appalachian location on receipt of deficiency citations for substandard nursing home care. Because market competition may arise between nursing homes operating in close spatial proximity²⁴⁻²⁶ and market competition has been shown to affect nursing home quality,⁸ it could not be assumed that standard errors of the estimates were independently distributed. Accordingly, the standard errors of all regression models were adjusted using a Huber-White Sandwich estimator available in Stata 9.0.²⁷ Predicted values (\hat{y}) obtained from the estimation procedures were saved, aggregated to county-level estimates and plotted using ArcGIS 3.1 software.²⁸ Observed (unadjusted) counts of total deficiencies received and total number of deficiencies cited at level ‘G’ or higher were mapped for reference purposes, as well.

RESULTS

Descriptive Findings

Table 1 presents descriptive statistics of nursing home resident population and facility operating characteristics among facilities located within and outside of Appalachia. Findings suggest that, on average, Appalachian nursing homes served resident populations with higher ADL impairment levels, had a larger proportion of residents whose stays were reimbursed by Medicaid, and a lower proportion of residents who paid privately for their care. Facilities located in Appalachia also were more likely to be hospital-based, reflecting hospital swing-bed policies in rural areas, and were less likely to offer specialty beds designated for the care of residents with Alzheimer's disease. Additionally, nursing homes in Appalachia tended to be smaller in size and less often located in urban areas in comparison with their non-Appalachian counterparts. However, regardless of location, approximately 28% of all facilities operated as nonprofits, 50% of facilities were chain-affiliated and 6% were government-run facilities.

Table 2 compares potential differences in nursing home quality and care strategies across facilities by Appalachian status. Nursing homes in Appalachia were found to have a higher percentage of residents who were identified as being bedfast, diagnosed with dementia, prone to disruptive behavioral symptoms, had pressure sores, and who were incontinent. The use of urinary catheters, feeding tubes and psychotropic medications was also more prevalent among facilities located in Appalachia in comparison with their non-Appalachia counterparts. However, despite having a greater percentage of residents who were incontinent, fewer residents located in Appalachian nursing homes were reported to be receiving continence retraining assistance. Lastly, although nursing homes in Appalachia appeared to do less well on most of the broad quality of care measures, Appalachian facilities were found to apply physical restraints less

frequently than their non-Appalachian counterparts, which interestingly, represents an area of care that has received substantial attention among researchers and policy analysts.^{29, 30}

Although important differences in operational and organizational characteristics, which have been identified elsewhere as potential indicators of poor quality of care^{9, 31-33} were found between facilities located within and outside Appalachia, bivariate comparisons of deficiency citations received across the two regions suggest that facilities in Appalachia perform similarly in comparison with their non-Appalachian counterparts on annual nursing home surveys for quality of care. Table 3 contains the means and standard deviations for each of the 17 categories of care, the total number of deficiencies cited at level ‘G’ or higher, and the percentage of facilities receiving no deficiencies. Additionally, the fifth column in the table indicates whether, on average, deficiency citations received by facilities in Appalachia were issued at higher or lower levels of severity for each of the 17 categories of care, compared with facilities located elsewhere. Findings indicate that although the Appalachia region has fewer deficiency-free nursing homes overall, the number of deficiencies received and the proportion issued at level ‘G’ or higher, on average, are lower among facilities located in Appalachian. For example, facilities located in Appalachia received on average 5.35 deficiencies, while facilities outside Appalachia received an average of 6.07 deficiencies. Roughly 13% of all deficiencies issued in Appalachia were cited at level ‘G’ or higher, whereas in non-Appalachian facilities, 17% of all deficiencies were issued at severity levels indicating that actual harm occurred. Nursing homes in Appalachia received fewer deficiencies in 10 of the 17 areas of care, performed equally well in 6 of the 17 areas of care, and received a higher number of deficiencies in only one area of care—dental service violations. Although Appalachian facilities received fewer citations overall, as well as fewer deficiencies cited at level ‘G’ or higher, a review of citation trends (see Table 3,

column 5) across each of the 17 areas of care reveals that in 9 of the 17 areas of care, facilities in Appalachia received citations, that on average, indicated a higher severity of infraction or greater potential for actual harm than did facilities located elsewhere. This finding most likely indicates that the lower number of deficiencies issued at level 'G' or higher in Appalachia reflects a general trend of fewer deficiencies received, rather than an absolute reduction in quality of care problems.

Table 4 reports the partial, unstandardized regression coefficients and corresponding *p*-values for model estimates of the number of deficiencies received (Model 1) and the number of deficiencies received at level 'G' or higher (Model 2) among all nursing homes. Because models estimated separately by Appalachian status yielded similar results, combined results using an Appalachian dummy variable are presented here. Notably, the quality of care variables presented in Table 2 were not included in the multivariate estimation procedures because these variables are best understood as capturing outcomes of quality of care rather than predictors of quality.¹³ Thus, their inclusion would risk over-adjusting facility differences.³⁴

Total Deficiencies Received (Model 1)

Findings suggest that facilities whose resident populations have higher levels of ADL impairment, have a greater proportion of Medicaid reimbursed stays, and a smaller proportion of privately paid days received more deficiencies than did otherwise similar facilities, holding other factors constant. Results indicate that for every 10% increase in the proportion of residents receiving Medicaid, the number of deficiency citations received increases by roughly 0.36 of a point. Thus, a 30% increase in Medicaid census is associated with the receipt of an additional deficiency citation, on average. Government-run facilities and nursing homes that held nonprofit status received fewer deficiencies when compared with their respective counterparts and after

adjusting for other factors. Nonprofit facilities received 1.5 fewer deficiencies than did nursing homes holding for-profit status, while government facilities received nearly 1.2 fewer deficiencies than did non-government-run facilities. Nursing homes that were chain operated, hospital-based and larger in size received more deficiency citations than did their otherwise similar counterparts. Facilities that were chain-operated received 0.5 more deficiencies in comparison with facilities that were singularly operated, while hospital-based facilities received 0.7 more deficiencies than their otherwise similar counterparts. Higher levels of RN staffing were found to have a sizable effect on the number deficiencies received. For every 10% increase in FTE RN hours per resident, the number of deficiency citations received decreases by 7.14 deficiencies. Nursing homes located in urban areas were found to receive 0.7 more deficiencies than their otherwise similar, more rurally located counterparts, while facilities located in the Appalachian region received nearly 0.8 fewer deficiencies on average than did nursing homes located outside Appalachia, after adjusting for urban location and other factors.

Deficiencies Received at Level ‘G’ of Higher (Model 2)

Although facilities whose resident populations had higher levels of ADL impairment and those who had fewer privately paid stays were found to receive more deficiencies in general, no effect was found in terms of the severity-level of deficiencies issued. However, the proportion of residents receiving Medicaid was not only predictive of receiving more deficiencies in general, but also of receiving deficiencies that were issued at levels indicating that a greater severity of infraction occurred; albeit, the size of the effect was quite modest. Potentially, this finding may suggest that while high Medicaid census rates are indicative of quality of care problems, the affect on quality is more diffuse in nature. Among factors capturing facility operating characteristics, only nonprofit status and facility bed size were found to influence the receipt of

level 'G' or higher deficiency citations. Nonprofit facilities received fewer deficiencies indicating that actual harm occurred, relative to their for-profit operating counterparts, while an increase in the number of nursing home beds was associated with an increase in the number of level 'G' or higher deficiencies; although again, the effect size was modest. Although beds designated for the care of residents with Alzheimer's disease had no effect on the number of deficiencies received overall, results from Model 2 suggest that facilities with special care beds for residents with dementia received more level 'G' or higher deficiencies than did facilities without special care beds. Although this finding is difficult to interpret, three plausible explanations exist, including: facilities with quality of care problems are more apt to designate beds in an attempt to improve either actual quality or perceptions about quality, residents with dementia are more difficult to care for and thus drain facility resources leading to poorer quality outcomes, or nursing home surveyors are more apt to scrutinize facilities that either identify specialty care services for residents with Alzheimer's disease or that have a higher concentration of residents with dementia.

Interestingly, although only FTE RN levels were found to affect the number of deficiencies received in the first model, both FTE RN and FTE CNA levels were found to decrease the proportion of deficiencies issued at level 'G' or higher. A 10% increase in FTE RN hours per resident decreased the number of level 'G' or higher citations by nearly 2 deficiencies. Likewise, a 10% increase in FTE CNA hours per resident lowered level 'G' or higher deficiencies by nearly 0.2 deficiencies. Considered together, these findings may suggest that while increased RN staffing levels improves quality of care practices in general, sufficient numbers of CNA staffing levels may be necessary to ensure adequate implementation of care strategies. Lastly, although urban location did not appear to affect the severity level of

deficiency citations received, facilities located in Appalachia were found to receive, on average, 0.5 fewer deficiencies than their non-Appalachian counterparts, holding other factors constant.

Spatial Patterns in Deficiency Citations

To further explore the effect of Appalachian location of facility receipt of deficiency citations, results of the regression analyses were examined spatially. Predicted values (\hat{y}) from each of the regression models were averaged across counties and mapped using GIS software. For comparison purposes, observed (unadjusted) rates of deficiency citations are mapped as well. Figures 1 and 2 contain the observed and predicted values of deficiency citations received, respectively, and Figures 3 and 4 contain the observed and predicted values for deficiency citations cited at level 'G' or higher, respectively. For all four figures, deficiencies are scaled into quintiles, from low to high, indicated by increasingly darker shading. Visual inspection of the maps reveals that, overall, nursing homes located in rural areas appear to receive fewer deficiencies than do facilities located in more densely populated areas. However, after adjusting for covariates listed in Table 4, a clear pattern of fewer deficiencies emerges across the Appalachian region that cannot be fully unexplained by either urban-rural or quality of care differences in the region, suggesting most likely that other, unexplained but regionally distributed factors are contributing to the number and type of deficiencies received by nursing home facilities. Caution is urged in interpreting the maps, however, as one important caveat applies. Because Appalachian status was identified using a dummy variable, which shifts the prediction equation's intercept at the y-axis, the effect of the Appalachian location is artificially constrained to the physical boundaries of observation. In other words, county dividing lines do not necessarily provide meaningful boundaries. Although technically, the interpretation of the regression results remains the same, substantively, it is likely that at least some of the

neighboring regional areas share similar regional attributes, and thus, if additional measures of spatial effects were available for inclusion rather than a single dummy variable, the results would most likely appear more diffuse at the borders. Nonetheless, the maps visually and accurately display the empirical results of the regression equation, revealing marked geographic differences in the patterns of deficiency citation issuance across facilities located within and outside of the Appalachian region.

DISCUSSION

Study findings suggest that wide and unexplained variation exists in the number and type of deficiency citations issued to nursing homes located within and outside of the Appalachia region. Although in part, these variations reflect important differences in the receipt of deficiency citations related to facility population and operational attributes— factors that have been shown elsewhere to affect nursing home quality of care,³¹ the regional concentration of certain facility characteristics, combined with poorer outcomes on several measures of quality of care, raises important questions regarding the extent to which these variations reflect actual differences in nursing home quality versus regional differences in annual nursing home inspection practices. For example, despite larger Medicaid censuses, more frequent use of urinary catheters for managing incontinence, higher prevalence rates of pressure sores, and greater use of psychotropic medications among nursing homes located in Appalachia, findings from this study suggest that fewer and less severe deficiencies were issued to Appalachian facilities in comparison with facilities located elsewhere, after controlling for other factors.

Although uncontrolled differences in population case-mix may account for some of the variation in deficiency citation issuance, given the size of the population studied and the regional boundaries explored, it is unlikely that lack of adequate risk-adjustment fully explains the

variations reported here.³⁴ Rather, visual inspection of the regression results suggests that systemic causes of variation other than true quality of care differences are contributing to the observed variations. In some respects, these findings are not surprising, given previous reports of state-by-state variations in deficiency citation issuance.^{13, 15} However, findings from this study provide empirical evidence that wide variations exist not only across states, but across regions and within states, as well. Likewise, although within state variation in deficiency citations may capture, at least in part, true differences in quality of care arising from competition across nursing home markets, the uniformity of fewer and less severe deficiencies issued across rural areas in general and within Appalachia in particular, suggests that at best, this is only partially responsible for the observed variations identified in the study. Moreover, because the pattern of deficiency citations exists across regions too large to be considered viable markets for nursing home competition,²⁵ and because several population, organizational and nurse staffing variables were controlled for in the estimation procedures, results from this investigation raise concern that variations in the numbers and types of deficiency citations issued to nursing homes reflect factors other than quality of care differences.

Accordingly, the findings presented here raise important policy questions, particularly in light of the current CMS practice of publicly reporting survey findings on its National Nursing Home Compare Website¹⁶, coupled with the vital role the survey inspection plays in demonstrating nursing home compliance with federal regulations, as plausibly, at least some of the variation captured in the findings presented here reflect differences in the survey process itself. For example, a recent investigation revealed that states vary widely in the funding allocated to complete nursing home inspections, that important differences exist in the composition of survey team members and the training they received, in remuneration practices of

survey team members, as well as in adequate numbers of and turn-over in surveyor personnel.³⁵

Nonetheless, additional research is needed before results from this study can confirm systemic variations in annual nursing home inspection practices and to disentangle any systemic causes of variation from true quality of care differences.

Clearly, greater understanding of the impact of regional variations in deficiency citation issuance is needed to improve the oversight, regulation and reporting of nursing home quality of care. Moreover, because nursing homes typically serve diverse populations with a wide range of healthcare needs requiring a variety of services and skills, greater effort is needed to understand the extent to which certain facility population and operating characteristics are distributed unequally across regional boundaries, that consequently, may leave certain subpopulations of older adults disproportionately reliant on nursing home markets that lack competitive quality features. For example, the strong effect of Medicaid census rates on receipt of deficiency citations most likely not only captures regional differences in income levels, but also structural and organizational characteristics among facilities that concomitantly result in higher Medicaid census rates and limit the provision of services that enable facilities to offer competitive quality of care, as well. Thus, the findings presented in this study indicate that before the implications and outcomes of regional differences in nursing home quality of care can be understood and subsequently addressed, effort is needed to first investigate the extent to which regional differences in the survey process itself systematically affect conclusions about nursing home quality of care performance. At best, failure to disentangle true quality differences from differences in assessing quality of care across regions limits information available to consumers that is necessary to make informed choices about long-term care options. At worst, confounding true quality differences with systemic causes of variations in quality may mislead consumers into

believing that their options for long-term care are equivalent to those residing in more economically developed regions of the county.

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Table 1: Descriptive Statistics of Nursing Homes Located Within and Outside Appalachia

Variable	Facilities Located in Appalachia (n=1,498)		Facilities Located Outside Appalachia (n=14,941)	
	Mean(%)	SD	Mean(%)	SD
Resident Characteristics				
Average ADL Score	4.05*	0.46	3.83	0.00
Percentage Medicaid Stays	65.38*	25.18	61.43	25.52
Percentage Private-Pay Stays	18.81*	16.37	24.85	19.75
Facility Operating Characteristics				
Non-Profit Status	0.29	0.45	0.28	0.45
Chain Membership	0.54	0.50	0.52	0.50
Government Facility	0.06	0.24	0.06	0.24
Hospital Based	0.14*	0.01	0.10	0.00
Facility Bed Size	104.74*	63.14	109.65	74.23
Facility Amenities				
Alzheimer's Beds	0.13*	0.34	0.19	0.39
Hospice Beds	0.01	0.11	0.01	0.11
Staffing Patterns				
FTE RNs Per Resident	0.08	0.18	0.07	0.25
FTE CNAs Per Resident	0.15*	0.12	0.13	0.29
Location				
Urban Location	0.49*	0.50	0.67	0.47

Note: * $p < .05$

Table 2: Potential Quality Differences Between Nursing Homes Located Within and Outside Appalachia?

Variable	Facilities Located in Appalachia (n=1,498)		Facilities Located Outside Appalachia (n=14,941)	
	Mean(%)	SD	Mean(%)	SD
Resident Characteristics				
Percentage Bedfast	0.06*	0.07	0.03	0.07
Percentage with Dementia	0.42*	0.19	0.36	0.19
Percentage with Behavior Symptoms	0.27*	0.16	0.25	0.16
Percentage with Pressure Sores	0.07*	0.05	0.06	0.05
Percentage with Urinary Incontinence	0.50*	0.18	0.44	0.18
Care Strategies				
Percentage with Urinary Catheter	0.07*	0.06	0.06	0.06
Percentage with Feeding Tubes	0.07*	0.07	0.06	0.09
Percentage Receiving Psychotropics	0.62*	0.13	0.58	0.16
Percentage in Physical Restraints	0.08*	0.10	0.09	0.11
Percentage in Continence Training	0.15*	0.10	0.21	0.14

Note: * $p < .05$.

Table 3: Comparison of Deficiency Citations across Nursing Homes Located Within and Outside Appalachia

Variable	Facilities Located in Appalachia (n=1,498)		Facilities Located Outside Appalachia (n=14,941)		Severity Level App to Non-App
	Mean(%)	SD	Mean(%)	SD	Direction
Total Number of Deficiencies	5.35*	4.83	6.07	5.65	
Deficiencies Cited at Level G or Above	0.13*	0.33	0.17	0.38	
Deficiency Free Nursing Homes	0.10*	0.30	0.12	0.33	
Resident Rights Violations	0.38*	0.73	0.42	0.76	↑
Admission Rights Violations	0.02	0.14	0.02	0.15	↑
Resident Behavior Violations	0.22*	0.49	0.25	0.53	↓
Quality of Life Violations	0.58*	0.93	0.70	1.05	↓
Resident Assessment Violations	0.68*	1.01	0.86	1.18	↓
Quality of Care Violations	1.66	1.73	1.70	1.88	↑
Nursing Services Violations	0.03*	0.17	0.05	0.21	↓
Dietary Services Violations	0.56*	0.88	0.62	0.91	↑
Physician Services Violations	0.05	0.26	0.05	0.24	↑
Rehabilitative Services Violations	0.01	0.09	0.01	0.10	↑
Dental Services Violations	0.03*	0.18	0.01	0.11	↑
Pharmacy Services Violations	0.22*	0.50	0.26	0.60	↑
Infection Control Violations	0.25	0.52	0.26	0.53	ND
Physical Environment Violations	0.19*	0.47	0.33	0.65	↓
Administration Violations	0.11*	0.38	0.15	0.43	↓
Laboratory Violations	0.06	0.26	0.06	0.27	↑
Other Violations	0.17*	0.41	0.20	0.48	↓

Note: * $p < .05$, ND=no difference.

Table 4: Robust Regression Results of Factors Associated with Receipt of Deficiency Citations

Variable	Model 1 Total Deficiencies Received		Model 2 Cited at Level G or Above	
	Coefficient	<i>p</i> -Value	Coefficient	<i>p</i> -Value
Resident Characteristics				
Average ADL Score	0.276	0.043	0.111	0.123
Percentage Medicaid Stays	0.036	0.000	0.001	0.000
Percentage Private-Pay Stays	0.008	0.041	0.001	0.591
Facility Operating Characteristics				
Non-Profit Status	-1.492	0.000	-0.020	0.009
Chain Membership	0.543	0.000	0.011	0.105
Government Facility	-1.176	0.000	-0.008	0.553
Hospital Based	0.702	0.001	-0.006	0.659
Facility Bed Size	0.006	0.000	0.001	0.000
Facility Amenities				
Alzheimer's Beds	-0.152	0.289	0.018	0.041
Hospice Beds	0.462	0.229	0.022	0.430
Staffing Patterns				
FTE RNs Per Resident	-0.714	0.036	-0.189	0.038
FTE CNAs Per Resident	0.113	0.442	-0.017	0.004
Location				
Urban Location	0.707	0.000	-0.001	0.906
Appalachia	-0.768	0.000	-0.498	0.000
Adjusted R-Square	0.06		0.02	

FIGURE 1: Low to High Quintiles (Light to Dark) of the Average Number of Deficiencies Issued per Facility per County, Unadjusted

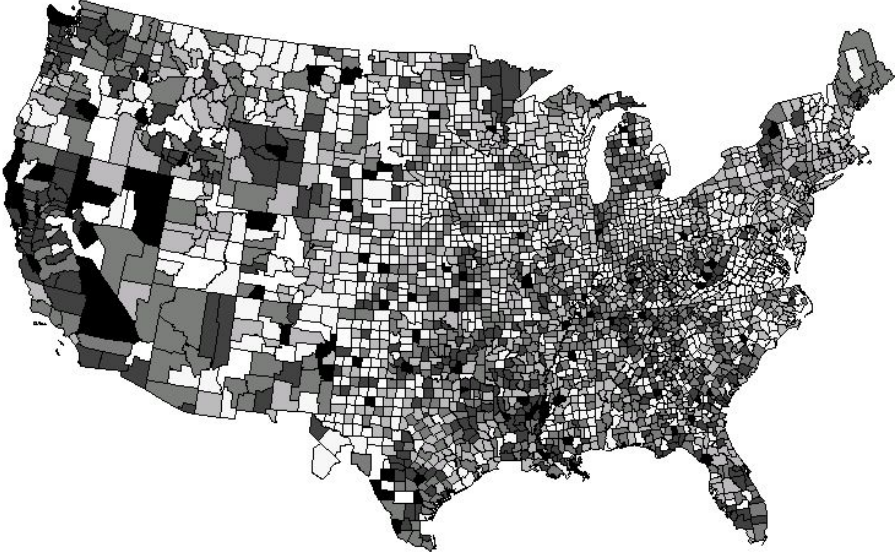


FIGURE 2: Low to High Quintiles (Light to Dark) of the Average Number of Predicted Deficiencies (\hat{y}) per Facility per County

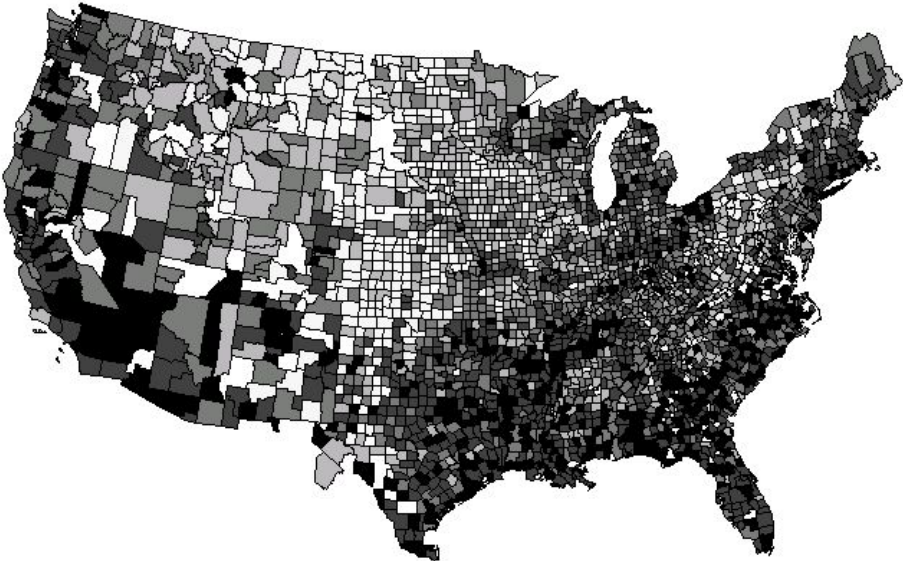


FIGURE 3: Low to High Quintiles (Light to Dark) of the Average Number of Deficiencies Issued at Level 'G' or Higher per Facility per County, Unadjusted

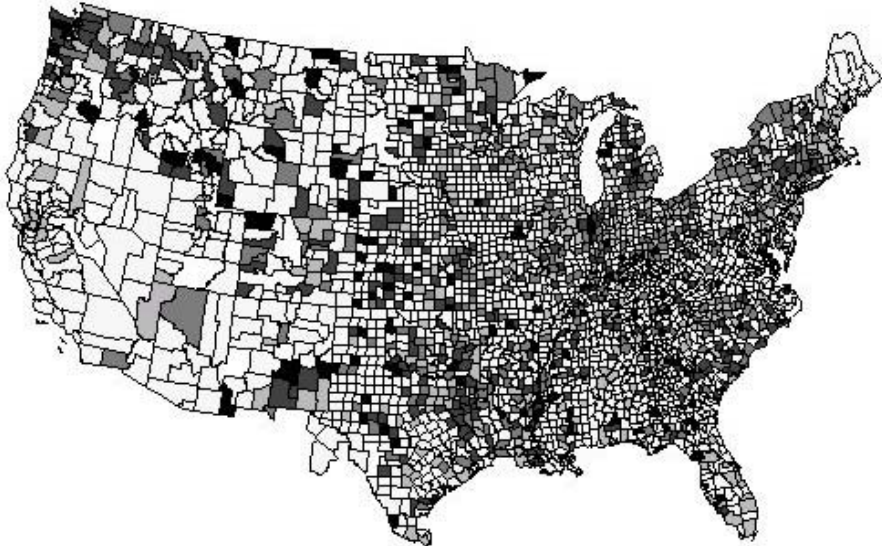


FIGURE 4: Low to High Quintiles (Light to Dark) of the Average Number of Predicted Deficiencies (\hat{y}) Issued at Level 'G' or Higher per Facility per County

