

## **Chapter 10**

### **Relationship of Quality of Life and Indicators from Extant Data**

The goal of this chapter is to evaluate whether quality of life (QOL) is associated with indicators that can be derived from extant data sources. Specifically, we linked the data from the QOL interviews with data files from the two national data reporting systems for nursing homes: the Minimum Data Set (MDS) and the Online Survey and Certification Automated Record (OSCAR). The MDS was used to construct two sets of measures: (1) indicators of resident factors that may be associated with QOL and (2) indicators of facility level quality of care. Data for all the residents in the study facilities were provided by CMS. For each resident in the sample, the most proximate MDS assessment record to the interview was extracted and linked to the interview data. The OSCAR was used to construct measures of various categories of nursing home personnel and to get a count of citations for QOL related problems on the state survey. The most proximate OSCAR record to the data collection window for each facility was used for analysis.

### **Variables**

#### Resident Factors from MDS Data.

Resident factors thought to be associated with QOL were identified. An index of physical function based on level of independence in eating, dressing, toileting, transferring, and walking was computed using magnitude estimation weights (Finch, Kane, & Philp, 1995). A cognitive function scale was computed based on short and long-term memory and cognitive skills for daily decision making items from the MDS. This scale correlates very highly with the Cognitive Performance Scale (Morris et al., 1994); however, it does not confound physical function (i.e. eating) with cognitive function. Indicators were constructed for diagnoses of depression and hip

fracture. Variables for age in years, gender, and length of stay (greater or less than 90 days) were also computed. Measures of visual acuity, bladder and bowel continence, and daily use of physical restraints (trunk, limb or chair that prevents rising) were also taken from the MDS.

#### Nursing Home Quality Indicators from MDS Data.

Indicators of quality of care were computed for each facility based on the cohort of residents living in that facility at the time of the survey using standard definitions developed by Zimmerman and colleagues (1995). These indicators, computed using data from the MDS, are in use across the country as part of the state and Federal regulatory processes and as a focus for internal quality improvement efforts. All QIs are expressed as the percentage of residents in a facility with the given condition. Several QIs (e.g., QI 8: Prevalence of Incontinence) are computed for high and low risk strata. In these cases, we selected the indicator for low risk group to avoid multicollinearity.

#### Facility Factors from OSCAR Data.

The ratio of staff to residents was computed for several key categories thought to be related to QOL: certified nursing aides, registered nurses, licensed practical nurses, occupational therapists, physical therapists, social workers, dietary, housekeeping, and administrative staff. Activity staff and recreational therapists were combined because facilities used these personnel categories somewhat interchangeably. Staffing ratios were based on the sum of all full-time, part-time and contract FTEs reported on the most recent OSCAR file for each facility. The number of FTEs per 100 residents was computed by dividing the sum by the number of residents living in the facility and multiplying by 100.

Staffing data reported by facilities are notoriously error prone, containing both implausibly high and low (zero) values. In keeping with previous work using these data (Harrington, et al.,

2000), we removed any values that implied a staff to resident ratio of 1 to 1 or higher and also eliminated the top 2%. In order to retain all 101 facilities in our sample we had to replace these values with plausible figures. Where possible, we used data from the previous or subsequent OSCAR record. If this was not available, we used the median value for facilities in the same state, stratified by whether the facility is for-profit or non-profit and whether it is certified as a Medicare Skilled Nursing Facility. Data were imputed for a total of 8 cases. The mean and range was not affected by this procedure. All analyses were conducted on both the complete data set and a restricted data set without imputed data. There was no significant difference in the magnitude or pattern of inferences between these two sets of analysis; results are based on the full data set. There were no significant differences between the staffing levels of the sampled facilities and the median for all other facilities in the 6 study states.

#### Deficiencies Related to QOL from Survey.

The number of deficiencies in areas related to QOL (see Figure 10.1) received in the most proximate state survey to the data collection window were computed for each facility. To adjust for differences between states in the way deficiencies are assigned, we standardized the number of deficiencies by dividing by the standard deviation and subtracting the mean number of deficiencies within each state.

Telephone Transfer and discharge Physical restraints Abuse Staff treatment of residents Resident rooms Room space Exits Privacy Dignity Self-determination/ participation Accommodate needs Notice before room change Activities program	Social services Environment Housekeeping Clean linens Private closet Adequate lighting Comfortable temperatures Access to records Informed of condition Limit on charges to funds Privacy and confidentiality Voice grievances Resolve grievances
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Figure 10.1. Citations Related to Quality of Life

## Analysis

The goal of this analysis was to determine if the QOL of a sample of nursing home residents was associated with resident factors and characteristics of the facilities in which they live. The dependent variables, dimensions of self-reported QOL, are measured at the individual level, whereas the main facility level independent variables are measured at a higher level of aggregation. In addition, since the main hypothesis we are testing is that nursing home residents in the same facility will have similar QOL, we need to explicitly take this intercorrelation into account. An appropriate technique for this type of data is to use hierarchical linear modeling (HLM), which takes into account the nested nature of the data and provides correct estimates of the standard errors (Bryk & Raudenbush, 1992; Goldstein, 1995). SAS Proc Mixed was used for all analyses (Singer, 1998).

Four sets of models were estimated: (1) we used HLM to examine the association between resident factors derived from the MDS and QOL; (2) we used HLM to examine the association between facility quality of care indicators (QIs) and resident QOL, adjusting for resident factors;

(3) we used HLM to examine the association between facility personnel and resident QOL, adjusting for resident factors; and (4) we used HLM to examine the association between the number of citations received and resident QOL, adjusting for resident factors. The analysis was repeated for each of the 11 QOL scales.

All continuous independent variables were standardized such that the grand mean for all facilities was zero. This facilitates comparison of effect sizes between variables measured on different scales. Thus the coefficients for continuous variables represent the effect of a one standard deviation change on the dependent variable (a 1-4 scale). The coefficients for discrete variables represent the effect of changing from zero to one on the dependent variable.

## **Findings**

Table 10.1 shows the associations between resident factors and QOL. Residents who are older generally have lower QOL (Functional Competence, Relationships, Individuality, and Meaningful Activity) with the exception of Security, which is slightly higher for older residents. Women generally have higher QOL than men (Privacy, Autonomy, Dignity, Individuality, and Spiritual Well-being). Residents with greater cognitive impairment report higher QOL with respect to Comfort, Functional Competence, Enjoyment, and Meaningful Activity, but lower QOL with respect to Privacy, Dignity, Individuality, and Relationships. Residents who are more physically impaired report lower QOL on all domains but Individuality and Dignity. Long-stay residents generally report higher QOL (e.g., Privacy, Functional Competence, Relationships, Individuality, Meaningful Activity, and Spiritual Well-being), but report lower QOL on the Security domain. Residents with visual impairment report lower QOL on 6 domains (Privacy, Functional Competence, Autonomy, Relationships, Individuality, and Meaningful Activity), and those with depression report lower QOL on 9 domains (all but Individuality and Relationships).

Table 10.2 shows the association between QIs and QOL. We find a mixed set of results. For some QIs we find consistent association between a higher prevalence of the problem and *lower* QOL. Depression without therapy, incontinence without a plan, weight loss, decline in late loss ADLs, use of antianxiety or hypnotic drugs, restraints, and little or no activity all are associated with reduced QOL. For other QIs, we find the opposite pattern, where a higher prevalence of the problem is associated with *better* QOL. This pattern is seen, for example, with incidence of fractures, falls, behavioral symptoms affecting others, polypharmacy, incontinence, and dehydration.

Table 10.3 shows the association between personnel and QOL. Few consistent findings are found. Ratios of activities staff to residents are associated with better QOL in the Privacy and Meaningful Activity domains. Ratios for administrative staff are associated with higher QOL on the Functional Competence domain. Ratios of Licensed Practical Nurses are associated with lower QOL in the Dignity domain. .

Table 10.4 shows the association between citations and QOL. In general, facilities with greater numbers of citations have lower QOL. However, this trend was only statistically significant for the Privacy and Autonomy domains.

Table 10.1. Association between Quality of Life and Resident Characteristics

	Comfort		Privacy		Functional Competence		Autonomy		Dignity		Security		Relationships		Individuality		Meaningful Activity		Enjoyment		Spiritual Well Being	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Age	-0.01	0.60	-0.01	0.26	<b>-0.04</b>	<b>0.01</b>	0.00	0.86	0.00	0.61	<b>0.02</b>	<b>0.04</b>	<b>-0.05</b>	<b>0.001</b>	<b>-0.03</b>	<b>0.03</b>	<b>-0.03</b>	<b>0.03</b>	0.02	0.22	0.00	0.98
Gender (Female)	-0.02	0.55	<b>0.06</b>	<b>0.05</b>	-0.02	0.56	<b>0.06</b>	<b>0.03</b>	<b>0.06</b>	<b>0.01</b>	<b>0.05</b>	<b>0.05</b>	0.01	0.71	<b>0.09</b>	<b>0.001</b>	0.00	0.93	0.02	0.46	<b>0.14</b>	<b>0.001</b>
Race (White)	0.06	0.10	<b>0.14</b>	<b>0.001</b>	0.01	0.76	-0.01	0.82	-0.04	0.21	0.07	0.07	-0.07	0.15	-0.09	0.08	-0.01	0.81	0.03	0.56	<b>-0.27</b>	<b>0.001</b>
Cognitive Function	<b>0.07</b>	<b>0.001</b>	<b>-0.05</b>	<b>0.001</b>	<b>0.11</b>	<b>0.001</b>	-0.01	0.50	<b>-0.03</b>	<b>0.01</b>	0.00	0.76	<b>-0.04</b>	<b>0.001</b>	<b>-0.04</b>	<b>0.01</b>	<b>0.07</b>	<b>0.001</b>	<b>0.11</b>	<b>0.001</b>	-0.01	0.41
Physical Function	<b>-0.06</b>	<b>0.001</b>	<b>-0.06</b>	<b>0.001</b>	<b>-0.33</b>	<b>0.001</b>	<b>-0.15</b>	<b>0.001</b>	<b>-0.05</b>	<b>0.001</b>	<b>-0.06</b>	<b>0.001</b>	-0.03	0.13	-0.03	0.12	<b>-0.10</b>	<b>0.001</b>	<b>-0.08</b>	<b>0.001</b>	<b>-0.04</b>	<b>0.04</b>
Long Stay (>90 days)	<b>0.10</b>	<b>0.001</b>	0.01	0.67	<b>0.09</b>	<b>0.01</b>	0.05	0.10	0.04	0.14	<b>-0.11</b>	<b>0.001</b>	<b>0.14</b>	<b>0.001</b>	<b>0.14</b>	<b>0.001</b>	<b>0.25</b>	<b>0.001</b>	0.09	0.02	<b>0.16</b>	<b>0.001</b>
Vision Impairment	-0.01	0.37	<b>-0.03</b>	<b>0.03</b>	<b>-0.06</b>	<b>0.001</b>	<b>-0.06</b>	<b>0.001</b>	-0.01	0.31	-0.01	0.41	<b>-0.04</b>	<b>0.01</b>	<b>-0.03</b>	<b>0.03</b>	<b>-0.06</b>	<b>0.001</b>	-0.02	0.12	-0.01	0.37
Bladder Incontinence	0.00	0.63	-0.02	0.12	-0.01	0.39	<b>-0.04</b>	<b>0.001</b>	-0.01	0.11	-0.01	0.33	-0.01	0.36	0.00	0.85	0.01	0.43	0.00	0.80	0.02	0.14
Depression	<b>-0.15</b>	<b>0.001</b>	-0.05	0.07	<b>-0.09</b>	<b>0.001</b>	<b>-0.08</b>	<b>0.001</b>	<b>-0.04</b>	<b>0.04</b>	<b>-0.08</b>	<b>0.001</b>	<b>-0.08</b>	<b>0.01</b>	-0.03	0.32	<b>-0.08</b>	<b>0.01</b>	<b>-0.11</b>	<b>0.001</b>	<b>-0.09</b>	<b>0.001</b>
Bowel Incontinence	0.00	0.98	-0.02	0.06	<b>-0.04</b>	<b>0.001</b>	0.01	0.16	-0.01	0.14	0.01	0.56	0.00	0.73	0.00	0.89	-0.02	0.22	-0.01	0.54	-0.02	0.13
Hip Fracture	0.06	0.20	0.04	0.45	0.01	0.83	0.01	0.88	0.06	0.10	0.04	0.32	0.01	0.92	-0.08	0.12	0.07	0.21	-0.07	0.22	-0.07	0.22
Daily Restraints	0.03	0.62	-0.09	0.16	-0.01	0.82	0.04	0.50	-0.08	0.08	0.04	0.39	-0.06	0.36	-0.10	0.13	0.03	0.61	0.03	0.65	-0.06	0.33

Table 10.2. Association between Quality of Life and Quality of Care Indicators

Indicator (QI)	Comfort		Privacy		Functional Competence		Autonomy		Dignity		Security		Relationships		Individuality		Meaningful Activity		Enjoyment		Spiritual Well Being	
	Coef.	p	Coef	p	Coef.	p	Coef.	p	Coef	p	Coef	p	Coef	p	Coef	p	Coef	p	Coef.	p	Coef	p
Incidence New Fractures	0.03	0.10	0.01	0.47	<b>0.06</b>	<b>0.001</b>	<b>0.04</b>	<b>0.04</b>	0.02	0.06	0.03	0.08	0.02	0.35	0.03	0.27	0.01	0.57	0.01	0.53	0.03	0.23
Prevalence Falls	-0.02	0.23	0.03	0.22	-0.01	0.68	-0.02	0.42	0.00	0.98	0.00	0.82	0.02	0.48	0.01	0.66	<b>0.05</b>	<b>0.04</b>	0.04	0.16	0.00	0.98
Prevalence Symptoms Affecting Others	<b>0.04</b>	<b>0.04</b>	0.02	0.48	0.02	0.35	0.02	0.43	0.01	0.63	0.01	0.44	0.01	0.53	-0.03	0.38	-0.01	0.78	0.05	0.08	0.06	0.03
Prevalence Depression	0.01	0.75	0.08	0.09	-0.04	0.41	0.00	0.97	-0.02	0.38	0.02	0.55	0.07	0.15	0.04	0.50	0.07	0.17	0.04	0.47	0.03	0.62
Prevalence Depression w/o Therapy	-0.03	0.32	<b>-0.11</b>	<b>0.01</b>	-0.02	0.69	-0.03	0.48	0.01	0.78	-0.04	0.17	-0.05	0.23	-0.02	0.70	-0.06	0.17	-0.07	0.13	0.00	0.99
Uses 9 or More Medications	0.02	0.14	<b>0.04</b>	<b>0.04</b>	0.01	0.49	0.02	0.15	0.04	0.00	<b>0.03</b>	<b>0.01</b>	<b>0.06</b>	<b>0.00</b>	<b>0.06</b>	<b>0.01</b>	<b>0.04</b>	<b>0.05</b>	0.01	0.69	0.04	0.06
Incidence Cognitive Impairment	<b>-0.03</b>	<b>0.03</b>	-0.01	0.49	0.02	0.34	-0.01	0.59	0.00	0.81	0.01	0.36	<b>0.05</b>	<b>0.01</b>	<b>0.05</b>	<b>0.03</b>	<b>0.05</b>	<b>0.01</b>	0.02	0.29	0.02	0.43
Prevalence Incontinence - Low Risk	0.00	0.91	0.03	0.08	0.02	0.19	0.01	0.42	<b>0.02</b>	<b>0.05</b>	-0.02	0.21	<b>0.05</b>	<b>0.01</b>	0.03	0.24	0.00	0.98	0.01	0.67	0.01	0.53
Prevalence of Incontinence without a Plan	0.03	0.06	0.02	0.41	0.01	0.54	0.00	0.98	0.00	0.95	0.02	0.19	-0.01	0.67	0.01	0.74	<b>-0.05</b>	<b>0.01</b>	0.00	0.86	-0.03	0.15
Prevalence of Indwelling Catheters	0.00	0.95	-0.01	0.65	0.00	0.89	0.00	0.98	-0.01	0.35	0.01	0.39	-0.03	0.26	0.00	0.99	-0.01	0.55	0.04	0.12	-0.03	0.33
Prevalence of Fecal Impaction	0.01	0.48	-0.01	0.54	0.00	0.97	0.00	0.92	0.00	0.90	0.02	0.07	0.02	0.19	-0.01	0.60	0.01	0.44	0.02	0.23	0.03	0.14
Prevalence Urinary Tract Infection	-0.01	0.70	-0.01	0.72	-0.01	0.46	0.00	0.83	0.00	0.77	0.00	0.92	-0.03	0.09	-0.02	0.44	-0.01	0.54	-0.01	0.58	0.04	0.11
Prevalence Weight Loss	0.02	0.13	0.00	0.85	0.02	0.28	0.01	0.41	0.01	0.41	0.02	0.13	<b>-0.04</b>	<b>0.04</b>	-0.03	0.29	-0.03	0.11	-0.01	0.64	-0.04	0.08
Prevalence tube feeding	0.03	0.13	-0.01	0.84	-0.01	0.71	0.00	0.85	-0.02	0.20	0.01	0.76	-0.01	0.61	0.00	0.92	0.00	0.86	0.01	0.79	0.01	0.82
Prevalence dehydration	<b>0.04</b>	<b>0.001</b>	0.02	0.25	0.02	0.22	0.01	0.72	0.01	0.55	<b>0.03</b>	<b>0.03</b>	0.01	0.49	0.02	0.46	0.00	0.85	-0.01	0.76	-0.01	0.80



Table 10.2, Continued

Indicator (QI)	Comfort		Privacy		Functional Competence		Autonomy		Dignity		Security		Relationship		Individuality		Meaningful Activity		Enjoyment		Spiritual Well- being	
	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p	Coef.	p
Prevalence bedfast residents	-0.02	0.22	-0.01	0.57	-0.02	0.28	-0.01	0.53	0.01	0.53	-0.03	0.10	0.01	0.68	0.00	0.90	0.02	0.48	-0.03	0.24	-0.02	0.50
<b>Incidence Decline in Late Loss ADLs</b>	0.00	0.76	0.00	0.82	-0.01	0.55	-0.02	0.28	0.01	0.44	<b>-0.03 0.03</b>		-0.02	0.32	-0.01	0.69	-0.02	0.28	0.00	0.98	0.00	0.80
Incidence of Decline in ROM	0.00	0.81	-0.01	0.69	-0.01	0.51	-0.02	0.29	0.01	0.45	-0.02	0.19	0.02	0.16	0.01	0.55	0.02	0.39	0.02	0.41	0.01	0.78
<b>Prevalence Antipsychotics - Low Risk</b>	0.02	0.25	0.00	0.87	<b>0.04 0.02</b>		0.01	0.50	0.00	0.93	-0.02	0.19	0.00	0.87	-0.01	0.64	-0.02	0.21	-0.01	0.63	0.01	0.63
<b>Prevalence of Antianxiety- Hypnotics</b>	<b>-0.06 0.001</b>		<b>-0.07 0.01</b>		-0.03	0.26	-0.03	0.24	-0.03	0.07	-0.03	0.09	<b>-0.06 0.03</b>		-0.02	0.56	<b>-0.06 0.02</b>		-0.06	0.06	0.00	0.91
<b>Prevalence of hypnotic use</b>	<b>0.05 0.03</b>		<b>0.07 0.02</b>		-0.01	0.72	0.02	0.44	0.01	0.41	0.03	0.17	0.03	0.32	-0.01	0.85	<b>0.07 0.02</b>		0.04	0.21	0.00	0.95
<b>Prevalence of Restraints</b>	<b>-0.08 0.001</b>		-0.01	0.71	-0.02	0.32	0.00	0.85	-0.02	0.18	<b>-0.03 0.02</b>		0.01	0.63	-0.02	0.54	0.03	0.15	<b>-0.05 0.04</b>		-0.02	0.51
<b>Prevalence of little or no activity</b>	<b>-0.03 0.03</b>		0.00	0.86	0.01	0.46	-0.01	0.61	-0.01	0.41	0.00	0.90	-0.03	0.11	0.00	0.94	-0.04	0.06	-0.01	0.71	-0.02	0.37
Prevalence of Stage 1-4 Pressure Ulcers - Low Risk	0.00	0.78	0.00	0.91	0.01	0.51	0.00	0.82	0.00	0.81	0.01	0.55	0.01	0.60	0.00	0.89	0.00	0.93	-0.01	0.69	-0.02	0.31

Table 10.3. Association between Quality Life and Nursing Home Personnel

	Comfort		Privacy		Functional Competence		Autonomy		Dignity		Security		Relationships		Individuality		Meaningful Activity		Enjoyment		Spiritual Well Being	
	Coef	p	Coef	p	Coef	p	Coef	p	Coef	P	Coef	p	Coef	p	Coef	p	Coef	p	Coef	p	Coef	p
<b>Activities Staff</b>	0.00	0.78	<b>0.05</b>	<b>0.02</b>	0.02	0.34	0.02	0.30	0.00	0.75	0.02	0.22	0.02	0.46	0.02	0.54	<b>0.06</b>	<b>0.001</b>	0.04	0.09	0.03	0.23
Social Work Staff	0.02	0.39	0.00	0.93	-0.01	0.78	0.00	0.79	-0.01	0.33	0.00	0.89	0.03	0.23	-0.02	0.58	-0.01	0.70	0.04	0.07	0.03	0.27
Registered Nurses	0.02	0.24	0.02	0.27	-0.02	0.23	0.02	0.31	0.01	0.20	0.02	0.19	0.01	0.79	0.02	0.43	0.01	0.76	0.03	0.23	0.01	0.58
<b>Licensed Practical Nurses</b>	0.00	0.80	-0.01	0.79	-0.01	0.54	-0.01	0.79	<b>-0.02</b>	<b>0.05</b>	-0.02	0.19	-0.01	0.57	0.01	0.87	-0.03	0.15	-0.03	0.19	<b>-0.05</b>	<b>0.05</b>
<b>Nursing Assistants</b>	0.00	0.88	0.00	0.89	-0.01	0.42	-0.01	0.78	0.01	0.39	0.00	0.99	-0.02	0.47	0.01	0.86	-0.01	0.53	0.00	0.96	0.00	0.95
Occupational Therapists	-0.01	0.56	-0.01	0.83	0.00	0.89	-0.01	0.69	0.00	0.90	-0.01	0.56	-0.02	0.41	0.02	0.64	0.02	0.48	0.00	0.93	-0.02	0.43
Physical Therapists	0.03	0.23	-0.01	0.59	0.00	0.82	0.00	0.83	0.01	0.69	0.03	0.08	0.02	0.55	-0.03	0.36	0.00	0.99	0.00	0.87	0.04	0.14
<b>Administrative Staff</b>	0.02	0.34	0.03	0.13	<b>0.03</b>	<b>0.05</b>	0.01	0.61	0.01	0.17	0.00	0.85	-0.02	0.34	0.01	0.79	0.01	0.72	-0.01	0.53	0.00	0.83
Dietary Staff	0.00	0.95	-0.02	0.42	0.02	0.34	-0.01	0.40	-0.01	0.35	0.01	0.46	-0.03	0.11	0.00	0.99	-0.02	0.34	-0.04	0.05	0.01	0.52
Housekeeping Staff	-0.01	0.47	-0.03	0.12	0.01	0.61	0.02	0.27	-0.01	0.26	0.00	0.99	-0.01	0.46	-0.02	0.47	0.00	0.80	-0.02	0.24	-0.02	0.23

Table 10.4. Association between Quality Life and Number of Citations

	Comfort		Privacy		Functional Competence		Autonomy		Dignity		Security		Relationships		Individuality		Meaningful Activity		Enjoyment		Spiritual Well Being	
	Coef	p	Coef	p	Coef	p	Coef	p	Coef	P	Coef	P	Coef	p	Coef	p	Coef	p	Coef	p	Coef	p
<b>Number of Citations</b>	-0.02	0.14	<b>-0.04</b>	<b>0.03</b>	-0.01	0.57	<b>-0.03</b>	<b>0.05</b>	-0.02	0.06	-0.01	0.50	0.01	0.62	-0.03	0.28	0.00	0.96	-0.02	0.26	-0.02	0.39

## Conclusions

We found a number of associations between data available from extant sources and resident self-reported QOL. In general, however, resident level data provide the most consistent pattern of associations. Resident characteristics such as physical function, visual impairment, incontinence, and depression are associated with quality of life in the expected direction. People with greater levels of impairment report lower levels of QOL.

When we turn to facility level factors, such as staffing levels and quality of care; however, the patterns are less clear. It might be expected that higher ratios of staff to residents would be associated with better QOL. Staffing ratios are considered low by most experts, and higher ratios are associated with better QOL. However, staffing ratios are not clearly associated with better QOL in our sample. The exception is that there is some evidence for the value of activities staff. Nursing and other categories, however, do not show any statistically significant pattern. Indeed, higher ratios of licensed practical nurses seem to be associated with lower QOL.

Quality of care at the facility level offers the most confusing set of results. For example, the positive association between fractures and falls and QOL may be due to greater freedom and autonomy. Residents are given the opportunity to do as much as they can for themselves (FC), but this comes at the risk of falling and experiencing a fracture. Higher prevalence of restraint use and bedfast residents are associated with lower QOL, which is consistent with conventional wisdom. However, it is unclear why the prevalence of incontinence and incontinence without a plan should go in opposite directions. Similarly, it is tempting to conclude that higher prevalence of polypharmacy and hypnotics make it more likely for residents who respond to the survey (who may not be using those drugs) to experience higher QOL. However, further analysis is needed to address this point. The overall sense from this set of analyses is that few of

the QIs are associated with QOL.

Finally, citations in the state survey system are associated with lower QOL. This is in the expected direction. However, the finding is statistically significant in only 2 out of the 11 dimensions (and marginally significant in one more). Further analysis of this issue is warranted. For example, we plan to explore other citations and other methods of adjusting for state variation in the survey process.

In summary, extant data are rich source of information for understanding resident and facility level differences in QOL. However, the mostly null findings with regard to staffing and mixed findings with respect to QIs make it unlikely that strong predictive models can be derived from these sources.

## References

- Bryk, A., & Raudenbush, S. (1992). *Hierarchical Linear Models* ( Vol. 1). Newbury Park: Sage.
- Finch, M., Kane, R. L., & Philp, I. (1995). Developing a new metric for ADLs. *Journal of the American Geriatrics Society*, 43(8), 877-884.
- Goldstein, H. (1995). *Multilevel Statistical Models* ( 2 ed.). New York: John Wiley & Sons.
- Harrington, C., Zimmerman, D., Karon, S. L., Robinson, J., & Beutel, P. (2000). Nursing home staffing and its relationship to deficiencies. *J Gerontol B Psychol Sci Soc Sci*, 55(5), S278-287.
- Morris, J. N., Fries, B. E., Mehr, D. R., Hawes, C., Phillips, C., Mor, V., & Lipsitz, L. A. (1994). MDS cognitive performance scale. *Journal of Gerontology: Medical Sciences*, 49(4), M174-M182.
- Singer, J. D. (1998). Using SAS PROC MIXED to Fit Multilevel Models, Hierarchical Models, and Individual Growth Models. *Journal of Educational and Behavioral Statistics*, 24(4), 323-355.
- Zimmerman, D. R., Karon, S. L., Arling, G., Clark, B. R., Collins, T., Ross, R., & Sainfort, F. (1995). Development and Testing of Nursing Home Quality Indicators. *HCFA Review*, 16(4), 107-127.