Preparing For the Future:

An Evaluation of Alternative Methods for Estimating the Needed capacity of Nursing Home Beds in Kentucky

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Capstone
March 29, 2007
Spring 2007

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I. Executive Summary

Due to the aging of the generation known as "Baby Boomers", the nation is expected to witness extraordinary growth in the total population ages 65 and over. Population projections provided by the United States Bureau of the Census suggest that this segment of the population will double in size to 72 million by the year 2030. In order to prepare for the anticipated increase elderly Americans, policy officials have been analyzing the potential effects on the nation's long-term care system. Although Baby Boomers can expect to live longer than their predecessors, as they age, it is predicted that this generation will experience dramatic increases in the incidence of chronic diseases. These health related factors, coupled with increased longevity of Baby Boomers, leads experts to contend that there will be heavy reliance on institutionalized care in the years to come.

As a result of the surge in the number of elderly individuals, Kentucky is expected to rank 14th in the number of persons age 65 and over by the year 2025. Long-term policy experts argue that this growth in the elderly population could place a strain on, or even cripple, the state's ability to meet the health care needs of these individuals. In order to assess the state's ability to provide access to long-term care, this report examined the state's policy regarding the assessment nursing home bed capacity and alternative methods for estimating the future level of need for nursing home facilities. The methods analyzed in this report include: Kentucky's Certificate of Need (CON) process, Tennessee and Mississippi population-based formulas and the development of a state-specific statistical regression methodology.

After examining the state's CON policy regarding the establishment of nursing facility beds, it was concluded that the state policy does not lend itself to predicating future nursing home need. In an attempt to predict the needed capacity of nursing home beds in Kentucky, the two aforementioned methods were evaluated. Prior to applying the models to the state, validity assessments were made concerning the accuracy of the projections yielded by each model. The population-based formulas used by Tennessee and Mississippi were applied to all 50 states and were found to yield inaccurate results regarding the level of need for beds in a number of states. In several instances, the use of these formulas could potentially place an unnecessary financial burden on states. An empirical model was developed to account for factors that might lead to increased rates of institutionalization in Kentucky, an empirical model was developed. However, the estimated model explains 13% of the observed variation in per capita bed need. As a result of the lack of explanatory power and statistical significance of several of the independent variables used in the model, it was concluded that this model should not be applied to Kentucky in order to project the future level of bed need for Kentucky.

Given the inability of the methods presented in this report to accurately assess the future level of nursing home need, state policy makers may find it beneficial to take prudent steps toward analyzing and developing strategies to ensure that the state has the needed capacity to manage the projected increase in elderly population.

II. Problem Statement

Due to the phenomenon known as "The Graying of America", an immense amount of attention has been focused on the nation's long-term care system. Data released by the United States Bureau of the Census (Census Bureau) suggests that the number of citizens age 65 and over will double in size to 72 million by the year 2030. As a result, long-term care experts have been examining ways to develop and implement public policy initiatives that will ensure that the nation's elderly population is provided with access to quality social services in a cost-effective manner. [1] The dramatic increase in this segment of the population has been attributed to the aging of the generation of Americans known as "Baby Boomers". A direct result of medical advances, America's aging population exhibits much different characteristics than their predecessors. Today's senior citizens have lower rates of disability, achieve higher levels of education and less often live in poverty. However, by the time these individuals enter long-term care institutions, the demand for more acute care will increase. As a result of the increase in the life expectancy rate of the average adult American, policy analyst have expressed concern regarding the ability of the nation's primary source of long-term care for the elderly, nursing homes, to provide access to affordable quality care. [2]

A study profiling nursing homes found that residents are arriving at facilities later in age and in poorer health. Figures indicate that the average age of admission to a nursing home is approximately 80. In addition, experts contend that if the rate of the number of individuals utilizing nursing homes as their primary long-term care option

continues to increase, the number of nursing home residents will likely double by the year 2030.[3]

On the state level, the surge in the elderly population has generated concern among Kentucky policy makers and long-term care experts. Estimates suggest that by the year 2020, senior citizens will comprise approximately 17 percent of the state's population, as compared to 12.6 percent in 2003. Assuming the projections are accurate, the expected increase in the number of nursing home residents might place a strain on, or even cripple the Commonwealth's ability to meet the demands of the growing elderly population. Unlike states with similar demographic characteristics, such as Mississippi and Tennessee, Kentucky does not include projections of anticipated nursing home need as part of its State Health Plan.[4]

National debates have been waged regarding federal and state policies requiring the healthcare providers to acquire a Certificate of Need (CON) before delivering health services. The federal government implemented the CON process in 1974 in an effort to limit the supply of nursing home beds and to control the increase in state and federal Medicaid expenditures from the nursing home industry. In order to construct a hospital or nursing home, the potential provider must prove there is sufficient need for the services the facility offers within a particular region. The determination of the "need" for development of a new facility is based on each state's individually tailored need formula. Experts with the National Conference of State Legislatures contend that an understanding of the Certificate of Need process is critical to the assessment of whether the nation's long-term care system is prepared to facilitate the growing

elderly population. A study conducted in 1998 concluded that the existence of CON and moratoria policies reduced the number of nursing home beds in states. [5]

While there is a significant amount of discussion on the current trends in long-term care reform, to a great extent the emphasis has been on the shift to Home and Community-Based Services (HCBS). Although community-based services appear to be the wave of the future, experts contend that the need for services that are only provided in nursing homes should be examined as life-expectancy rates increase, as longevity is key indicator of the likelihood of institutionalization. [6]

Table A: Medicaid Payment: Nursing Home Eligibility Determinants

1	Assistance with mobility
2	Physical or environmental management for confusion or agitation
3	Must be feed
4	Assistance with going to the bathroom or using bedpan for elimination
5	Assistance with the administration of stabilized dosages of medication
6	Requires restorative and supportive nursing care
7	Assistance with the administration or preparation of injections by licensed personnel
8	Is incapable of providing self-care due to physical or mental conditions
9	Displays a lack of cognition and communication

* An individual must meet any combination of two of these criteria to receive Medicaid payments for nursing facility care or care under Home and Community-Based Service

In anticipation of increases in Kentucky's elderly population, policy officials must find ways to efficiently and effectively ensure that the aging population has access to affordable quality care. The Kentucky Cabinet for Health and Family Services (CHFS) estimates that approximately 24,000 elderly persons currently reside in Kentucky nursing homes. There are a little more than 26, 000 nursing home beds located at facilities throughout the state. Additionally, CHFS officials estimate that total nursing home Medicaid expenditures for the 2006 twelve-month cycle reached approximately $720 million. [7]

Due to mounting fiscal pressures, the recent changes to the Medicaid program (the primary source of funding for nursing home care, particularly for the low-income) and the shift toward community-based services, an assessment of whether the state's CON process is an effective and efficient measure of the future need for nursing home beds in light of the state's rapidly growing elderly population, should be conducted.[8]

III. Certificate of Need

National Policy

In thirty-seven states across the nation, public and private firms are required to obtain a state license known as Certificate of Need (CON) in order to construct or expand facilities that would contain additional health care facility beds. In 1974, the National Health Planning and Resources Development Act was passed mandating state CON approval on all new construction or expansion of health care facilities (i.e. hospitals and nursing homes). [9]

The intention of the legislation, as it relates to the nursing home market, was to constrain the rapid growth in expenditures due to the oversupply (or unnecessary duplication) of nursing home beds. In spite of the fact that the federal government removed the state requirement for CON programs in 1986, the majority of states continue to institute varying CON policies and moratoriums on nursing home bed supply. Although fourteen states have repealed their CON policies, these states still retain some mechanism intended to regulate expenditures associated with the duplication of health care services. [10]

There are two prevailing economic justifications for the institution of state regulatory policies regarding the supply of nursing facilities. The first is referred to as the public interest argument, which maintains that CON provisions are needed in order to

prevent unregulated market competition that results in the construction of unnecessary health care facilities and increases in the costs of providing medical care to state-funded Medicaid to patients. [11] Furthermore, proponents of the imposition of CON regulations contend that the policy allows states to ensure Medicaid patients have access to institutionalized care, by limiting the ability of the market to undersupply beds to low-income elderly due to low Medicaid reimbursement rates. In this sense, the CON policy increases social welfare.[12]

The second economic rationale for CON regulation is the special interest theory, which asserts that the construction of health care facilities through CON regulations constrains entry of potential providers into the market and therefore allows existing nursing homes to face less competition. Opponents of CON policies make the argument that these regulations serve as an explicit contract between the nursing home industry and state governments, as CON policies enable providers to increase prices to private-pay residents to a level above the competitive market level. Another source of criticism regarding CON regulations came in 2004 with the release of a report by the Federal Trade Commission and the Department of Justice. The document claimed CON programs contribute to rising health care costs, as these regulatory policies inhibit the ability of competitive markets to limit the costs associated with care and guarantee quality and access to treatment and services. [13]

Kentucky's CON Policy

In Kentucky, the CON process was implemented in 1972, predating the 1974 federal mandate. According to a publication from the Kentucky Long-Term Policy Research Center, the state's CON policy has been altered with every gubernatorial administration. As a result of these changes, the process was characterized as a

"fragmented, centralized administrative process, with a provider-led dialogue which excludes consumers, taxpayers and health policy experts."[14]

Rather than establishing a decision-making entity composed of health policy experts, CON decisions are often determined by administrative hearing officers with minimal expertise in healthcare. These hearings are open to the public; however the public is rarely made aware that the hearings take place and discussions regarding the potential impact on local communities are typically limited to key health care firms and state officials. Critics of the state's CON process maintain that the current policy lacks the flexibility to meet need as it arises, as decisions are products of a formula outlined in the State Health Plan.[15]

Unlike many states' CON procedures, Kentucky's process does not allow communities to identify needs that arise at the local level. In fact, the state's nursing home bed-need formula is based solely on the ability of an individual to access institutionalized care within the geographic area in which the individual is located. Refer to the Figure 1 in the appendices for the complete formula.[16]

States similar in demographic composition to Kentucky, such as Mississippi and Tennessee, offer CON policies that seek to determine need on the county level. The formula used by Tennessee is as follows:

County Bed Need=

.0005xpop.65 and under, plus
.0120xpop. 65-74, plus
.0600xpop. 75-84, plus
.1500x pop.85, plus

Mississippi's bed to population ratio is slightly different from Tennessee's formula. The calculation methodology utilized by Mississippi in order to assess bed need is as follows[17]:

County Bed Need=

.0005xpopulation 64 and under
.014xpopulation 65-74
.059xpopulation 75-84
.179xpopulation 85+

The multiplier used in both the Tennessee and Mississippi bed to population formula's are age-adjusted ratios that were developed by the each state upon the inception of their respective CON programs. Officials in each state were contacted to determine how the specific age-related population factors were developed. However, officials from neither state were able to provide information regarding the original rationale for the specific factors included in determining the weighting of each age group in the formulas, nor for the association between the results of the formulas and demand for nursing home beds.

As the need for long-term care in the form of nursing home services rises due to the aging of the Baby Boomer generation, experts contend that public officials may need to make revisions to the CON process, as it does not necessarily reflect the state's level of preparedness for the future.

IV. Literature Review

Comprehensive academic literature examining the factors that contribute to increased demand for nursing home beds exists; however, most research studies evaluate the effects of the presence of Certificate of Need policies on the supply of long-term care beds. The intention of this report is not to assess whether the presence of a CON policy

constrains bed capacity, rather the intention of this study is to evaluate the factors that increase the likelihood of institutionalization in the future, as these factors enable the researcher to formulate an empirical framework that projects the level of bed need in Kentucky. The literature evaluated in this portion of the report suggests that there are multiple factors that contribute to the increased likelihood of institutionalization; many of these become the explanatory variables in the analysis portion of this study. [18]

Most of the research literature regarding nursing homes focuses on, individual level analysis of the factors contributing to the demand for institutionalized care; alternatives to nursing home care, and the combined effects of CON policies, quality and cost control measures associated with nursing home care. An examination of literature studying the factors that may lead to increased demand for nursing home care, thus the need to ensure adequate supply of beds, will be the primary focus of this review, as it informs the analysis of this report.

Determinants of utilization

In a study of individual level data exploring the determinates of nursing home utilization by a particular segment of low-income elderly population with high-risk health characteristics, Garber and MaCurdy (1989) find that there are three key factors that influence the likelihood of nursing home utilization by the elderly.[19] These were demographics, health and functional status, financial status and social supports (or living arrangements). When detailing the reasons for studying the impact demographics have on nursing home utilization, the authors noted that the vast majority of academic literature determined that age is a significant indicator of increased risk of institutionalization. The second factor influencing nursing home utilization is health and functional status. The

third variable used in the model was financial status; the authors assert that past research indicates that low income elderly are more likely to have higher rates of institutionalization. The researchers maintain that this is as a result of wealthier individuals' ability to access home health services. Another factor considered prior to their study was social supports of elderly individuals. Social supports include martial status, as being married is associated with diminished likelihood of nursing home admission. Analysis suggests that this is due to the healthier spouse's (usually a female) ability to provide aid to the disabled person. [20]

As previously mentioned Garber and MaCurdy used individual level data in order to assess the variables that lead to increased nursing home utilization. The complete listing of variables used in their study included: demographics, health and functional status, social supports (martial status and number of dependents), Medicaid and supplemental insurance, home ownership and educational attainment. The study found that home ownership, having living children and being non-white, decrease the likelihood of nursing home admission. The variables found to increase the likelihood of admission are being a Medicaid recipient, advanced age and functional impairments. In this study, income was not a significant factor in increased nursing facility utilization. Increased educational attainment was found to prolong the duration of institutionalization. [21]

The focus of a research study conducted by Lakdawalla and Philipson (1999) was to provide an analysis of how the market supply of long-term care (in the form of nursing homes) responds to increases in the aging population. The researchers hypothesized that aging may decrease the demand for market-based institutionalized care, due to increases in the supply of home and community-based services. Essentially, these home based care

services serve as a substitution for nursing home care. The study found that the supply of nursing home beds decreases with the longevity of females. Typically, females are able to care for their spouses even as they age themselves, therefore substituting home-based care for institutionalized care. In contrast, by the time females reach the point when the need for living assistance is evident, they tend to be widowed, therefore relying more on nursing home care. [22]

Stratman and Spellman (2006) conducted an empirical study in order to estimate the needed capacity of both nursing home and hospital beds within the Eugene-Springfield (Oregon) Metropolitan Statistical Area (MSA). The dependent variable for the regression model developed by the researchers was the number of nursing home beds in each MSA throughout the nation. This study utilized data compiled by the Census Bureau. Based on the models, the researchers attempted to determine whether the Eugene-Springfield MSA has adequate bed capacity levels in comparison to other communities with similar characteristics.[23]

As mentioned, the dependent variable in the model was the number of nursing home beds in each MSA. Each explanatory variable was selected based on previous research. The first independent variable was the total population age 65 and over, measured in thousands. The researchers hypothesized that the coefficient associated with this variable would indicate that the demand for nursing homes increases with the rise of the aging population. The second explanatory variable used was the male population 65 years and older, also measured in thousands. The assumption made was that this variable would lead to decreased demand in nursing home care. The third factor included in the model was a dummy variable indicating the existence of CON regulations in each MSA.

Based on past research, Stratman and Spellman contended that the presence of CON regulations would lead to decreased nursing home bed capacity. The fourth variable examined was the number of elderly persons (65 and over) below the federal poverty level. The hypothesis was that the more people in poverty would decrease the needed capacity of beds due to their inability to afford institutionalized care.

The fifth explanatory variable was the presence of functional disability. Instead of using Activities of Daily Living and Instrumental Activities of Daily Living measures, this study used data from the Census Bureau regarding self-care disability, measured in thousands. The hypothesis stated that the more individuals with functional disabilities the more likely the demand for nursing home care increases.

The final variable included in this analysis was educational attainment. For this regression model, the variable was persons 65 and over with some college or higher level of education, measured in thousands. The hypothesis was that these particular variables will yield a positive correlation between the assumptions that education is linked to longevity.

The researchers developed a base model that assessed the explanatory power of the variables in this model. The model had an R^2 of 95%, indicating that the independent variables explained the variation in nursing home beds. The results of the analysis yielded the following regression equation for MSA's across the nation:

Nhbeds *= 282.730 totalpop65-56.278males65-265.400CON-98.898poverty+369.196*

This model was then applied to two MSA's within the state of Oregon (including Eugene-Springfield), a Washington state MSA (serves as a comparison between mid-western states) and an MSA located in the state of New Mexico, (which does not have a

Certificate of Need law). The final results are that the Eugene-Springfield, Medford-Ashland, and Albuquerque MSA's were under needed capacity for nursing home beds at the time of this study, while the Spokane, Washington MSA was well over needed capacity.

The research reviewed above provides the theoretical and empirical basis for the development of the regression model that evaluates the explanatory power of several variables that serve as determinates of future needed capacity of nursing home beds in Kentucky. Conducting such analysis has the following objective: to determine what the possible impact of the projected increase in elderly population will be on future bed need. The results of this analysis will serve as estimations of future bed capacity, which may guide long-term care policy experts in the evaluation of the state's current CON process.

V. Research Methodology

Objective

This study is designed to assess different methods for projecting the future demand for nursing home beds in Kentucky. Population projections provided by the Census Bureau suggest that the state of Kentucky will rank 14th in the total number of individuals age 65 and over by the year 2025. Hence, an assessment of methods to project the state's anticipated future demand for nursing home beds has been conducted.

Research Question

Based on the mounting concern amongst long-term care analysts and health care advocates regarding the Commonwealth of Kentucky's ability to meet increasing

demands for affordable quality long-term care for the state's growing elderly population, the following research question is posed:

1) *How do candidate projection methods perform in estimating the demand for nursing home beds?*

Unit of Analysis

To efficiently and effectively estimate the anticipated demand for nursing beds throughout the state, the study first assessed the validity of two projection methods. Both the Tennessee and Mississippi population-based formulas were applied to all states in order to determine the feasibility of utilizing the formulas to estimate and project the level of bed need in Kentucky. In contrast, the variables analyzed in the regression model were developed based on characteristics specific to Kentucky. In the event the models were found to be valid measures of bed need the models would be applied to each individual county in the state, as an estimate of the needed supply of beds by county would then be provided.

Data Collection

In order to fulfill the main objective of this study: *to analyze the effectiveness of alternative methods for estimating nursing home bed supply in Kentucky, given the projected increase in the aging population*, quantitative data was obtained from state and national data centers. These resources enabled the researcher to: 1) to assess the performance of population-based CON formulas used by two states to project the level of bed need; and, 2) to establish a regression model to control for socioeconomic and demographic characteristics associated with a particular segment of the population being studied. The results of the assessments were to have served as the framework for the

development of empirical models aimed at estimating the needed capacity for nursing home beds in Kentucky's 120 counties. Data resources included: the United States Census Bureau, CHFS' CON office, Kentucky's Long-Term Policy Research Center, State Data Center, CON formulas from other states, and past research.

VI. Research Findings

Given that Kentucky's CON process does not attempt to assess the future need and supply for nursing home beds, this study examines two approaches to projecting the need for increased or decreased supply of nursing home beds. The results from these two methodologies are detailed below.

Evaluation of CON formulas

Kentucky's CON formula is not constructed to project future need for nursing facilities. The state's current formula captures current nursing facility occupancy rates by county in order to determine whether there is a need for a new facility, and thus more or fewer beds.[24] Given the variations in CON laws and formulas across states, an examination of two states with CON formulas that attempt to project future need by using a bed-to-population ratio were analyzed. The states with bed-to-population ratios studied in this project are Tennessee and Mississippi.[25]

It is important to note that these particular formulas would be likely to provide inaccurate assumptions as to the level of bed need in Kentucky due primarily to emerging health and social trends within the state that are not accounted for in the formulas' age-adjusted rate. For instance, there are certain medical trends that disproportionately affect the citizens of Kentucky compared to other states (i.e. Kentucky has high cancer and

mortality rates), which may cause the need for nursing facilities in Kentucky to exceed the need in comparable states.

By applying the formulas to all fifty states using data obtained from the Centers for Medicaid and Medicare Services, a determination was made as to the validity of the two formulations studied. The standard way of measuring the level of supply of nursing home beds is to assess the occupancy rates of nursing facilities within each state. Some long-term care experts contend that occupancy rates above 90% indicate an undersupply of nursing facility beds, and an occupancy rate below 90% indicates an oversupply of beds. [26]However, policy analysts and nursing home administrators contend that occupancy ratios ranging from 90% to 95% are considered fully occupied, and thus is the desirable range for which states try to achieve. Occupancy rates above and below this threshold respectively indicate an under and over supply of beds. In order to provide some flexibility in the assessment of whether the certificate of need formulas accurately measures the needed supply of beds in a given state, the aforementioned range was applied when evaluating the models.

Table B: ***Certificate of Need Population-Based Formula Validity Test***

Level of Supply	Occupancy Rate	Ratio
Under Supply	≥96%	≥1.6
Right Supply	90-95%	.95-1.5
Over Supply	< 95%	<.95

This information was applied to the two models in order to determine whether the formula seem to correlate with the occupancy rate categories. In the event that the

formulas indicate that 1) additional beds are needed in states that have relatively high occupancy rates and 2) fewer beds were needed in states that have relatively low occupancy rates, then the assumption was made that the formulas are accurately projecting the needed supply of nursing home beds. In contrast, in the event that the formulas yielded inconsistent results regarding occupancy rates, the conclusion was that there is little validity in the using only an age-adjusted formula to determine a state's anticipated level of nursing home bed need.

Validity Assessment Results

In order to test the validity of the both the Tennessee and Mississippi population based formulas, the formulas were applied to data obtained from the 2005 Online Survey, Certification and Reporting (OSCAR) survey for each state in the United States. The data includes information pertaining to each state's average and median occupancy rates as well as the number of beds each state reported having at the time the survey was conducted. As mentioned in a previous section, policy analysts often use the occupancy rate as an indicator of the need for additional nursing home beds. More specifically, experts prefer to use the median occupancy rate to measure the level of supply within states, as median occupancy rates account for outliers that may occur as result of the fluctuation in the supply of beds within a state. This is a particular concern when using data from the OSCAR survey, as it captures occupancy rates at a particular point in time.

When assessing whether the population-based formulas correlate with the occupancy rates of each of the states, the following questions where evaluated: 1) Are the formulas indicating the need for additional beds only when states have occupancy rates of at least 96% (potential undersupply); and, 2) Do the formulas indicate the need for fewer

beds in states that have low occupancy rates (oversupply)? To answer these questions, the number of beds the state CON formulas yield was divided by the actual number of beds provided by OSCAR. If this calculation yielded a result greater than 1.5, the formula was indicating that there was unmet need in that particular state. In order for the results to be valid, this unmet need should be found in states with high occupancy rates (at least 96%). In contrast, if the result of the calculated ratio was less than .95, the expectation was the formula was indicating oversupply in states with low occupancy rates. It is important to note that ratios between .95 and 1.5 indicate adequate (or right) supply of beds, and should correspond to occupancy ratios between 90-95%.

Based on the information obtained by calculating the aforementioned formulas, the conclusion was made that both the Tennessee and Mississippi formulas determine the level of need for nursing home beds for a portion of the states. Though these formulas did assess the over and under supply of beds, it can be deduced that population based ratios fail to incorporate factors other than population when determining the need for institutionalized care, and thus bed supply.

Upon further examination of the population-based CON formulas, it is evident that the use of these formulas to measure bed need presents several limitations. Nationally, there were 1,702,357 beds in 2005.[27] According to the formulas, the nation would have needed 24, 8025 additional beds in 2005 using the Tennessee formula and 36, 3709 additional beds under the Mississippi formula. In most instances, the extra beds were not needed, as the median occupancy rates associated with several of the states for which the formulas would add beds, indicate that the states had an adequate (or right) supply of beds. The most damaging evidence against the utilization of these CON

formulas is that the projected occupancy ratios yielded by the formula do not appear to correlate with the actual median occupancy rate associated with the states. The relationship between the occupancy ratio and the actual median occupancy ratio for Tennessee and Mississippi are 14% and 10%, respectively. This information is important, as state governments strive to control the bed ratio within states by keeping occupancy rates at relatively high levels (typically between 90-95%). Therefore, if the formulas fail to provide a direct correlation between the occupancy ratio it yielded and the actual occupancy ratio, states are at risk of losing their ability to restrain the growth of the nursing home industry, and thus Medicaid spending. The assumption could be made that there are other factors affecting the needed supply of beds that are not accounted for in the population-based ratios in these states.

Tables C & D: Occupancy Rate Correlations

C: Tennessee Correlation

Occupancy Ratio	Correlation Coefficient
US Median Occupancy Ratio	1.0000
TN Occupancy Ratio	0.1482

D: Mississippi Correlation

Occupancy Ratio	Correlation Coefficient
US Median Occupancy Ratio	1.0000
MS Occupancy Ratio	0.1098

Although both formulas indicated similar levels of bed need for a portion of the states, an analysis of the instances when the formulas yielded projections that were incorrect is warranted. The estimated bed need as determined by the formulas were labeled " way wrong" when the difference between the actual number of beds and the projected number of beds indicated a difference of more than 50% (in most instances) in the number of beds needed as indicated by the median occupancy rate. In addition, the formulas were deemed to be incorrect for states in which the formulas indicated that the current capacity

of states exceeds the amount the states should possess, when the number of beds these states currently contain are within the adequate (or right) occupancy range. Results show that the Tennessee population-based formula falsely indicated an under and over supply of nursing home beds in seven states. While the Mississippi formula yielded inaccurate results for thirteen states. The implications of using these formulas to project the level of bed in states where the formula was determined to inaccurately measure the level of need are that policy makers lose the ability to control the nursing home market, and thus the needed supply amount of nursing home beds. (Refer to Tables E and F below)

Tables E & F: Tennessee and Mississippi Validity Assessment Grids

States	Median Occupancy	Occupancy Test Value	Occupancy Test	TN Occupancy Test	TN Way Wrong	TN Percent Difference in Bed Need	TN Additional Beds	TN Unmet Need
Alabama	90.5	1.7	Right	Under		76%	1	
Alaska	86.4	2.3	Over	Under		138%	1	
Arkansas	74.2	1.2	Over	Right		22%		
Arizona	83.6	1	Right	Right		0%		
California	89.7	1.6	Over	Under		64%	1	
Colorado	84.5	0.86	Over	Over		-13%		
Connecticut	95	0.89	Right	Over		-10%		1
Delaware	92.1	1.3	Right	Right		32%	1	
Florida	92	1.8	Right	Under		84%		
Georgia	93.6	1.0	Right	Right		4%		
Hawaii	95.6	2.3	Right	Under	x	131%	1	
Iowa	81	0.73	Over	Over		-27%		
Idaho	78.1	1.38	Over	Right	x	39%		
Illinois	79.8	0.83	Over	Over		-17%		
Indiana	82.8	0.79	Over	Over		-21%		
Kansas	81.5	0.82	Over	Over		-17%		
Kentucky	93.2	0.97	Right	Right		-3%		1
Louisiana	76.6	0.41	Over	Over		-58%		
Massachuetts	93.1	0.95	Right	Right		-4%		1
Maryland	88	1.1	Over	Right		14%	1	
Maine	92.2	1.3	Right	Right		34%	1	
Michigan	90.5	1.4	Right	Right		43%	1	

Minnesota	93.5	0.97	Right	Right		-3%		1
Missouri	75	0.78	Over	Over		-22%		
Mississippi	92.2	0.93	Right	Right	x	-7%		
Montana	77.3	0.90	Over	Right		-10%		
North Carolina	91.8	0.84	Right	Right	x	-15%		1
North Dakota	94.1	0.83	Right	Over	x	-17%		1
Nebraska	83.3	0.73	Over	Over		-27%		
New Hampshire	92	1.09	Right	Right		9%		
New Jersey	90.7	1.86	Right	Under		119%	1	
New Mexico	90.7	1.6	Right	Under		63%	1	
Nevada	88.3	2.2	Over	Under		125%	1	
New York	95.1	1.1	Right	Right		11%	1	
Ohio	88	0.88	Over	Over		-12%		
Oklahoma	67.9	0.72	Over	Over		-28%		
Oregon	67.3	1.9	Over	Under	x	99%	1	
Pennsylvania	93.3	1.1	Right	Right		19%		
Road Island	94.9	0.98	Right	Right		-1%		1
South Carolina	94.4	1.43	Right	Right		44%	1	
South Dakota	95.8	0.86	Under	Over	x	-14%		1
Tennessee	90.8	0.95	Right	Right		-5%		1
Texas	76	0.95	Over	Right		-4%		
Utah	70.9	1.4	Over	Right		41%	1	
Virginia	92.2	1.3	Right	Right		38%	1	
Vermont	94.4	1.2	Right	Right		24%	1	
Washington	89.1	1.7	Over	Under		71%	1	
Wisconsin	90.5	1.0	Right	Right		1%		
West Virginia	93.3	1.2	Right	Right		24%		
Wyoming	86.7	0.99	Over	Right		-1%		
Total							19	9

States	Median Occupancy	Occupancy Test	Occupancy Test	MS Occupancy Test	MS Way Wrong	MS Percent Difference	MS Additional Beds	MS Unmet Need
Alabama	90.5	1.17	Right	Right		17%		
Alaska	86.4	1.07	Over	Right		8%		
Arkansas	74.2	1.5	Over	Right		55%		
Arizona	83.6	1.0	Right	Right		9%	1	
California	89.7	1.7	Over	Under		79%	1	
Colorado	84.5	1.0	Over	Right		7%		
Connecticut	95	0.93	Right	Right	x	-6%		1
Delaware	92.1	1.4	Right	Right		44%	1	
Florida	92	2.0	Right	Under	x	101%	1	
Georgia	93.6	1.13	Right	Right		13%		
Hawaii	95.6	2.6	Right	Under	x	165%	1	
Iowa	81	0.80	Over	Over		-19%		
Idaho	78.1	1.5	Over	Right	x	52%	1	
Illinois	79.8	0.91	Over	Right		-9%		
Indiana	82.8	0.86	Over	Over		-13%		
Kansas	81.5	0.90	Over	Right		-9%		
Kentucky	93.2	1.0	Right	Right		6%		
Louisiana	76.6	0.7	Over	Over		-25%		
Massachuetts	93.1	1.0	Right	Right		5%		
Maryland	88	1.2	Over	Right		25%	1	
Maine	92.2	1.4	Right	Right		46%	1	
Michigan	90.5	1.5	Right	Right		56%	1	
Minnesota	93.5	1.0	Right	Right		7%		
Missouri	75	0.85	Over	Over		-15%		
Mississippi	92.2	1.0	Right	Right		1%		
Montana	77.3	0.99	Over	Right		-1%		
North Carolina	91.8	0.88	Right	Over	x	-12%		1
North Dakota	94.1	0.91	Right	Right	x	-8%		1
Nebraska	83.3	0.79	Over	Over		-20%		
New Hampshire	92	1.19	Right	Right		19%		
New Jersey	90.7	1.3	Right	Right	x	30%	1	
New Mexico	90.7	1.7	Right	Under		77%	1	
Nevada	88.3	2.4	Over	Under	x	143%	1	
New York	95.1	1.2	Right	Right		21%	1	
Ohio	88	0.96	Over	Right		-4%		
Oklahoma	67.9	0.78	Over	Over		-22%		
Oregon	67.3	2.1	Over	Under	x	119%	1	
Pennsylvania	93.3	1.2	Right	Right		30%	1	
Road Island	94.9	1.0	Right	Right		8%		
South Carolina	94.4	1.5	Right	Right	x	56%		
South Dakota	95.8	0.94	Under	Right		-5%		1
Tennessee	90.8	1.0	Right	Right		4%		
Texas	76	1.0	Over	Right	x	4%		
Utah	70.9	1.5	Over	Right		54%	1	
Virginia	92.2	1.4	Right	Right	x	50%	1	
Vermont	94.4	1.3	Right	Right		36%	1	
Washington	89.1	1.8	Over	Under	x	87%	1	
Wisconsin	90.5	1.1	Right	Right		11%		
West Virginia	93.3	1.3	Right	Right		34%	1	
Wyoming	86.7	1.0	Over	Right		8%		
Total					13		20	4

Further evidence suggesting that population-based formulas may not be suitable tools for estimating the level of nursing home bed need is found in the examination of the instances where the formulas indicate that some states should have more beds than the actual number of beds present within the state, when the median occupancy rate indicates that the state has either an adequate supply or over supply of beds. As shown by the tables, both formulas potentially jeopardize each of these states ability to supply an adequate supply of beds. The financial burden on states for which these incidents are present, remains unclear. Using the assumption that the additional beds yielded by the formulas remain unoccupied (due to over supply), then the Medicaid expenditure for these states is zero. However, if there is a "bed hold" (meaning that the beds are being held for a limited amount of days for Medicaid patients), then potential costs to states could be substantial. Each state varies in the amount of money delineated for this purpose. In contrast, it is possible that since the CON formulas allow for additional nursing home beds, that these beds may be filled by patients (who would otherwise lack access to care or forced to utilize homecare services) due to the increased availability of institutionalized care. If this happens, states will likely see increases in Medicaid expenditures, which states endeavor to guard against.[28]

In order to provide a crude estimate of the potential fiscal impact to states as a result of the over-estimation of beds by these formulas, the percentage of Medicaid beds paid for by each state was multiplied by the number of additional beds as calculated by the population-based formulas. The answer was then multiplied by the average costs for nursing home care. It is imperative to understand estimates provided are rudimentary

approximations of the financial implications and more research is needed in order to develop a clearer picture of the potential financial impact of using these population-based formulas. According to Genworth Financial, the average annual cost of nursing home care is around $70,000. The additional costs associated with the Tennessee formula ranged from approximately $3 billion (California) to $38 million (Vermont). In contrast, the additional Medicaid expenditures for the Mississippi formula range from $4 billion (California) to $57 million dollars (Vermont). [29]

Experts may question why the formulas seem to over estimate the need for additional beds in certain states. The answer to this question is unclear, as the appearance of common characteristics is not detectable at first glance. For instance, significant variations amongst the states include: total percentage of elderly persons, geographic compositions (though most are rural) and poverty rates. Furthermore, data obtained by The Henry Kaiser Family Foundation indicates these states vary widely on the level of Medicaid spending, and other characteristics unique to nursing home care.[30] In this study, data shows that the formula utilized by Mississippi causes states to disburse more funds toward long-term care than the Tennessee formula. Supplementary analysis is needed in this area.

On the other hand, the imposition of these particular CON formulas undermine the ability of states to supply the needed level of beds by indicating that the states need fewer beds than is indicated by the occupancy rate associated with the state. Hence, utilization of these formulas, results in diminished bed capacity for each of the state shown in Tables E & F under the columns labeled “unmet need”.

Given the inconsistencies in the use of these formulas, it was determined that it would not be beneficial to use these formulas to project bed need for Kentucky. The use of population-based formulas to establish the level of bed need for counties should be further analyzed, as there appears to be other factors that may predict the appropriate need for institutionalization. An empirical framework was developed to account for other factors that may increase the instances of nursing home utilization in Kentucky.

Regression Model

The previous assessment of two state population-based CON formulas led the researcher to conclude that the formulas fail to account for the effect of state-specific demographic factors on the level of demand for nursing home beds. Therefore, a statistical analysis in the form of a regression model in log format was developed in an attempt to estimate the need for nursing home beds for each of the 120 counties in Kentucky. The model was calculated in log format in order to account for a nonlinear relationship between each of the variables in the model. In addition the dependent variable in the model is per capita beds (total beds for each county, divided by the total population age 65 and over in 2005), which helps to account for variations in the relative size of each county when projecting future bed need. The majority of the independent variables were entered as percentages in efforts to eliminate multicollinerity that may occur as a result of strong correlation between several independent variables. The explanatory variables used to develop the regression equations were selected based on a review of the research cited above. These variables include: total population 65 and over, males 65 and over, population 65 and over in poverty, total county population in poverty, population 65 and over high school, population 65 and over college or higher education

level, and Metropolitan Statistical Area (rural/urban proxy) (Garber and MaCurdy 1989; Lakdawalla and Philipson 1999; Stratman and Spellman 2006). Information regarding each of these variables was obtained from summary file data compiled by the Census Bureau.

Independent Variables and Hypothesis

The table below contains a brief overview of the independent variable categories and the expected effect on the supply of nursing home beds in each county.

Table: G *Anticipated Effect of Independent Variables*

Variable	Measurement	Expected Sign		Variable	Measurement	Expected Sign
Total Population 65+	(in 1000's)	+		Below Poverty Level (county)	(percentage)	-
Males 65+	(percentage)	-		65+ Below Poverty	(percentage)	-
Metropolitan Statistical Area (rural/urban proxy)	(dummy)	+		65+ High School Diploma	(percentage)	-
65+ College or More	(percentage)	+				

The expected effects of each of the independent variables listed follow the assumptions outlined in the previously cited literature. The explanatory variable for total population of persons age 65 (measured in thousands) and over should have a positive correlation with the demand for nursing home beds. The coefficient on the variable would indicate that as the total number of persons age 65 and over increases, the demand (and supply) of nursing home beds will increase.

For the second explanatory variable, males age 65 and over (measured as a percent), it could be deduced that the number of males within this segment of the population will have a negative effect on the demand for nursing home beds. This follows academic literature suggesting that as the proportion of males increase, demand for nursing home beds will decrease.

Metropolitan Statistical Area is used as a dummy variable and proxy to determine whether a county is rural or urban. The likely effect of this explanatory variable is that individuals living in counties located in an MSA are more likely to have access to nursing home care, and therefore the expected effect of this variable is positive. The opposite is true of individuals located outside of MSA's. Research indicates that while individuals located in small towns often have more access to nursing home care, those living in extremely rural areas rely more heavily on family support as they age.[31] Furthermore, it is expected that there will be fewer beds in counties located outside MSA's and more beds in highly populated MSA counties.

The two explanatory variables assessing the implications of educational attainment on the demand for nursing home beds are hypothesized to have two different effects. The explanatory variable indicating persons age 65 and over educated through high school (measured as a percent) will have a negative impact on the demand for nursing home beds, and thus the explanatory variable for persons 65 and over with at least a college education (measured as a percent) will have a positive effect on the needed supply of beds. Health and economic experts contend that the achievement of higher education leads to longevity, which is a primary factor in nursing home utilization. Therefore, it is logical to hypothesize that the more education the elderly population has received, the higher will be the demand for nursing home beds.

The expected effects of the two explanatory variables associated with the total county population below the federal poverty level (measured as a percent) and the population age 65 and over below the federal poverty level (measured as a percent) will be negatively correlated with the demand for nursing home beds. The primary reason for

this hypothesis follows the interpretations of past literature indicating that, while persons age 65 and below are eligible for Medicaid services, establishing Medicaid eligibility has been found to be a cumbersome process for the elderly population, as relatively few receive Medicaid assistance. It is important to note that there is research that counters this opinion by explaining that elderly individuals with higher incomes are less likely to use nursing home services, as these individuals have financial resources that allow them to access in-home assistance. This suggests that low-income individuals will be more likely to demand nursing home care, therefore yielding a positive correlation. In a state with relatively high percentages of individuals living in poverty, it is logical to apply this assumption to this particular model; however, for the purposes this report, the hypothesis will follow the assumption that while Medicaid does cover a portion of nursing home services, the number of individuals receiving the benefit is not significant enough for this model to yield a positive correlation between poverty and demand for nursing home beds.[32]

In the event the explanatory variables detailed above are found to be statistically significant, the model will be used to project the needed bed supply of nursing homes into the future. Each variable will then be applied to each county in efforts assess which areas will need more beds than others. Most of the independent variables will be held constant, with the exception of the following variables, which will be aged forward: total population of individuals age 65 and over, percentage of males 65 and older and percentage of persons with a high school diploma, in order to assess the additional demand for nursing home beds by county. Using census projections, a model will be applied to each county in order to determine future bed need. The model presented does

not account for functional impairments, as the majority of literature indicates the most significant factor influencing the need for nursing home beds is age, rather than the mere presence of a disability. However, literature indicates functional impairments are positively correlated with increased need for institutionalization.

The following regression equation may be applied to each county in order to project future bed need by county.

lnBed-pop(beds/population)=$\ln\beta_0 + \beta_1 \ln$ (total pop 65)- $\beta_2 \ln$ (males 65)+β_3(msa)+ $\beta_4 \ln$ (65 college)- $\beta_5 \ln$ (65highschool)- $\beta_6 \ln$ (county_poverty)- $\beta_7 \ln$ (65_poverty)

Regression Model Results

The complete table summarizing the regression coefficients and their effects on the needed supply of nursing home beds, and a chart outlining the projected level of nursing home bed need are provided below in Figure 2. The regression equation used to project per capita bed need for each county is indicated below:

lnBed_pop=7.62576+1.697499(lnmales65)-.1214335(lntotalpop65)-.5722793(lnpoverty65) +.0818773(lnedcollege)-1.583291(lnedhigh)-.05152781(lnpovertycounty)-.0306171(msa)

In this estimated empirical model, the independent variables explain 13% of the variation in the per capita need for nursing home beds. Due to the lack of explanatory power yielded by the model, projections of bed need for each county in Kentucky were not included in this report. The effects of the explanatory variables on the supply of nursing home beds are analyzed below.

Figure 2: Regression Results

Number of obs=120
F(7, 112)=2.60
Prob > F=0.0160
R-squared= .1398
Adj R-squared=.0860
Root MSE =.46423

Log_bed_pop	Coef.	Std.Err.	t	P>[t]	95% confidence interval	95% confidence interval
Log-males 65+	1.697499	.8431339	2.01	0.046	.0269374	3.368061
Log_pop_2005	-.1214335	.077948	-1.56	0.122	-.2758776	.0330105
Log_poverty65	-.5722793	.2698961	-2.12	0.036	-1.107044	-.0375148
Log_ed college	.0818773	.1824236	.45	0.654	-.2795716	.4433263
Log_ed high	-1.583291	.8069964	-1.96	0.052	-3.182251	.015669
Log_poverty	-.0152781	.2267318	-0.07	0.946	-.4645181	.4339618
Msa	-.0306171	.1113049	-0.28	0.784	-.2511534	.1899193
cons	7.625276	3.955712	1.93	0.056	-.2124597	15.46301

Total population 65+

The lack of statistical power yielded by the coefficient on this variable could be attributed to the inclusion of the males 65+ variable. Precautions were taken to account for collinerity between the two variables. However, dropping one of the variables was not an option, as past research indicates that both variables are strong determinants of nursing home utilization. The coefficient associated with the total population age 65 and over (measured as a percent) was negatively correlated with per capita bed need in this model, indicating that for a 1% increase in the number of individuals aged 65 and over, there will be a reduction in per capita bed need of 0.12%. In contrast to previous literature, this variable was statistically insignificant in this model. The original hypothesis implied that this independent variable would be positively correlated with per capita bed need.

Males 65+

As mentioned in a previous section of this document, the anticipated effect of the independent variable males age 65 and over, would negatively affect the per capita bed need of nursing homes based on past literature. Previous studies indicated that a reduction in nursing home bed utilization of males in this age group would most likely result, due to the existence of a living female caregiver; however, the variable yielded the opposite effect in this model. The results of the model indicate that for a 1% increase in the percentage of males 65 and over, 1.69% additional per capita nursing home beds are needed. This independent variable was found to be statistically significant at the .05 level.

Poverty County and Poverty 65+

The explanatory variable for the total percentage of individuals in a county living at or below the federal poverty level was found to be statistically insignificant and had a negative effect on the level of per capita bed need. This suggests that for a 1% increase in total poverty (county), the number of beds decreased by .015%.

The variable indicating the percentage of persons age 65 and over living at or below the federal poverty level has a negative coefficient, suggesting that for a 1% increase in poverty for elderly persons in this age group, a percentage decrease by 0.57% in the number of per capita beds needed may be expected. In contrast to the previous variable, this variable is statistically significant at the .05 level. These variables upheld the expectations that the variables would be negatively associated with per capita nursing home bed levels, possibly as a result of access issues.

Educational Attainment

The expected value associated with the two explanatory variables for educational attainment (individuals 65+ with high school diplomas and individuals 65+ with at least a college degree) confirmed the hypothesis pertaining to both of the variables.

For elderly individuals who have achieved at least a high school diploma, the likelihood of institutionalization is diminished. The model suggests that for every 1% increase in the percentage of individuals aged 65 and over with a high school diploma, 1.58% less per capita beds will be needed. This variable was statistically significant at the .05 level. Policy experts could argue that there is an additional benefit to instituting secondary education initiatives, as an increase in the number of diploma holding residents will lead to a reduction in the need for high cost institutionalized care.

As expected, the coefficient associated with individuals achieving at least a college degree was positive, indicating that individuals in this age group who have received at least a college education are more likely to have an impact on the level of per capita beds needed. The model suggests that for a 1% increase in individuals 65 and over with at least a college degree, the percentage of beds needed is expected to increase by .08% beds per capita. It is important to note that this variable was statistically insignificant.

Metropolitan Statistical Areas

The dummy variable used in this model, served as a proxy for rural or urban counties. The expectation was that residing in a county located within a MSA would be positively correlated with the percentage of nursing home beds per capita. However, the model suggests a negative relationship between the percentage of MSA and beds per capita. For every county located with a MSA, a reduction in the number of beds per

capita by .03 will result. In this model, the variable was found to be statistically insignificant.

VII. Conclusions

In response to the question of whether Kentucky's CON process will supply enough beds to meet the demands of a growing population, the answer is uncertain. This uncertainty stems from the lack of a CON process that enables policy experts to estimate and project need for nursing home beds into the future. In efforts to aid public officials in the development of methods for determining the need for nursing home beds, the following projection methods were evaluated: state CON population-based formulas and the establishment of a statistical methodology grounded in past research.

The Certificate of Need formulas analyzed in this study do not provide an accurate assessment of the future needed supply of nursing home facilities, as the formulas did not correctly identify states judged to currently have an oversupply or undersupply of nursing home beds based on median occupancy rates. Furthermore, the use of the formulas to estimate the level of nursing home beds increases the risk of imposing significant additional Medicaid expenditures on states. These additional costs would likely inhibit states' ability to implement effective cost containment strategies, as most states are employing policies aimed at reducing large budget shortfalls attributed to the program.

Finally, based on the results yielded by the two formulas, it is reasonable to suspect that there are other factors that influence the demand for nursing home beds besides population. Building an empirical framework that accounts for indicators of

institutionalization would provide a more accurate picture of the level of nursing home beds within an area.

Upon close examination of the regression model, it is apparent that there are a number of deficiencies within the framework that compromise the generalizibility of the results of this particular model. Due to the fact that several of the independent variables are not close to approaching statistical significance and that the full model has relatively low explanatory power (R^2 of 13%), the development of a model that has stronger predictive power must be undertaken in order to more accurately assess and predict the level of nursing home beds needed within the state. Given the lack of predictive power, the determination was made that the model should not be applied to Kentucky in efforts to project the future level of bed need. Furthermore, one may conclude that the use of the state's current CON formula may be able to satisfy the need for future supply of nursing home beds, given the fact that the state is disperse. Hence, it may be easier for people to obtain nursing home care in a contiguous county, as the bed in that county is closer to them. Future analysis in this area may include the running of a regression that eliminates a few of the variables in this model that were to not be statistically significant indicators of nursing home bed need. Conducting a study that does this may increase the explanatory power of the model of the needed supply of nursing home beds.

A key variable that should be considered in future research is functional status. This variable was not included in this particular model due to an inability to access the data in a timely manner; however, past research indicates that there is a strong correlation between functional status and impairments on entry into a nursing facility.

Another potential drawback of this study is the use of agency records to obtain information about the variables in the proposed models. The use of Census projections presents certain challenges due to the presence of unknown or changing data elements linked across time. For instance, if the model was applied to all Kentucky counties in order to predict the level of bed need, the reliability of data regarding the projected increases in population would need careful assessment.

In order to accurately project the future demand for institutionalized care beds, one would also need to take into account increases in services provided under Home and Community Based Waivers. While HCBS do not currently provide all of the services found in institutionalized settings, efforts have been made to strengthen the services provided under these Waivers. This study did not account for the existence of HCBS within the state and the potential effects of this program on the demand for nursing home beds over time. Furthermore, states may benefit financially from expanding the use of HCBS, as there are often lengthy waiting lists in states, which leads individuals to seek care in more costly institutionalized settings.

It is recommended that state health policy analysts conduct further studies in efforts to 1) assess the impact of the projected increase of the aging population on long-term care services, and 2) develop strategies to effectively and efficiently manage the quality, access and costs of institutionalized services, in order to accurately assess Kentucky's level of preparedness for the future.

APPENDICES

Appendix A

Figure 1: Kentucky's CON Formula

Nursing Home Bed Needs Assessment:

A=B-C

A: The net county nursing facility bed need

B: The number of patients from the applicant's proposed county of location who found nursing facility bed placement in a noncontiguous county as reported in the cabinet's latest Annual Long-Term Care Services Report.

C: The average number of empty beds in the county of application and all counties contiguous to the county of application. The average number of empty beds for a county shall be calculated by multiplying the number of non-state owned and non-continuing care retirement community licensed nursing home beds times the occupancy percentage for the county as reported in the cabinet's latest Annual Long-Term Care Services Report.

*Source: Kentucky Cabinet for Health and Family Services, State Health Plan 2006

Appendix B

Tables H & I: Validity Test Results: Tennessee and Mississippi CON Population-Based Formulas

States	Median Occupancy	Actual # of Beds	Tennessee formula	Difference	Occupancy Test
Alabama	90.5	26354	46314	19960	1.757380284
Alaska	86.4	2023	4812	2789	2.378645576
Arkansas	74.2	24151	29404	5253	1.217506521
Arizona	83.6	36590	36590	0	1
California	89.7	123406	202748	79342	1.642934703
Colorado	84.5	27056	23475	-3581	0.867644885
Connecticut	95	30169	27056	-3113	0.896814611
Delaware	92.1	4200	5537	1337	1.318333333
Florida	92	81645	150562	68917	1.844105579
Georgia	93.6	40112	41775	1663	1.041458915
Hawaii	95.6	4019	9266	5247	2.305548644
Iowa	81	33363	24456	-8907	0.733027605
Idaho	78.1	6065	8406	2341	1.385985161
Illinois	79.8	97458	81364	-16094	0.834862197
Indiana	82.8	47991	38034	-9957	0.792523598
Kansas	81.5	23712	19627	-4085	0.827724359
Kentucky	93.2	25816	25104	-712	0.972420205
Louisiana	76.6	37420	15825	-21595	0.422902191
Massachusetts	93.1	50157	48032	-2125	0.957633032
Maryland	88	29197	33374	4177	1.143062643
Maine	92.2	7368	9874	2506	1.340119435
Michigan	90.5	47102	67183	20081	1.426330092
Minnesota	93.5	35389	34376	-1013	0.971375286
Missouri	75	50211	39211	-11000	0.780924499
Mississippi	92.2	18339	17062	-1277	0.930366977
Montana	77.3	7329	6629	-700	0.904489016
North Carolina	91.8	42968	36399	-6569	0.847118786
North Dakota	94.1	6508	5407	-1101	0.830823602
Nebraska	83.3	15809	11570	-4239	0.731861598
New Hampshire	92	7817	8530	713	1.091211462
New Jersey	90.7	51195	95291	61143	1.861334115
New Mexico	90.7	6909	11259	4350	1.629613548
Nevada	88.3	5360	12069	6709	2.251679104
New York	95.1	120807	133792	12985	1.107485493
Ohio	88	91351	80679	-10672	0.883175882
Oklahoma	67.9	31237	22556	-8681	0.72209239
Oregon	67.3	12696	25275	12579	1.990784499
Pennsylvania	93.3	88878	105542	16664	1.187492968
Road Island	94.9	9044	8909	-135	0.985072977
South Carolina	94.4	17767	25514	7747	1.436033095
South Dakota	95.8	7108	6131	-977	0.86254924
Tennessee	90.8	37215	35465	-1750	0.952975951

Texas	76	115313	110439	-4874	0.957732433
Utah	70.9	7787	11004	3217	1.413124438
Virginia	92.2	31146	42890	11744	1.377062865
Vermont	94.4	3449	4286	837	1.242679037
Washington	89.1	22472	38367	15895	1.707324671
Wisconsin	90.5	38899	39328	429	1.011028561
West Virginia	93.3	10929	13503	2574	1.235520176
Wyoming	86.7	3051	3034	-17	0.994428056

States	Median Occupancy	Actual # of Beds	Mississippi Formula	Difference	Occupancy Test
Alabama	90.5	26354	30914	4560	1.173028762
Alaska	86.4	2023	2176	153	1.075630252
Arkansas	74.2	24151	37424	13273	1.549583868
Arizona	83.6	36590	39799	3209	1.087701558
California	89.7	123406	221078	97672	1.79146881
Colorado	84.5	27056	29009	1953	1.072183619
Connecticut	95	30169	28216	-1953	0.935264676
Delaware	92.1	4200	6042	1842	1.438571429
Florida	92	81645	164075	82430	2.009614796
Georgia	93.6	40112	45391	5279	1.131606502
Hawaii	95.6	4019	10650	6631	2.649912914
Iowa	81	33363	26887	-6476	0.805892755
Idaho	78.1	6065	9207	3142	1.518054411
Illinois	79.8	97458	88952	-8506	0.912721377
Indiana	82.8	47991	41683	-6308	0.868558688
Kansas	81.5	23712	21511	-2201	0.9071778
Kentucky	93.2	25816	27253	1437	1.055663155
Louisiana	76.6	37420	28204	-9216	0.753714591
Massachusetts	93.1	50157	52620	2463	1.049105808
Maryland	88	29197	36397	7200	1.246600678
Maine	92.2	7368	10755	3387	1.459690554
Michigan	90.5	47102	73279	26177	1.555751348
Minnesota	93.5	35389	37751	2362	1.066743903
Missouri	75	50211	42739	-7472	0.851187987
Mississippi	92.2	18339	18510	171	1.009324391
Montana	77.3	7329	7276	-53	0.992768454
North Carolina	91.8	42968	37964	-5004	0.88354124
North Dakota	94.1	6508	5955	-553	0.915027658
Nebraska	83.3	15809	12577	-3232	0.795559491
New Hampshire	92	7817	9318	1501	1.192017398
New Jersey	90.7	51195	66752	15557	1.303877332
New Mexico	90.7	6909	12234	5325	1.770733825
Nevada	88.3	5360	13048	7688	2.434328358
New York	95.1	120807	146040	25233	1.208870347
Ohio	88	91351	87900	-3451	0.962222636
Oklahoma	67.9	31237	24520	-6717	0.784966546
Oregon	67.3	12696	27742	15046	2.185097669
Pennsylvania	93.3	88878	115359	26481	1.297947749
Road Island	94.9	9044	9775	731	1.080827068
South Carolina	94.4	17767	27771	10004	1.563066359
South Dakota	95.8	7108	6739	-369	0.948086663
Tennessee	90.8	37215	38546	1331	1.035765148
Texas	76	115313	119596	4283	1.037142386
Utah	70.9	7787	11954	4167	1.53512264
Virginia	92.2	31146	46680	15534	1.498747833
Vermont	94.4	3449	4685	1236	1.358364743
Washington	89.1	22472	42063	19591	1.871796013
Wisconsin	90.5	38899	43111	4212	1.108280419
West Virginia	93.3	10929	14642	3713	1.339738311
Wyoming	86.7	3051	3297	246	1.080629302

Table J: Additional Costs of Tennessee Population-Based Formula

States	Difference	Percentage of Medicaid Spending	Average Cost of Nursing Home Care	Total additional Expenditure
Alabama	19960	0.71	70,000	992,012,000.00
Alaska	2789	0.83	70,000	162,040,900.00
California	79342	0.66	70,000	3,665,600,400.00
Delaware	1337	0.59	70,000	55,218,100.00
Hawaii	5247	0.75	70,000	275,467,500.00
Maryland	4177	0.61	70,000	178,357,900.00
Maine	2506	0.67	70,000	117,531,400.00
Michigan	20081	0.66	70,000	927,742,200.00
New Jersey	61143	0.65	70,000	2,782,006,500.00
New Mexico	4350	0.67	70,000	204,015,000.00
Nevada	6709	0.62	70,000	291,170,600.00
New York	12985	0.73	70,000	663,533,500.00
Oregon	12579	0.61	70,000	537,123,300.00
South Carolina	7747	0.7	70,000	379,603,000.00
Utah	3217	0.55	70,000	123,854,500.00
Virginia	11744	0.63	70,000	517,910,400.00
Vermont	837	0.66	70,000	38,669,400.00
Washington	15895	0.61	70,000	678,716,500.00

* Percent of Medicaid spending for each state was obtained from Kaiser Family Foundation State Health Facts (Distribution of Certified Nursing Facility Residents by Primary Payer Source 2005)

Table K: Additional Costs of the Mississippi Population-Based Formula

States	Difference	Percentage of Medicaid Spending	Average Cost of Nursing Home Care	Total Additional Expenditure
Arizona	3209	0.64	70,000	143,763,200.00
California	97672	0.66	70,000	4,512,446,400.00
Delaware	1842	0.59	70,000	76,074,600.00
Florida	82430	0.6	70,000	3,462,060,000.00
Hawaii	6631	0.75	70,000	348,127,500.00
Idaho	3142	0.59	70,000	129,764,600.00
Maryland	7200	0.61	70,000	307,440,000.00
Maine	3387	0.67	70,000	158,850,300.00
Michigan	26177	0.66	70,000	1,209,377,400.00
New Jersey	15557	0.65	70,000	707,843,500.00
New Mexico	5325	0.67	70,000	249,742,500.00
Nevada	7688	0.62	70,000	333,659,200.00
New York	25233	0.73	70,000	1,289,406,300.00
Oregon	15046	0.61	70,000	642,464,200.00
Pennsylvania	26481	0.63	70,000	1,167,812,100.00
Utah	4167	0.55	70,000	160,429,500.00
Virginia	15534	0.63	70,000	685,049,400.00
Vermont	1236	0.66	70,000	57,103,200.00
Washington	19591	0.61	70,000	836,535,700.00
West Virginia	3713	0.73	70,000	189,734,300.00

* Percent of Medicaid spending for each state was obtained from Kaiser Family Foundation State Health Facts (Distribution of Certified Nursing Facility Residents by Primary Payer Source 2005)

Appendix C

General Information on Nursing Home Expenditures by Payment Source

Exhibit 1: Sources and Amount of Nursing Home Spending (US)

Public Programs		Private Sector	
Medicaid	48%	Out of pocket (paid by patient)	31%
Medicare	12%	Health insurance	5%
Other	2%	Other private funds	2%
Total	62%	Total	38%

(Source: American Geriatric Society Foundation for Health in Aging, 2005)

Exhibit 2: Distribution of Certified Nursing Facility Residents by Primary Payor Source

Primary Payor Source	Kentucky (%)	United States (%)
Medicaid	71	66
Medicare	13	12
Private/Other	16	22
Total	100	100

(Source: Kaiser Family Foundation. State Health Facts. 2003)

Exhibit 3: Distribution of Certified Nursing Facilities by Ownership Type

Ownership Type	Kentucky (%)	United States (%)
For Profit	68	66
Non-profit	30	28
Government-Owned	2	6
Total	100	100

(Source: Kaiser Family Foundation. State Health Facts. 2003)

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