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AREA DIFFERENCES IN UTILIZATION OF MEDICAL CARE AND MORTALITY
AMONG U.S. ELDERLY

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ABSTRACT

This paper examines 313 U.S. areas for differences in medical care utilization and mortality of whites ages 65-84 in 1990. The variables included in the analysis are education, real income, cigarette sales, obesity, air pollution, percent black, and dummy variables for seven regions and five population size categories from MSAs over 500,000 to not in MSA.

Utilization, especially inpatient care, is strongly positively related to mortality. Mortality is positively related to cigarette sales, obesity, air pollution and percent black. Utilization (especially outpatient) is significantly higher in MSAs with populations greater than 500,000. Mortality does not vary with population size, with or without controls. Florida is an outlier for both utilization (very high) and mortality (by far the lowest of any region). The puzzles of Floridian exceptionalism and the positive relation between white mortality and percent black are discussed but not resolved.

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I. Introduction

The two most important, most enduring questions in health economics are: (1) What are the determinants of expenditures? (2) What are the determinants of health? Extensive research over the last 35 years has produced a variety of answers to these questions, depending in large part on the specific context within which the questions are posed. One crucial distinction is between explaining changes over time and explaining cross-sectional differences at a given time. With regard to secular changes in the U.S. in recent decades, most health economists now believe that advances in medical technology provide the major explanation for both increases in expenditures and improvements in health.[1] With regard to cross-sectional differences, the focus of this paper, there is less agreement. By exploiting a rich body of data from the Center for Medicare and Medicaid Services (formerly HCFA), the U.S. Census of Population, and other sources, we hope to narrow that disagreement, at least with respect to area differences in utilization of care and mortality of the elderly.

Our focus on the elderly is motivated in part by the fact that they account for a disproportionate share of national health care expenditures and an even greater share of government health care expenditures. Moreover, the elderly experience the bulk of the major health problems of the population. Approximately one-half of all deaths occur between ages 65-84, and another one-fourth occur at ages 85 and above. These shares are based on the current age distribution of the U.S. population. For a stationary population experiencing current age-specific mortality rates, deaths at ages 65-84 would still account for almost one-half the total; the share at 85 and above would rise to one-third. The focus on the elderly is facilitated by the fact that the Medicare program generates a large, detailed body of data on utilization and mortality.

One reason for focusing on area differences is that the large number of metropolitan and non-metropolitan areas in the U.S. provides a convenient framework for aggregating individual data in the search for variables that may be related to utilization and mortality. Moreover, many health policy analysts believe that an understanding of area differences may suggest opportunities to limit expenditures and/or improve health (e.g., Wennberg, Fisher, and Skinner, 2001).

This paper has two main sections: utilization and mortality. In most markets an interest in expenditures would require attention to prices as well as quantities, but given universal insurance coverage through Medicare and administrative price setting by HCFA, utilization is a natural subject for study. Mortality is only one of many possible measures of health, but there are several reasons to concentrate on it. First, mortality is by far the most objective measure. Secondly, it is, for most people, the most important health outcome. Thirdly, it is probably significantly correlated with morbidity since most deaths are preceded by illness.

In this paper we focus on "whites", ages 65-84, or more specifically, those not identified as African-American. We exclude blacks because at those ages both utilization and mortality of blacks are higher than for whites and the percentage black in an area is correlated with other variables of interest. Moreover, preliminary research by Donald Nichols suggests that the relationship between those other variables and utilization and mortality may be significantly different for blacks than for whites. We exclude anyone 85 and over because it is more difficult to obtain accurate measures for self-reported variables such as education and income. About one-half the population 85 and over suffer from some form of dementia and about one-fifth are in nursing homes where measurement of income is particularly problematic. Moreover, most nursing home utilization is not covered by Medicare, the source of our data on utilization.

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Briefly, we find wide variation in the utilization of health services across regions. It is not simply that some regions are higher along all dimensions of care, but that in some regions (Florida, for example) there is much more diagnostic testing, even while per capita inpatient services are comparable to the national average. In general, utilization is strongly positively associated with mortality across areas - in other words, areas with more sick elderly use more health care, other things equal.   There remains, however, substantial variation in utilization after controlling for factors such as education, income, and mortality.

Cross-area variations in mortality rates among this elderly group are not as large as variations in utilization, but they are still substantial. The 10 percent of MSAs with the highest mortality (age-sex adjusted) have an average death rate 38 percent greater than the 10 percent of MSAs with the lowest mortality. The comparable differential between the high and low utilization areas is 49 percent.

Education, real income, cigarettes, obesity, air pollution, and the percent black account for more than half of the variation in mortality across areas, but there is still substantial differences across regions unexplained by these variables. Florida, in particular, has death rates significantly below the national average; the differential is particularly large for areas in the southern portion of the state. The final section of the paper explores two puzzles revealed by regression analyses: (1) Why Florida is so different from the rest of the country with respect to utilization and mortality; and (2) Why the presence of more blacks in an area should be associated with higher mortality among elderly whites. We considered several possible solutions to these puzzles, including differential migration patterns of the elderly, but ultimately we are left with conjectures rather than robust explanations.

II. Previous Studies

Spatial Variations in Health Care Utilization

There is an extensive literature on geographic variations in health care spending and how it might be explained; we consider here a selective overview of these studies.

Researchers have documented variations across regions in health care utilization beginning with the studies by Glover in the 1930s, the work by Wennberg and associates in the 1970s and 1980s, and more recent studies by a wide variety of researchers.[2] There is a general consensus that the variations are real and persistent over time. The *Dartmouth Atlas of Health Care* provides extensive documentation of the differences across regions for a variety of utilization measures (Wennberg and Cooper, 1999). In the Atlas studies, regions are defined based on Hospital Referral Regions (HRRs), each of which has at least one hospital with a tertiary cardiovascular or neurological surgical center. The geographical boundary of the HRR is based on the migration patterns of Medicare patients who use the hospitals inside the HRR, of which there are 306 in the U.S. Average 1995-96 fee-for-service Medicare per capita expenditures ranged from $3,506 in Eugene, Oregon, $3,700 in Minneapolis, $7,783 in Miami, to $9,033 in McAllen, Texas; these are all adjusted for age, sex, race, and regional price differences using a variant of the Part B price adjuster. Utilization rates of specific interventions that are not subject to the difficulties of price adjustment also show dramatic variations across regions. These differences are therefore best thought of as differences in quantities – hospital admissions, physician visits, and procedures – for the enrollees who live in each region,

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regardless of where they actually get their care.

Most of the controversy comes in how these variations can be interpreted. One clear possibility is factors related to demand; a sicker population, for example, should lead to greater demand for health care. Health status is clearly a critical determinant of health care utilization. Average annual spending for Medicare beneficiaries with "poor" self-assessed health is $8743, but only $1656 for those in excellent health (Wennberg and Cooper, 1996).

While regional differences in health status are clearly important determinants of health care spending (as we demonstrate below), they do not fully explain the two-fold differences in Medicare spending across regions. Even after accounting for differences across regions in underlying health measures such as stroke, heart attacks, hip fractures, cancer incidence, income, poverty rates, and behavioral factors such as the percentage of smokers and seatbelt users, one cannot explain more than 42 percent of the overall variation across regions in expenditures (Skinner and Fisher, 1997; Skinner, Fisher, and Wennberg, 2001). Longitudinal cohort studies also reveal differences in resource use across both hospitals and regions after controlling for patient health status and function (Chau, Fisher, and Skinner, 2001).[3]

A related "demand" based explanation is that patient preferences (owing to unmeasured illness or preferences for care holding illness constant) determine health care utilization, so that health care resources move to areas with the greatest demand as measured by initial physician visits or other indicators such as health (Escarce, 1992; Escarce, 1993; Folland and Stano, 1989; Green and Becker, 1994). In many of these studies, demand is inferred by the frequency of initial visits to the physician (as opposed to subsequent referrals, which are viewed as supply-driven). It remains an interesting, and largely untested question as to whether visits to physicians reflect

demand (patient preferences) or supply (how often the physician schedules office visits). Clearly, these demand-related factors can potentially explain some of the variation we observe, particularly in Florida where rates of utilization are higher than the rest of the country.

Another explanation is based on the supply of health care resources. The earliest incarnation of this link is "Roemer's Law," which states that if a hospital bed is built, it will be filled. In this view, the pre-existing resource capacity of the area, which arose out of historical accident, in turn determines the intensity of care in the region. In regions with greater supplies of hospital beds, inpatient expenditures are higher. A similar story holds for physician supply; larger populations of physicians per capita are associated with higher levels of per capita physician expenditures (Wennberg and Cooper, 1996, 1999).

However, correlation does not establish causation. One could expect more hospital beds to be built where there is greater demand, and one would expect physicians to move to regions where the demand of physician services is high. Furthermore, the correlations are not very strong. For example, using *Dartmouth Atlas* data, just one-quarter of the variation in Part B (physician) expenditures across the U.S. can be explained by physician supply. And while the supply of specialists in Miami is 45 percent higher than the supply in Minnesota, the number of visits by specialists to people in their last six months of life in Miami is more than 4 times larger. In other words, there appear to be significant nonlinearities in treatment patterns across regions that cannot be explained solely by differences in resource supply.

Another hypothesis, closely related to Wennberg's "practice style" theory is that some physicians show greater "enthusiasm" for specific procedures (Wennberg, Barnes, and Zubkoff, 1982; Chassin, 1993). A recent study surveyed both orthopedic surgeons and referring

physicians with regard to their propensity to perform surgery (in the former case) and their perceptions of outcomes and propensity to refer (in the latter case), and found that these factors were highly significant in explaining overall knee replacement rates in the population, even after controlling for the underlying clinical conditions of the patients (Wright et al, 1999). The study did not, however, test patient preferences conditional on health needs.

A number of studies seeking to explain physician behavior have examined associations between specific physician psychosocial attributes or physician training or practice characteristics (years in practice, diversity of diagnoses managed, specialty) and measures of utilization (Allison, et al, 1998; Franks et al, 2000; Pearson et al., 1995; Selby et al, 1999). Although associations were generally weak, physicians with greater fear of malpractice, anxiety due to uncertainty, and less willingness to take risks were more likely to spend more per patient or more likely to refer. However, the magnitudes of these differences are not large enough to explain, by themselves, the wide regional variation in utilization.

As a statistical proposition, differences in physician enthusiasm by themselves are not enough to generate regional variations. Most regions include a large number of physicians, and if physicians are endowed with differing but randomly distributed levels of enthusiasm, they would average out over the large number of physicians in the area. (Of course, for some surgical procedures, one or two specialists could exert a strong influence on regional rates.) The interesting question therefore is why enthusiasm should be correlated across physicians within a given region.

Finally, factors that operate at the level of the hospital and market are also known to influence spending. Teaching status, membership in multi-hospital chains, degree of

competition, and hospital ownership (e.g. for-profit ownership) have all been associated with differences in resource use (Gray and McNerney, 1986; Kessler and McClellan, 1999; Silverman, Skinner, and Fisher, 1999; Taylor, Whellan, and Sloan, 1999). The extent to which these factors contribute to regional differences in spending is not well understood.

Spatial Variations in Mortality

Spatial variations in mortality have not been studied as extensively as variations in utilization, and many studies have focused heavily on the influence of one or two variables such as air pollution or income inequality. The earliest investigations typically used states or a limited number of MSAs as the units of observation, thus suffering from the problem of few degrees of freedom. (Auster, Leveson, Sarachek, 1969, Morris Silver, 1972) Considerable effort has been devoted to studying the effects of income and education, and to sorting out the relative importance of these closely related variables. Both variables are usually found to be related to mortality, but their importance can vary greatly with age and cause of death. Income, for instance, is much more highly correlated with infant mortality than with deaths at other ages.

Attempts to discover the impact of medical care have produced mixed results (Fuchs-Kramer, 1972; Hadley 1988). More recently, Skinner, Fisher, and Wennberg (2001) used as an instrument physician visits in the last six months. This geographical variable was highly correlated with overall Medicare expenditures but uncorrelated with predicted survival based on regional measures of health. This study found "flat of the curve" effects of Medicare expenditures on survival, at least for the expenditures explained by physician visits in the last six months. Similar results were found using cohort data of heart attack patients controlling for detailed chart data using the Cooperative Cardiovascular Project data (Fisher et al, 2001).

Several studies have found a positive association between air pollution and mortality.[4] More recently, numerous investigators have focused on income inequality (rather than low income per se) as a major cause of higher mortality.[5] In two comprehensive reviews of this literature Deaton (2001) and Deaton and Paxson (1999) critique the theoretical foundations of these studies and their empirical implementations. Deaton's attempts to find evidence of a relation between income inequality and mortality give no support to this popular hypothesis (Deaton and Paxson (2001) and Deaton and Lubotsky (2001)).

III. Data and Estimation Strategy

In this paper utilization is measured using a weighted index of quantities of services. We adopt this approach, instead of using Medicare expenditures, because it sidesteps the difficult problem of deflating Medicare expenditures across regions to "undo" differential payments made by Medicare for the same service in different areas. These differentials are introduced to offset differences in costs experienced by the providers of care and for other reasons. Deflated expenditures are also problematic to the extent that the residents of an area receive services in another area. In such cases, the price index of the area of residence is not the appropriate deflator.[6]

We count the number of specific services received by the resident of an area, regardless of the area where the services were provided. Each detailed service is then weighted by the national reimbursement rate for that service; the sum of the weighted quantities divided by the number of Medicare enrollees is the total utilization for each area. Because this approach relies on billing codes for thousands of detailed services, systematic differences across areas in coding

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could introduce inaccuracies into this measure. Also, services not covered by Medicare are not included.

The year of the study is 1990, with the utilization and mortality measures based on an average of 1989-91. Many of the other measures are obtained from the 1990 Census of Population. There are 224 metropolitan statistical areas (MSAs) with populations exceeding 100,000.[7] In addition, residents of MSAs with less than 100,000 are aggregated to one group within each state and residents outside MSAs are also aggregated to one group per state. The result is 313 areas.[8]

In this paper the areas are aggregated into seven "regions" as follows:

Region	Census Divisions and States
1. North:	New England, Middle Atlantic, and East North Central
2. Upper South:	Delaware, Maryland, D.C., Virginia, and West Virginia
3. Deep South:	North Carolina, South Carolina, Georgia, and East South Central
4. Florida:	Florida
5. West/South:	West South Central
6. Big Sky:	West North Central, Montana, Idaho, Wyoming and Colorado
7. West:	Pacific, Arizona, New Mexico, Utah and Nevada

This regional breakdown was developed by a geographer, Ge Lin, who found it to be more useful than the conventional census regions or divisions in studying disability among the elderly (Lin, 2000). We find this breakdown intuitively appealing, especially for the distinctions it makes among the southern states and among the mountain states and its treatment of Florida as a

separate region.

We also aggregate areas according to their total population size in the following manner
(1) Over 500,000, (2) 250,000 to 500,000, (3) 100,00 to 250,000, (4) Under 100,000 (aggregated
to a single area within a state), and (5) Non MSAs (aggregated to a single area within each state).
When regions and population size are used as dummy variables, the omitted categories are North
and Over 500,000.

IV. Results

Table 1 presents a list of variables included in this paper, giving the short name,
definition, and source. For a fuller explanation of the derivation the utilization measures, see
Appendix A. The utilization measure, mortality, percent high school dropout (LOED), and real
income have all been adjusted for age and sex. Cigarette use and obesity are state measures; the
same value is assigned to every area within each state. Particulate concentration (Pollution) is
only available for MSAs >100,000.

Table 2 provides summary statistics for each variable. The means and standard
deviations are calculated by weighting each area by its share of the population white ages 65-84.
Looking first at the means, we see that inpatient utilization accounts for about two-thirds of the
total and outpatient utilization one-third. Admissions are approximately evenly divided between
medical and surgical. Approximately one-half of total physician utilization is accounted for by
treatment (procedures), about one-third by evaluation and management, and about one-sixth by
diagnostic interventions.

The utilization measure shows considerably more variation across areas than does

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mortality. The relative variation in outpatient utilization is more than double that for inpatient utilization. As between medical admissions and surgical admissions, the former has twice the variation of the latter. Diagnosis has the most variation of the three types of physician services; all three have much greater variation than hospital admissions. This difference may be explained in part by more random variation in the measure of outpatient utilization, which has a smaller mean and is calculated from a smaller sample.

Utilization Indexes By Region and Population Size

Tables 3 and 4 show indexes of utilization for areas grouped by region or population size for various types of utilization. All indexes are based on US=100. All are adjusted for age and sex, and areas are weighted by their population of whites 65-84. The first column of Table 3 shows total utilization is much greater in Florida than in the rest of the country. Utilization is lowest in Big Sky. Across areas grouped by population size, total utilization is highest in the areas with over 500,000 population and, the 250,000-500,000 population group is second highest. The other three categories all have below average utilization, with little difference among them.

Comparisons between indexes for inpatient (INUTIL) and outpatient (OUTUTIL) utilization (Table 3 columns 2 and 3) show many substantial differences, both for regions and population size. Most noteworthy is Florida, where the inpatient index is slightly below the national average, but outpatient utilization is approximately 55 percent above. In Big Sky the direction of difference is reversed; the inpatient index exceeds the outpatient index by more than 20 percentage points. Areas of large population size tend to show relatively more utilization of outpatient care; the reverse is true for MSAs < 100,000 and the areas that are not MSAs.

Substantial regional and population size differences in the indexes for medical admissions and surgical admissions can be seen in Table 4. In Florida, the index for surgical admissions is 15 percentage points higher than for medical admissions; the West region also has relatively more surgical admissions. In the three southern regions, medical admissions tend to be relatively higher than surgical admissions but the only big differential is in the Deep South.

The final utilization comparisons in Table 4 are among three types of physician services: evaluation and management, diagnosis, and treatment (surgical and non-surgical procedures). The differences for Florida are huge, with the index for diagnostic tests 63 percent above the U.S. average while evaluation and management is only 27 percent above. The procedures/treatment index is intermediate at 45 percent above the U.S. average. When only the areas above 100,000 are compared, the differentials are slightly smaller. In Big Sky the diagnostic test index is particularly low: 14 percentage points below the procedures/treatment index in the same region.

Correlations Among The Different Measures of Utilization

Most measures of utilization are positively correlated, suggesting that the forces that influence variation in utilization across areas are stronger than the possibilities for substitution between various types of utilization. For example, the coefficient of correlation between inpatient and outpatient utilization is 0.27, even though there are surely some opportunities for substitution between inpatient and outpatient care. Similarly, although some health problems can be treated either medically or surgically, the correlation between medical admissions and surgical admissions is 0.47. The largest negative correlation , -0.13, is between medical admissions and physicians' diagnostic services. (For a full set of correlation coefficients see Appendix Table B-1).

Mortality Indexes

Table 5 presents mortality indexes for areas grouped by region or by population size. As in the utilization tables, all indexes have been adjusted for age and sex, and areas are weighted by the population of whites 65-84 in those regions. The most striking result is the low mortality in Florida, which is slightly more than 10 percent below the U.S. average. Also below the U.S. average are Big Sky and West regions. The other four regions all have above average mortality with the Deep South experiencing the highest rate, more than 8 percent above the U.S. average. When areas are grouped by population size, the most notable result is that the mortality indexes are approximately the same across all the groups. Apparently despite the many socio-economic and other differences that exist between the large and the small metropolitan and non-metropolitan areas, white death rates at ages 65-84 do not vary with population size.

The second and third columns of Table 5 allow comparisons of mortality between ages 65-74 and 75-84 (adjusted for sex mix). On the whole, the indexes are very similar. The regional rankings of mortality for the two age groups are almost identical. There is a slight tendency for the regional differentials to be smaller at ages 75-84 than at 65-74. When age-adjusted mortality rates for men and women are compared (columns 4 and 5 of Table 5), two substantial regional differentials are evident. In Deep South the relative mortality index is more than 7 percentage points higher for men than for women. In West, the index for men is 6 percentage points lower than for women.

Socioeconomic and Other Indexes

Differentials in socioeconomic and other indexes across areas grouped by population size and region are shown in Table 6. Florida again stands out from the rest of the country in several

respects. The percentage of high school dropouts is the lowest and real income the highest of all the regions. Only the West rivals Florida in having a low percentage of elderly with less than 12 years schooling. By contrast, the percent of dropouts is particularly high in the Deep South. Across the population size groups, the patterns for the percentage of high school dropouts and real income are quite systematic, with the former indexes rising and the latter falling as population size falls.

Regional differences in cigarette use and obesity are not as large as for the percentage with low education and have distinctive patterns of their own. Cigarette use is highest in the Deep South and lowest in the West. Obesity is highest in the North and WestSouth and lowest in Florida. Both cigarette use and obesity are lowest in the two largest population size groups and highest in the three other groups. In this respect, the pattern is similar to that for low educational attainment.

The reasons for including BLACK in the study will become apparent in discussion of the mortality regressions. For the present, we note that this variable has great regional variation, with extremely high rates in the Upper South and Deep South and extremely low rates in Big Sky and West. The index is much above average in the largest metropolitan areas and considerably below average in all the others.

The last variable in Table 6, pollution, is only measured for the MSAs greater than 100,000. The index for the West is 21 percent above the U.S. average; all other regions are below the U.S. average, with the lowest rate in Florida. Across population size groups, the pollution index declines steadily from the largest to the smallest.

<u>Correlations Among Variables</u>

Some variables, such as low education and real income, are highly correlated with one another; the coefficient is –0.61. Low education is also significantly correlated with cigarettes (0.38) and obesity (0.37). All three variables are significantly correlated with mortality: low education (0.49), cigarettes (0.44), and obesity (0.41). For a full matrix of correlation coefficients among all the variables see Appendix Table B-2

<u>Regression Analysis: Utilization</u>

In this section, we consider what factors appear to explain the various measures for utilization. All variables are in natural logs except for the region and population size dummy variables. All regressions are run across the 313 areas and across the 224 MSAs > 100,000. At a theoretical level, the relation between low education and utilization is uncertain. It might be negative because individuals with less than 12 years of schooling might lack information about health care or might have less easy access to care. On the other hand, the relationship might be positive to the extent that those with less education are in worse health and require more care.

The predictive relation between income and utilization is also uncertain. If higher-income individuals are in better health, the relationship might be negative, but the relationship could be positive if there is a strong positive income elasticity of demand for care. Among other considerations, higher-income individuals are more likely to have private insurance that supplements Medicare.

Finally, because poor health usually results in increased utilization of health care, we expect mortality to be positively related to utilization to the extent that mortality is a good indicator of poor health. The relationship could be negative if this effect is outweighed by a

reverse causality running from greater utilization to lower mortality. Because of the possibility

of reverse causality, the parameter estimate for MORT should be regarded as a lower-bound

estimate of the true coefficient.

Table 7 presents regression results for our measure of total utilization for three

specifications. The first includes only the region and population size dummies, the second the

two socioeconomic variables and mortality, and the third all the variables together. The results

for the 224 MSAs are similar to those for the 313 areas and are available in Appendix Table B-3.

Probably the most striking result is the large coefficient for MORT: With all variables included,

it is 0.51 (0.08). Under the reasonable assumption that the mortality rate is a good indicator of

the health of the population, we infer that variation in health status across areas is a major

determinant of health care utilization among whites 65-84. Another notable result is the large

increase in the Florida coefficient when the other variables are added to the regression. All the

population size dummies have significant negative coefficients; that is, utilization is greater in

MSAs larger than 500,000 than in any of the other areas. One likely interpretation is that patients

in large metropolitan areas find it easier to obtain care (because of closer proximity to hospitals

and physicians and the availability of a wide range of specialists).

Table 7 also presents regression results for inpatient utilization and outpatient utilization

for the specification that includes all the variables. The coefficient for mortality is very large for

inpatient care, but much smaller for outpatient care. For Florida, the reverse is true, with a huge

coefficient for outpatient care and a much smaller (but still statistically significant coefficient) for

inpatient care. In contrast, the Big Sky region has a large, statistically significant positive

coefficient for inpatient care and a negative one for outpatient care. Clearly, regions differ both

with regard to overall utilization as well as with respect to specific components of care. Neither low education nor real income are significantly related to utilization after controlling for the other variables. This result may reflect the offsetting theoretical considerations discussed above.

Table 8 presents similar regression results for medical and surgical admission and the three types of physician services. The coefficient for mortality is extremely large for medical admissions, no doubt reflecting the severe illness of many patients with neoplastic, cardiovascular, and cerebrovascular diseases who are admitted to medical services with little hope of altering the final outcome. The mortality coefficient for surgical admissions is less than half that for medical admissions, but still highly significant. In contrast, none of the three types of physician utilization has a mortality coefficient that is significantly different from zero.

The relationship between mortality and utilization reported in this paper is echoed in a study by Frohlich, Fransoo, and Roos (2001) of 12 communities in Winnipeg, Manitoba. They found that age-sex adjusted deaths before age 75 (their "Premature Mortality Rate") was positively correlated with most types of care. However, PMR was not correlated with visits to specialists and negatively correlated with "high profile" procedures such as MRIs, CABGs, hip and knee replacements, and preventive services.

The coefficients for Florida are particularly large for diagnostic and treatment services, smaller but still highly significant for evaluation and management, and smallest for hospital admissions. The Big Sky region has notably large negative mortality coefficients for evaluation and management and diagnostic services and a notably large positive coefficient for medical admissions. In comparisons of utilization across areas grouped by population size, the most striking result is the much higher utilization of evaluation and management and diagnostic

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services in MSAs > 500,000 relative to those with 250-500,000 and especially areas with less

than 250,000 or not MSAs. The only significant result for the socio-economic variables is a

large positive relation between real income and treatment.

Because there may be some causality running from utilization to mortality, we also ran

two-stage least squares regressions. The results are reported in Appendix Table B-5. The

coefficients for predicted Ln mortality are typically much larger than in the OLS regressions, but

the standard errors are also much larger, raising questions about the reliability of the estimates.

Regression Analysis: Mortality

In addition to the dummy variables for region and population size, the mortality

regressions include the percentage of who did not finish high school and mean real income.

Education and income have been shown to exhibit strong associations with mortality. Similarly,

the harmful effects of cigarettes and obesity on health have been well established. Finally, we

also include a variable measuring the fraction of the population that is African-American. We

hypothesize a positive relationship between the percentage black and mortality for two reasons.

First, this variable may be a marker for selective migration; migrants tend to be healthier than

nonmigrants and they may have disproportionately opted for areas with low percentage black. A

second set of reasons involve differences between the areas directly related to the percentage of

African Americans. These differences might take the form of changes in the psychosocial

environment that adversely affected health, or changes the quantity and mix of locally-provided

services.

The mortality regression results are presented in Table 9 in three specifications similar to

those shown for utilization. First we note that the R^2s are considerably higher for mortality than

for utilization regressions. This is despite the fact that none of the population-size dummies are significantly different from zero either when just the geographical dummies are included or when the other variables are entered into the regression. This is unlike the utilization regressions where there is a significant differential between the largest areas and the others.

Inclusion of the other variables results in a significant reduction in the negative coefficients for Big Sky and West. There is also a small reduction in the negative coefficient for Florida. Nevertheless, even after controlling for all the other variables, Florida has a coefficient (relative to North) of -0.096 (0.01). It is the region with by far the lowest mortality. After controlling for the other variables, the highest regional mortality is in the Upper South.

Looking at the other variables we find that the percentage of high school dropouts has a positive coefficient until the geographic variable dummies are entered into the equation. Then the coefficient, while still positive, is not significantly different from zero. In the full regression real income has a negative coefficient which is significantly different from zero. Cigarette use has the expected positive coefficient which becomes larger when the geographic dummies are included. Obesity has the expected positive coefficient but it becomes smaller when the geographic dummies are included. Finally, the percent black has a positive coefficient and also remains relatively unchanged by inclusion of the geographic dummies. In the regressions across the 224 MSAs > 100,000, shown in Appendix Table B-6, the results are similar. In addition, the pollution index has the expected positive coefficient and remains relatively unchanged in the presence of the geographic dummies.

Preliminary efforts to find an effect of income inequality were unsuccessful. In fact, in a variety of specifications, the coefficient for inequality was always negative. Similarly, we found

no evidence of a relationship between religiousity and mortality whether measured by percent of religious adherents or by frequency of church attendance.

V. Two Puzzles

Here we consider two specific puzzles regarding patterns of mortality and utilization. The first puzzle is why the percentage of African-Americans in an area is positively related to the mortality of whites 65-84. The second puzzle concerns the unusually low mortality and unusually high utilization in Florida relative to the rest of the country.

<u>Percent Black and Mortality</u>

Why should the mortality of whites 65-84 be significantly positively related to the percent of the total population of an area that is black? The possible answers fall into two main categories. First, there may be health differences *among the elderly whites* that are correlated with BLACK, differences that are not accounted for by the other variables in the mortality regression. Such differences could arise as a result of selective in- and out-migration under the reasonable assumption that the movers are healthier than the stayers.

Second, there may be differences *among the areas* that are correlated with the white mortality. Some of these differences could take the form of fewer, *locally* provided services or a different mix of services that affect white mortality. Some differences could be psychosocial, such as racial tension or the fear of crime.

In order to learn more about the relationship between percent black and white mortality, we tested to see whether it is stronger in areas of high or low segregation. Using three Cutler-Glaeser measures of segregation – centralization, isolation, and dissimilarity -- we divided the

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areas into equal groups of high segregation and low segregation and ran the basic mortality

regression for each group. In none of the three trials did the coefficient for LnBLACK differ

significantly between the high and the low segregation group. The mean coefficient for the three

high segregation groups regressions was 0.018 and for the low segregation groups 0.022.   It

appears that the relation between BLACK and MORT is about the same for areas of high and low

segregation.

Another attempt to gain insight into the percent black effect produced more significant

results. We divided the 224 MSAs > 100,000 into two equal groups based on the percentage

change in the population of whites 65-74 between 1980 and 1990. The two groups are

designated as "high growth" and "low growth" respectively. We then ran identical, full

specification regressions for each group with the following results for the percent black

coefficient: In the high growth areas, the coefficient is 0.051 (0.010); in low growth areas, the

coefficient is 0.008 (0.009). The fact that percent black is not significantly related to mortality in

the low growth areas suggests rejection of explanations that rely on *differences among the areas*.

 If such differences were causal, it is not easy to see why they would not also be operative in the

low growth areas.

The large coefficient in the high growth areas suggests the possibility of unmeasured

differences in selective migration, with the healthier (or more health conscious) migrants moving

to the areas with lower percent blacks. However, if there is also a selective out-migration, why

doesn't that produce a significant coefficient for BLACK in the low-growth areas? One possible

answer is that much of the out-migration probably comes from a relatively few, very large areas

such as New York, Chicago, Philadelphia, Boston and Detroit whereas the destination of the

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migrants is more dispersed with many going to areas with relatively small populations. This means that the effect of out-migration on the mortality rates of the remaining populations could be much less than the effect of in-migration on mortality rates in the high growth areas.

Floridian Exceptionalism

The data examined in this paper reveal that Florida is exceptional in three respects: (1) Among whites ages 65-84 utilization of care is much higher than in any other region and the differential increases when other variables are introduced as controls; (2) Mortality is by far the lowest in the country; (3) The positive relation between mortality and utilization which is evident in the rest of the country is not present in Florida.

Above average Medicare spending in Florida has been well established in previous studies, e.g., Wennberg and Cooper (1999). Our direct, detailed measures of utilization of services (rather than nominal or deflated Medicare spending) show that the Florida differential from the North of 0.193 (0.021) when only population size is controlled for rises to 0.270 (0.023) when education, real income, and mortality are included in the regression. Depending on the type of care, the size of the Florida differential varies enormously, from 0.058 (0.029) for medical admissions to 0.499 (0.049) for diagnostic services.

With respect to mortality the introduction of other variables reduces the negative coefficient for Florida from –0.134 (0.014) to –0.096 (0.015), but it still remains much larger than Big Sky, the region with the next lowest mortality –0.026 (0.012).

The combination of low mortality and high utilization is one of the most intriguing aspects of Floridian exceptionalism. When total utilization in Florida is regressed on mortality (controlling for education and income, all variables in logs) the coefficient is slightly negative,

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albeit not significantly different from zero. For the country as a whole, including Florida, the coefficient is 0.515 (0.084); when Florida is excluded the coefficient rises to 0.636 (0.092).

In order to gain some insight into Floridian exceptionalism, we examined each Florida MSA > 100,000 separately as shown in Table 10. Predicted levels of utilization and mortality, obtained for each MSA from regressions that exclude Florida, are compared to actual levels, and the percent differential between actual and predicted calculated. We see that utilization is above predicted in every Florida MSA, but the differentials tend to be largest in the southern portion of the state. The mortality differentials also tend to be greatest in the southern MSAs; indeed the three most northern MSAs have actual mortality that is above the levels predicted from the regression. Two exceptions to the north vs. south differences are Daytona Beach and Ocala; these relatively northern MSAs have utilization and mortality differentials that resemble those of the southern MSAs.

Is Florida the only state with exceptional results? To answer this question we examined several other states that have been mentioned in health policy discussions as being unusual with respect to utilization or mortality or both. With methods analogous to those used to obtain the results presented in Table 10, we calculated percentage differentials between actual and predicted values for MSAs > 100,000 in Arizona, Minnesota, Nevada, Oregon, and Utah. The results presented in Table 11, show some differentials, but nothing that comes close to challenging the characterization of Florida as "exceptional."

Another possible explanation for the low mortality rates in Florida is migration. Suppose that people who move to Florida are, on average, healthier than their counterparts who did not move. Given the large share of Florida residents who have moved from other states, one would

expect that Florida would be a very healthy region simply because of this selection effect.

To test this hypothesis, we used the Medicare claims database for 1998 in Miami and Tampa, Florida, two regions with large populations of retirees. We first compared mortality rates of current residents of these areas as a function of where they were living three years previously. The sample was limited to nonblacks aged 68-84, with a cut off of 68 to ensure that we could match Medicare denominator information on zip code of residence from three years before when they were 65. Migrants from the North experience a lower mortality probability (odds ratio equal to 0.80, 95% confidence interval of 0.71 to 0.91), which is consistent with the hypothesis that migrants tend to be somewhat healthier than non-migrants. Migrants from other parts of the country, however, showed if anything slightly elevated mortality rates, although individually the effects were not significant. In any case, the overall influence of recent migrants (during the past 3 years) is minimal with regard to overall mortality rates because the proportion of recent movers – just 4.2 percent of the sample – is so small. Weighting the odds ratios by the proportion of people who migrated implies that the influence of this recent migration on overall mortality rates in the region is to reduce it by only about 0.5 percent.

The three-year window is probably too restrictive. Another approach is to use the first three digits of the individual's Social Security number. For this cohort, Social Security numbers were most likely issued while in their adult years, particularly during the 1940s through the 1960s when eligibility of Social Security gradually expanded to cover most employment sectors. This approach runs the risk of including in the "migrant" category individuals who may have been living in Florida for several decades. In any case, the results do not support the migration explanation; the one-third of the sample who received their Social Security number in Florida

had slightly lower mortality than those who received their number in some other region.

If selective in-migration does not explain low mortality in the southern Florida MSAs, there are two other possibilities that need to be explored. First, the relatively benign climate for most of the year allows the elderly residents to pursue a great deal of physical activity including golf, tennis, swimming, walking, etc. Such activity is undoubtedly conducive to better health. Second, the low mortality in the southern Florida MSAs may result from a high level of social interaction among the elderly, as well as public services directed toward this very large voting bloc. Many of them live in communities populated primarily by other elderly where there is a great deal of eating out together, participating in social functions, and helping one another at times of physical or emotional stress.

Many social critics deplore age-restricted living arrangements and argue that the elderly would derive health and other benefits from interactions with members of younger generations. Reconciliation of these two points of view could lie in the classic quantity-quality trade-off. Holding the quantity of social interaction constant, the social critics may be correct that interactions across generations are more beneficial. But it also may be true that the greater quantity of social interactions in the elderly-segregated communities more than offsets the lower value of a given unit of interaction.

As is apparent from the above discussion, it is much easier to document Floridian exceptionalism than it is to explain it. We do not think that the high utilization is the cause of the low mortality because there is no support for this view in data for the rest of the country. When we tried utilization as a RHS variable in the mortality regression, the coefficient was positive in both OLS and 2SLS specifications. Nor do other studies find in comparisons between Florida

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and other regions that reductions in mortality are attributable to greater levels of care (Skinner, Fisher, and Wennberg, 2001). One "demand-driven" explanation for both high utilization and low mortality is that Floridians are very concerned about health, and this concern may also be expressed in exercise, diet, and other behaviors that are demonstrably linked to longevity, as well as increased demand for medical care.

VI. Summary

This paper examines 313 U.S. areas for differences in medical care utilization and mortality of whites ages 65-84 in 1990. Areas are grouped into seven regions and five groups based on population size. Utilization is measured by direct count of detailed services, weighted by the national reimbursement for each service.

Probably the most noteworthy result of the utilization regressions is the extent to which cross-area variation in utilization is related to variation in mortality. For total utilization, the elasticity is 0.515 (0.084) after controlling for region, population size of area, education and real income. This is a lower-bound estimate; the true coefficient would be larger to the extent that there is a negative relationship running from utilization of care to mortality. The elasticity is especially large for medical admissions, and especially small for physicians' diagnostic services and treatments.

Also noteworthy is the extent to which the well-known propensity for higher utilization in Florida is even larger after controlling for socioeconomic variables and mortality. The coefficient for Florida is 40 percent (eight percentage points) higher when the other variables are in the regression.

A third result worthy of comment is the much higher utilization in MSAs of over 500,000 population relative to other areas. The average differential is about eight percent. Among the other areas there is no strong pattern related to population size. Similarly, there is no consistent pattern for the socioeconomic variables in their relationship to total utilization of care (although see McClellan and Skinner, 1999).

The mortality regressions produced several noteworthy results. First, we find no relationship between mortality and population size. Elderly residents of large MSAs enjoy no advantage in life expectancy over their peers who live in small MSAs or outside MSAs despite the well publicized differentials in the availability of medical care. Secondly, we find a very large negative coefficient for Florida. This region has by far the lowest mortality of any large region regardless of whether or not other variables are controlled for. Cigarette smoking, air pollution, and obesity have their expected positive coefficients. Lastly we note a robust positive relationship between percent black and mortality of whites 65-84. This relationship is particularly strong among areas with above average growth of the elderly population between 1980 and 1990. Among low growth areas, the coefficient is not significantly different from zero. This puzzle, and the exceptional results for Florida for utilization and mortality, require further investigation.

1. See for example Cutler, et al. (1998), Pardes, Manton, and Lander (1999), Currie and Gruber (1996), and Schneider (1999).

2. For an excellent review of some of this earlier literature, see Eisenberg (1986). More recently, see Wennberg and Cooper (1999), Escarce (1992), Green and Becker (1994), Welch, et al. (1994), Chassin, Brook, Park, et al. (1986), and references therein.

3. Cutler and Sheiner (1999) found that regional measures of the age/sex/race composition of the population explained 70 percent of regional differences in (age-sex-race adjusted) Medicare expenditures. The factors providing the additional explanatory power included the age-composition of deaths in the region and the age-specific mortality rates. Here we raise a cautionary note about "ecological fallacy" in which aggregated data are used to make inferences about individual causal pathways, a concern of particular importance to any research on geographic variation (Susser, 1994a, 1994b). For example, the percentage of the elderly population that is Hispanic is predicted to increase regional Medicare expenditures (Cutler and Sheiner, 1999), yet average Medicare expenditures for Hispanics is roughly equal to expenditures for non-Hispanics.

4. See Evans, et al. (1984), Chappie and Lave (1982), and Ozkaynak and Thurston (1987).

5. See Kennedy, et al. (1996), Kaplan, et al. (1996), and Lynch, et al. (1998).

6. The Medicare records define residence as the location where the individual receives Social Security retirement checks.

7. One other MSA > 100,000, St. Cloud, Minnesota, was excluded from the study because of problems with the mortality data.

8. Some states do not have any MSAs with less than 100,000 or do not have any non-MSA residents.

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Table 1. Names, Definitions, and Sources of Variables

TOTUTIL	Total health care utilization per white Medicare enrollee 65-84[a], 1989-1991	HCFA[efg], 1989-1991
INUTIL	Inpatient utilization (including institutional reimbursement and physician services), per white Medicare enrollee 65-84[a], 1989-1991	HCFA[efg], 1989-1991
OUTUTIL	Outpatient utilization (including institutional reimbursement for same day services, physician and misc. services) per white Medicare enrollee 65-84[a], 1989-1991	HCFA[efg], 1989-1991
TOTADM	Weighted total hospital admissions, 1989-1991, per white Medicare enrollee 65-84[a], 1989-1991	HCFA[ef], 1989-1991
MEDADM	Weighted hospital medical admissions, per white Medicare enrollee 65-84[a], 1989-1991	HCFA[ef], 1989-1991
SURGADM	Weighted hospital surgical admissions, per white Medicare enrollee 65-84[a], 1989-1991	HCFA[ef], 1989-1991
TOTPHYS	Total physician utilization (inpatient and outpatient), per white Medicare enrollee 65-84[a], 1989-1991	HCFA[eg], 1989-1991
EANDM	Physician utilization for evaluation and management services (inpatient and outpatient), per white Medicare enrollee 65-84[a], 1989-1991	HCFA[eg], 1989-1991
DIAG	Physician utilization for diagnosis (inpatient and outpatient), per white Medicare enrollee 65-84[a], 1989-1991	HCFA[eg], 1989-1991
TREAT	Physician utilization for procedures/treatment (inpatient and outpatient), per white Medicare enrollee 65-84[a], 1989-1991	HCFA[eg], 1989-1991
MORT	Deaths per 1,000, whites 65-84[a], average 1989-1991	HCFA[e], 1989-1991
LOED	Percent of whites 65-84[a] with less than 12 years of schooling, 1990	U.S. Census of Population, 1990
REALINC	Mean income for whites ages 65-84[a] (1990) deflated by cost of living index[c] (1991)	U.S. Census of Population, 1990
CIGS	Per capita sales by state (packs), average 1984-1989	Tobacco Institute, 1998
OBESE	Percent obese[d] by state, adjusted for race, 1991	Mokdad et al, 1999
POLUTN	Mean PM-10 concentration (particulate matter 10 microns or smaller in diameter, $\mu g/m^3$), average 1990-1994	Shprentz, 1996
BLACK	Percent of total population black, 1990	Area Resource File, 1992

Table 1. Names, Definitions, and Sources of Variables

Notes:

a) Standardized for age and sex

b) HCFA 5% samples (Medpar, Outpatient SAF, BMAD, HHA SAF, Hospice SAF)

c) COL predicted from a regression of U.S. Chamber of Commerce cost-of-living index for 109 metropolitan areas (1991) on standardized wage index and median property values (1990)

d) Body mass index (weight divided by square of height)≥ 30 kg/m^2

e) Hiskew 20% random sample

f) MEDPAR 20% random sample

g) BMAD 5% random sample

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Table 2. Summary Statistics: All Areas
Part A   N=313

| | Mean[a] | St. Dev[a] | C.V.[a] | percentile | | | | MIN | MAX |
				25th	50th	75th			
TOTUTIL	3265	368	11.3	2870	3088	3375		2316	4368
INUTIL	2132	207	9.7	1903	2063	2231		1576	2931
OUTUTIL	1133	254	22.4	930	1051	1169		691	1998
TOTADM	1783	178	10.0	1589	1735	1888		1352	2423
MEDADM	933	138	14.8	793	904	1004		567	1518
SURGADM	849	65	7.7	789	840	889		615	1083
TOTPHYS	1195	237	19.9	975	1096	1226		797	1976
EANDM	400	82	20.5	318	359	397		235	660
DIAG	210	61	29.2	157	185	222		100	460
TREAT	585	120	20.6	488	546	637		377	1011
MORT	38.3	3.1	8.1	36.1	38.8	41.1		29.2	51.8
LOED	0.382	0.098	25.7	0.318	0.388	0.459		0.134	0.691
REALINC	14022	1570	11.2	12772	13995	15373		9473	21105
CIGS	114.7	16.2	14.1	107.3	112.6	124.3		62.4	193.4
OBESE	0.118	0.018	15.1	0.103	0.120	0.132		0.082	0.158
BLACK	0.108	0.088	81.0	0.018	0.061	0.143		0.001	0.425

a) Weighted by population whites ages 65-84

Table 2. Summary Statistics: MSAs > 100,000
Part B   N=224

| | Mean[a] | St. Dev[a] | C.V.[a] | percentile | | | | MIN | MAX |
				25th	50th	75th			
TOTUTIL	3340	388	11.6	2880	3113	3484		2316	4368
INUTIL	2136	215	10.1	1874	2056	2238		1576	2931
OUTUTIL	1204	267	22.2	955	1084	1218		691	1998
TOTADM	1766	179	10.1	1567	1710	1889		1352	2423
MEDADM	906	126	13.9	777	872	980		567	1518
SURGADM	859	71	8.3	787	850	914		615	1083
TOTPHYS	1274	243	19.1	1012	1132	1273		797	1976
EANDM	430	83	19.3	328	373	410		235	660
DIAG	230	63	27.2	165	195	235		117	460
TREAT	613	127	20.8	503	566	652		377	1011
MORT	38.2	3.1	8.2	36.2	38.9	41.3		29.2	51.8
LOED	0.345	0.080	23.2	0.305	0.368	0.425		0.167	0.691
REALINC	14464	1536	10.6	13221	14402	15679		9473	21105
CIGS	112.9	13.8	12.2	107.3	112.6	124.3		62.4	193.4
OBESE	0.116	0.017	14.8	0.103	0.120	0.133		0.082	0.151
POLUTN	29.3	6.1	20.9	23.7	26.4	29.1		17.2	60.4
BLACK	0.124	0.077	62.2	0.028	0.076	0.154		0.001	0.425

a) Weighted by population whites ages 65-84

Table 3. Utilization Indexes[a] for Areas[b] Grouped by Region and Population Size
(US=100)

Part A   N=313   All Areas

	TOTUTIL	INUTIL[c]	OUTUTIL[d]
Region			
North	96.8	97.8	95.1
Upper South	101.2	102.4	98.9
Deep South	102.7	104.8	98.6
Florida	117.5	97.4	155.3
West South	101.8	104.9	95.9
Big Sky	91.8	99.3	77.7
West	101.8	100.3	104.5
Population size			
> 500 K	103.6	101.4	107.9
250-500 K	99.5	95.8	106.4
100-250 K	94.8	95.7	93.2
< 100 K	96.9	100.3	90.5
Not MSA	94.9	99.2	86.7
U.S. Expenditure per enrollee	3265	2132	1133

Part B   N=224 MSAs > 100,000

	TOTUTIL	INUTIL[c]	OUTUTIL[d]
Region			
North	96.1	98.1	92.5
Upper South	100.1	99.2	101.8
Deep South	100.5	102.3	97.1
Florida	116.0	97.2	149.3
West South	101.6	104.9	95.8
Big Sky	93.1	101.6	78.1
West	102.2	102.2	102.0
U.S. Expenditure per enrollee	3340	2136	1204

a) All indexes standardized for age and sex
b) Area values weighted by population whites ages 65-84
c) Includes hospital and physician
d) Includes hospital, physician and misc. services

Table 4. Hospital Admissions Indexes for Areas Grouped by Region and Population Size (US=100)

Part A   N=313   All Areas

	TOTADM	MEDADM	SURGADM	TOTPHYS[a]	EANDM[a]	DIAG[a]	TREAT[a]
Region							
North	98.5	98.8	98.2	94.0	100.1	95.4	89.3
Upper South	102.2	105.4	98.8	98.5	99.6	95.5	98.9
Deep South	107.3	113.5	100.4	92.7	91.0	91.0	94.5
Florida	92.3	84.8	100.7	142.0	126.6	162.8	145.0
West South	105.8	107.0	104.4	97.5	91.7	99.0	101.0
Big Sky	101.1	101.9	100.2	85.3	80.5	77.2	91.6
West	97.8	94.4	101.4	111.2	110.3	104.9	114.0
Population size							
> 500 K	100.0	98.4	101.7	109.0	111.6	112.8	105.8
250-500 K	95.4	91.1	100.1	102.7	96.6	104.4	106.2
100-250 K	96.2	94.0	98.6	92.4	87.7	92.1	95.7
< 100 K	102.1	105.2	98.6	89.5	88.5	83.3	92.4
Not MSA	101.6	105.5	97.3	86.3	84.2	80.5	89.8
U.S. Expenditure per enrollee	1783	933	849	1195	400	210	585

Part B   N=224 MSAs > 100,000

	TOTADM	MEDADM	SURGADM	TOTPHYS[a]	EANDM[a]	DIAG[a]	TREAT[a]
Region							
North	99.4	100.8	98.0	91.7	97.7	93.3	86.9
Upper South	97.7	98.1	97.3	102.1	100.0	101.6	103.8
Deep South	104.6	106.7	102.2	91.5	86.4	90.1	95.6
Florida	92.6	86.3	99.2	136.4	121.7	153.6	140.3
West South	105.7	105.9	105.6	97.6	91.1	97.1	102.3
Big Sky	103.3	105.2	101.4	85.3	81.7	77.6	90.8
West	100.3	99.0	101.7	108.3	108.1	100.7	111.3
U.S. Expenditure per enrollee	1766	906	859	1274	430	230	613

a) Includes inpatient and outpatient
Note: See footnotes a and b to Table 4

Table 5. Mortality Indexes for Areas Grouped by Region and Population Size
(US=100)

Part A   N=313   All Areas

Region	MORT	65-74	75-84	Men	Women
North	102.2	102.3	102.0	101.9	102.5
Upper South	106.4	107.4	105.5	106.3	106.5
Deep South	108.5	109.7	107.5	112.0	104.5
Florida	89.5	90.0	89.2	90.3	88.7
West South	103.9	104.0	103.8	104.3	103.4
Big Sky	94.0	93.2	94.6	95.4	92.4
West	94.0	92.8	94.9	91.0	97.3
Population size					
> 500 K	99.8	99.7	99.9	98.7	101.1
250-500 K	98.1	97.1	98.8	97.8	98.4
100-250 K	100.7	100.6	100.8	101.4	100.0
< 100 K	101.7	102.0	101.4	102.8	100.4
Not MSA	99.8	100.1	99.5	101.6	97.7
Deaths per 1,000	38.31	26.16	59.68	48.95	30.72

Part B   N=224 MSAs > 100,000

Region	MORT	65-74	75-84	Men	Women
North	102.9	103.4	102.6	103.1	102.8
Upper South	104.4	103.8	104.8	103.6	105.2
Deep South	108.7	110.2	107.6	112.0	105.1
Florida	88.9	89.8	88.2	90.5	87.1
West South	104.7	103.5	105.6	105.4	103.9
Big Sky	97.7	96.8	98.3	98.1	97.2
West	94.5	93.4	95.3	92.2	97.1
Deaths per 1,000	38.20	26.03	59.60	48.41	30.92

Note: See footnotes a and b to Table 4

Table 6. Socioeconomic and Other Indexes for Areas Grouped by Region and Population Size (US=100)

Part A N=313 All Areas

	LOED[a]	REALINC[a]	CIGS	OBESE	BLACK
Region					
North	102.2	95.6	102.0	108.0	94.1
Upper South	109.6	107.5	105.9	95.9	167.8
Deep South	131.0	96.3	118.3	97.6	195.2
Florida	73.3	112.3	106.4	83.0	121.6
West South	115.4	104.0	97.3	105.3	126.0
Big Sky	100.1	104.1	94.8	101.0	38.5
West	75.9	100.7	83.9	88.1	48.9
Population size					
> 500 K	88.4	103.3	97.9	98.0	125.5
250-500 K	95.1	103.1	99.4	98.9	78.8
100-250 K	100.4	101.8	100.9	102.2	74.1
< 100 K	116.0	94.0	104.1	102.8	77.4
Not MSA	119.6	94.2	102.2	102.9	68.3
U.S. average	0.382	14,022	114.7	0.118	0.108

Part B N=224 MSAs > 100,000

	LOED[a]	REALINC[a]	CIGS	OBESE	BLACK	POLUTN
Region						
North	109.7	94.8	102.6	109.1	106.6	97.2
Upper South	95.6	118.0	107.1	90.5	203.0	90.2
Deep South	121.4	101.9	118.3	98.3	168.3	99.0
Florida	79.8	108.5	108.1	84.2	105.3	81.7
West South	110.9	108.8	97.6	107.9	118.9	87.3
Big Sky	94.9	103.8	98.8	97.3	64.7	96.4
West	80.9	99.0	85.4	89.1	49.2	120.8
U.S. average	0.345	14,464	112.9	0.116	0.124	29.3

a) Standardized for age and sex
Note: See footnote b to Table 4

Table 7. Utilization Regression Results,
OLS, N=313 (Standard error in parenthesis)

	LnTOTUTIL			Ln INUTIL	Ln OUTUTIL
R^2	0.366	0.090	0.450	0.343	0.652
Upper South	0.053		0.029	0.022	0.036
	(0.025)		(0.025)	(0.024)	(0.037)
Deep South	0.080		0.040	0.027	0.063
	(0.018)		(0.019)	(0.018)	(0.027)
Florida	0.193		0.270	0.113	0.496
	(0.021)		(0.023)	(0.022)	(0.034)
West South	0.064		0.049	0.064	0.021
	(0.019)		(0.020)	(0.019)	(0.029)
Big Sky	-0.028		0.014	0.092	-0.148
	(0.018)		(0.019)	(0.018)	(0.028)
West	0.038		0.091	0.094	0.087
	(0.015)		(0.017)	(0.016)	(0.025)
250-500	-0.064		-0.058	-0.053	-0.065
	(0.020)		(0.019)	(0.018)	(0.027)
100-250	-0.090		-0.090	-0.074	-0.118
	(0.021)		(0.020)	(0.019)	(0.029)
<100	-0.061		-0.060	-0.027	-0.117
	(0.016)		(0.016)	(0.015)	(0.024)
Not MSA	-0.082		-0.079	-0.041	-0.152
	(0.014)		(0.015)	(0.015)	(0.022)
Ln LOED		-0.080	0.036	0.043	0.020
		(0.033)	(0.036)	(0.034)	(0.052)
Ln REALINC		0.151	0.026	-0.032	0.147
		(0.072)	(0.074)	(0.071)	(0.108)
Ln MORT		0.361	0.515	0.694	0.216
		(0.086)	(0.084)	(0.080)	(0.122)
Intercept	8.086	5.247	5.986	5.458	4.853
	(0.009)	(0.730)	(0.763)	(0.729)	(1.113)

Table 8. Utilization Regression Results by Type of Service, OLS, N=313

	Ln MEDADM	Ln SURGADM	Ln EANDM	Ln DIAG	Ln TREAT
R^2	0.526	0.261	0.549	0.570	0.609
Upper South	0.024	-0.019	0.035	0.025	0.076
	(0.031)	(0.020)	(0.040)	(0.054)	(0.037)
Deep South	0.046	0.001	-0.029	0.033	0.064
	(0.023)	(0.015)	(0.030)	(0.040)	(0.028)
Florida	0.058	0.077	0.264	0.499	0.464
	(0.029)	(0.018)	(0.037)	(0.049)	(0.034)
West South	0.063	0.051	-0.030	0.080	0.112
	(0.025)	(0.016)	(0.032)	(0.042)	(0.029)
Big Sky	0.139	0.064	-0.115	-0.138	0.042
	(0.024)	(0.015)	(0.030)	(0.041)	(0.028)
West	0.081	0.067	0.078	0.062	0.242
	(0.021)	(0.013)	(0.027)	(0.036)	(0.025)
250-500	-0.067	-0.013	-0.156	-0.140	-0.039
	(0.023)	(0.015)	(0.030)	(0.040)	(0.028)
100-250	-0.087	-0.036	-0.213	-0.184	-0.083
	(0.025)	(0.016)	(0.032)	(0.042)	(0.029)
<100	0.007	-0.023	-0.196	-0.254	-0.060
	(0.020)	(0.013)	(0.026)	(0.034)	(0.024)
Not MSA	0.009	-0.039	-0.235	-0.280	-0.110
	(0.019)	(0.012)	(0.024)	(0.032)	(0.022)
Ln LOED	0.084	0.013	-0.009	0.064	0.043
	(0.044)	(0.028)	(0.057)	(0.076)	(0.053)
Ln REALINC	-0.147	0.083	-0.126	0.170	0.304
	(0.092)	(0.059)	(0.118)	(0.157)	(0.109)
Ln MORT	1.100	0.466	0.190	-0.116	0.106
	(0.104)	(0.067)	(0.133)	(0.178)	(0.123)
Intercept	4.272	4.250	6.560	4.239	3.046
	(0.945)	(0.605)	(1.212)	(1.618)	(1.122)

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Table 9. Mortality Regression Results, N=313 All Areas

	(1)	(2)	(3)
R^2	0.485	0.521	0.627
Upper South	0.041		0.045
	(0.017)		(0.016)
Deep South	0.064		0.025
	(0.012)		(0.013)
Florida	-0.134		-0.096
	(0.014)		(0.015)
West South	0.019		0.020
	(0.013)		(0.013)
Big Sky	-0.079		-0.026
	(0.012)		(0.012)
West	-0.085		-0.009
	(0.010)		(0.012)
250-500	-0.013		0.001
	(0.013)		(0.012)
100-250	-0.004		0.009
	(0.014)		(0.013)
<100	-0.009		-0.004
	(0.011)		(0.011)
Not MSA	-0.016		-0.010
	(0.009)		(0.011)
Ln LOED		0.076	0.036
		(0.018)	(0.023)
Ln REALINC		-0.141	-0.121
		(0.042)	(0.049)
Ln CIGS		0.098	0.133
		(0.027)	(0.031)
Ln OBESE		0.148	0.111
		(0.024)	(0.025)
Ln BLACK		0.027	0.021
		(0.003)	(0.004)
Intercept	3.671	4.992	4.507
	(0.006)	(0.428)	(0.510)

Table 10. Percent Differential[a] Between Actual and Predicted Values for Florida MSAs > 100,000

Degrees north latitude		TOTUTIL		MORT		Percent Differential	
		Actual	Pred.	Actual	Pred.	TOTUTIL	MORT
30.26	Pensacola	3724	3197	41.1	37.9	16.5	8.4
30.2	Jacksonville	4084	3310	40.5	37.8	23.4	7.0
29.4	Gainesville	3548	3190	42.7	36.7	11.2	16.4
29.11	Daytona Beach	3342	2524	30.7	37.4	32.4	-17.9
29.1	Ocala	3331	2610	33.1	38.8	27.6	-14.7
28.33	Orlando	4074	3120	37.8	37.7	30.6	0.3
28.04	Melbourne	3858	2843	35.8	36.9	35.7	-2.8
28.02	Lakeland	3129	2814	35.0	38.5	11.2	-8.9
27.58	Tampa	3874	2992	35.7	37.5	29.5	-4.7
27.29	Bradenton	3442	2800	36.3	36.7	23.0	-1.1
27.28	Fort Pierce	3661	2690	33.3	37.1	36.1	-10.4
27.2	Sarasota	3667	2478	30.1	35.3	48.0	-14.6
26.42	West Palm Beach	4030	2607	30.2	35.7	54.6	-15.4
26.39	Fort Meyers	3769	2435	29.3	36.9	54.8	-20.5
25.45	Miami	4130	2820	33.0	37.7	46.5	-12.5

a) Calculated by running regressions across 209 MSAs >100,000 (Florida excluded), then predicting utilization and mortality for each Florida MSA using the regression equations and the MSA values, then calculating the percentage differential between observed and predicted.

Table 11. Percent Differential[a] Between Actual and Predicted Values for MSAs >100,000 in Selected States

	TOTUTIL	MORT
ARIZONA		
Phoenix	17.8	-3.6
Tucson	5.7	6.0
Yuma	4.7	1.2
MINNESOTA		
Duluth	-5.8	10.9
Minneapolis	-5.5	-0.7
Rochester	19.5	-4.1
NEVADA		
Las Vegas	-5.0	6.5
Reno	-5.4	0.2
OREGON		
Eugene-Springfield	-6.8	-7.1
Medford	-9.7	-10.3
Portland-Vancouver	-13.6	7.0
Salem	-12.6	-7.4
UTAH		
Provo-Orem	-12.8	7.2
Salt Lake City-Ogden	-24.6	10.5

a) Calculated for each state by running regressions across MSAs >100,000 (excluding the state in question), then predicting utilization and mortality for each MSA in that state using the regression equations and the MSA values, then calculating the percentage differential between actual and predicted.

Appendix Table B1. Coefficients of Correlation[a] Among Ten Measures of Utilization

Part A   N=313   All Areas

	TOTUTIL	INUTIL	OUTUTIL	TOTADM	MEDADM	SURGADM	TOTPHYS	EANDM	DIAG	TREAT
TOTUTIL	1.000	0.748	0.842	0.562	0.420	0.651	0.836	0.728	0.738	0.778
INUTIL	0.748	1.000	0.272	0.947	0.856	0.780	0.338	0.352	0.222	0.314
OUTUTIL	0.842	0.272	1.000	0.046	-0.086	0.310	0.938	0.770	0.890	0.873
TOTADM	0.562	0.947	0.046	1.000	0.947	0.730	0.058	0.103	-0.014	0.051
MEDADM	0.420	0.856	-0.086	0.947	1.000	0.472	-0.087	0.027	-0.134	-0.122
SURGADM	0.651	0.780	0.310	0.730	0.472	1.000	0.346	0.227	0.250	0.400
TOTPHYS	0.836	0.338	0.938	0.058	-0.087	0.346	1.000	0.873	0.910	0.915
EANDM	0.728	0.352	0.770	0.103	0.027	0.227	0.873	1.000	0.807	0.630
DIAG	0.738	0.222	0.890	-0.014	-0.134	0.250	0.910	0.807	1.000	0.736
TREAT	0.778	0.314	0.873	0.051	-0.122	0.400	0.915	0.630	0.736	1.000

a) Weighted by population whites ages 65-84

Appendix Table B1. Coefficients of Correlation[a] Among Ten Measures of Utilization

Part B   N=224   MSAs > 100,000

	TOTUTIL	INUTIL	OUTUTIL	TOTADM	MEDADM	SURGADM	TOTPHYS	EANDM	DIAG	TREAT
TOTUTIL	1.000	0.751	0.847	0.588	0.484	0.623	0.861	0.727	0.724	0.813
INUTIL	0.751	1.000	0.285	0.954	0.888	0.828	0.391	0.411	0.213	0.373
OUTUTIL	0.847	0.285	1.000	0.086	-0.011	0.238	0.935	0.725	0.879	0.880
TOTADM	0.588	0.954	0.086	1.000	0.950	0.833	0.141	0.192	0.006	0.141
MEDADM	0.484	0.888	-0.011	0.950	1.000	0.619	0.051	0.193	-0.056	-0.002
SURGADM	0.623	0.828	0.238	0.833	0.619	1.000	0.267	0.143	0.117	0.359
TOTPHYS	0.861	0.391	0.935	0.141	0.051	0.267	1.000	0.857	0.892	0.911
EANDM	0.727	0.411	0.725	0.192	0.193	0.143	0.857	1.000	0.776	0.601
DIAG	0.724	0.213	0.879	0.006	-0.056	0.117	0.892	0.776	1.000	0.706
TREAT	0.813	0.373	0.880	0.141	-0.002	0.359	0.911	0.601	0.706	1.000

a) Weighted by population whites ages 65-84

Appendix Table B2. Coefficients of Correlation[a] Among Utilization, Mortality and Other Variables

<u>Part A   N=313   All Areas</u>

	TOT UTIL	MORT	LOED	REAL INC	OBESE	BLACK	CIGS
TOTUTIL	1.000	0.119	-0.145	0.191	-0.158	0.383	0.055
MORT	0.119	1.000	0.490	-0.275	0.411	0.398	0.443
LOED	-0.145	0.490	1.000	-0.610	0.366	0.067	0.379
REALINC	0.191	-0.275	-0.610	1.000	-0.193	0.287	-0.136
OBESE	-0.158	0.411	0.366	-0.193	1.000	-0.081	0.209
BLACK	0.383	0.398	0.067	0.288	-0.081	1.000	0.262
CIGS	0.055	0.443	0.379	-0.136	0.209	0.262	1.000

a) Weighted by population whites ages 65-84

Appendix Table B2. Coefficients of Correlation[a] Among Utilization, Mortality and Other Variables

Part B   N=224

	TOT UTIL	MORT	LOED	REAL INC	OBESE	BLACK	CIGS	POLUTN
TOTUTIL	1.000	0.001	-0.170	0.143	-0.153	0.244	0.096	0.302
MORT	0.001	1.000	0.526	-0.216	0.531	0.395	0.403	0.086
LOED	-0.170	0.526	1.000	-0.547	0.474	0.127	0.336	-0.012
REALINC	0.143	-0.216	-0.547	1.000	-0.149	0.287	0.048	-0.214
OBESE	-0.153	0.531	0.474	-0.149	1.000	0.085	0.311	-0.040
BLACK	0.244	0.395	0.127	0.287	0.085	1.000	0.391	-0.047
CIGS	0.096	0.403	0.336	0.048	0.311	0.391	1.000	-0.273
POLUTN	0.302	0.086	-0.012	-0.214	-0.040	-0.047	-0.273	1.000

a) Weighted by population whites ages 65-84

	LnTOTUTIL			Ln INUTIL	Ln OUTUTIL
R^2	0.309	0.043	0.418	0.343	0.581
Upper South	0.037		0.021	0.003	0.058
	(0.036)		(0.037)	(0.034)	(0.055)
Deep South	0.053		0.011	0.006	0.022
	(0.027)		(0.027)	(0.025)	(0.040)
Florida	0.197		0.289	0.121	0.533
	(0.024)		(0.028)	(0.026)	(0.041)
West South	0.063		0.043	0.063	0.010
	(0.026)		(0.028)	(0.026)	(0.042)
Big Sky	-0.020		0.012	0.090	-0.146
	(0.028)		(0.027)	(0.025)	(0.040)
West	0.056		0.115	0.108	0.130
	(0.017)		(0.021)	(0.019)	(0.031)
250-500	-0.062		-0.055	-0.049	-0.062
	(0.021)		(0.019)	(0.018)	(0.029)
100-250	-0.087		-0.083	-0.066	-0.116
	(0.022)		(0.021)	(0.019)	(0.031)
Ln LOED		-0.090	0.025	-0.004	0.073
		(0.047)	(0.048)	(0.044)	(0.072)
Ln REALINC		0.093	0.066	-0.035	0.232
		(0.094)	(0.102)	(0.095)	(0.153)
Ln MORT		0.186	0.627	0.799	0.343
		(0.114)	(0.106)	(0.099)	(0.159)
Intercept	8.083	6.441	5.172	5.053	3.624
	(0.010)	(0.921)	(1.019)	(0.948)	(1.526)

Appendix Table B4. Utilization Regression Results by Type of Service, OLS, N=224 MSAs > 100,000

	Ln MEDADM	Ln SURGADM	LnEANDM	LnDIAG	LnTREAT
R^2	0.452	0.289	0.410	0.443	0.615
Upper South	-0.017	-0.041	0.040	0.034	0.137
	(0.044)	(0.029)	(0.061)	(0.079)	(0.052)
Deep South	0.006	0.003	-0.091	-0.037	0.057
	(0.032)	(0.021)	(0.044)	(0.058)	(0.038)
Florida	0.046	0.091	0.274	0.511	0.527
	(0.033)	(0.022)	(0.045)	(0.059)	(0.039)
West South	0.056	0.050	-0.036	0.022	0.132
	(0.033)	(0.022)	(0.046)	(0.060)	(0.039)
Big Sky	0.129	0.060	-0.130	-0.170	0.060
	(0.032)	(0.021)	(0.044)	(0.058)	(0.038)
West	0.085	0.084	0.107	0.089	0.284
	(0.024)	(0.016)	(0.034)	(0.044)	(0.029)
250-500	-0.060	-0.011	-0.154	-0.131	-0.038
	(0.023)	(0.015)	(0.032)	(0.041)	(0.027)
100-250	-0.073	-0.033	-0.205	-0.171	-0.085
	(0.025)	(0.016)	(0.034)	(0.045)	(0.029)
Ln LOED	-0.001	-0.002	0.012	0.078	0.072
	(0.056)	(0.038)	(0.078)	(0.102)	(0.067)
Ln REALINC	-0.144	0.109	-0.105	0.293	0.244
	(0.120)	(0.080)	(0.167)	(0.217)	(0.142)
Ln MORT	1.162	0.613	0.174	0.081	0.330
	(0.125)	(0.084)	(0.174)	(0.226)	(0.148)
Intercept	3.924	3.447	6.436	2.371	2.815
	(1.200)	(0.803)	(1.672)	(2.173)	(1.422)

Appendix Table B5. Utilization Regression Results, Two-Stage Least Squares
(standard error in parenthesis)

Part A   N=313 All Areas

	Ln TOTUTIL	Ln INUTIL	Ln OUTUTIL
R^2	0.422	0.246	0.637
Upper South	0.018	0.022	0.009
	(0.027)	(0.025)	(0.040)
Deep South	0.028	0.027	0.032
	(0.021)	(0.020)	(0.031)
Florida	0.295	0.114	0.557
	(0.029)	(0.027)	(0.043)
West South	0.045	0.063	0.011
	(0.020)	(0.019)	(0.031)
Big Sky	0.030	0.092	-0.109
	(0.022)	(0.021)	(0.033)
West	0.105	0.094	0.122
	(0.020)	(0.019)	(0.030)
250-500	-0.054	-0.053	-0.054
	(0.019)	(0.018)	(0.029)
100-250	-0.087	-0.074	-0.111
	(0.020)	(0.019)	(0.030)
<100	-0.053	-0.027	-0.100
	(0.017)	(0.016)	(0.025)
Not MSA	-0.070	-0.041	-0.128
	(0.017)	(0.016)	(0.025)
Ln LOED	0.015	0.042	-0.031
	(0.039)	(0.037)	(0.058)
Ln REALINC	0.034	-0.032	0.166
	(0.075)	(0.071)	(0.112)
Pred. Ln MORT	0.758	0.703	0.811
	(0.185)	(0.174)	(0.276)
Intercept	5.000	5.424	2.438
	(1.020)	(0.961)	(1.525)

Note: First stage used to predict regressions can be found in Table 9

Appendix Table B5. Utilization Regression Results, Two-Stage Least Squares
(standard error in parenthesis)
Part B   N=224 MSAs > 100,000

	Ln TOTUTIL	Ln INUTIL	Ln OUTUTIL
R^2	0.381	0.260	0.528
Upper South	0.000	-0.007	0.017
	(0.041)	(0.036)	(0.065)
Deep South	-0.022	-0.009	-0.043
	(0.031)	(0.027)	(0.049)
Florida	0.369	0.156	0.687
	(0.038)	(0.033)	(0.060)
West South	0.031	0.058	-0.013
	(0.031)	(0.027)	(0.049)
Big Sky	0.036	0.100	-0.098
	(0.030)	(0.026)	(0.048)
West	0.153	0.124	0.204
	(0.025)	(0.022)	(0.040)
250-500	-0.042	-0.043	-0.038
	(0.022)	(0.019)	(0.034)
100-250	-0.072	-0.061	-0.095
	(0.023)	(0.020)	(0.037)
Ln LOED	-0.048	-0.036	-0.067
	(0.056)	(0.049)	(0.089)
Ln REALINC	0.063	-0.037	0.225
	(0.112)	(0.097)	(0.177)
Pred. Ln MORT	1.332	1.106	1.702
	(0.229)	(0.198)	(0.362)
Intercept	2.549	3.907	-1.438
	(1.339)	(1.160)	(2.116)

Note: First stage used to predict regressions can be found in Table 9

Appendix Table B5. Utilization Regression Results, Two-Stage Least Squares (standard error in parenthesis)

Part A   N=313 All Areas, cont.

	Ln MEDADM	Ln SURGADM	Ln EANDM	Ln DIAG	Ln TREAT
R^2	0.450	0.204	0.544	0.564	0.608
Upper South	0.023	-0.029	0.019	0.001	0.080
	(0.033)	(0.021)	(0.043)	(0.057)	(0.039)
Deep South	0.044	-0.010	-0.047	0.007	0.069
	(0.025)	(0.017)	(0.033)	(0.044)	(0.030)
Florida	0.060	0.100	0.301	0.551	0.455
	(0.035)	(0.023)	(0.046)	(0.061)	(0.042)
West South	0.063	0.048	-0.036	0.071	0.114
	(0.025)	(0.016)	(0.032)	(0.043)	(0.030)
Big Sky	0.141	0.079	-0.091	-0.105	0.036
	(0.027)	(0.018)	(0.035)	(0.047)	(0.032)
West	0.082	0.080	0.099	0.092	0.236
	(0.024)	(0.016)	(0.031)	(0.042)	(0.029)
250-500	-0.067	-0.009	-0.150	-0.131	-0.040
	(0.024)	(0.015)	(0.031)	(0.041)	(0.028)
100-250	-0.086	-0.033	-0.208	-0.178	-0.084
	(0.025)	(0.016)	(0.032)	(0.043)	(0.030)
<100	0.008	-0.017	-0.186	-0.240	-0.063
	(0.021)	(0.014)	(0.027)	(0.036)	(0.025)
Not MSA	0.010	-0.030	-0.220	-0.260	-0.114
	(0.021)	(0.013)	(0.027)	(0.036)	(0.024)
Ln LOED	0.082	-0.006	-0.039	0.021	0.051
	(0.047)	(0.031)	(0.062)	(0.082)	(0.056)
Ln REALINC	-0.147	0.090	-0.115	0.187	0.301
	(0.092)	(0.060)	(0.119)	(0.159)	(0.109)
Pred. Ln MOR′	1.123	0.684	0.553	0.392	0.011
	(0.225)	(0.147)	(0.293)	(0.391)	(0.268)
Intercept	4.181	3.366	5.087	2.176	3.432
	(1.246)	(0.812)	(1.617)	(2.162)	(1.481)

Note: First stage used to predict regressions can be found in Appendix Table B6

Appendix Table B5. Utilization Regression Results, Two-Stage Least Squares
(standard error in parenthesis)
Part B   N=224 MSAs > 100,000, cont.

	Ln MEDADM	Ln SURGADM	Ln EANDM	Ln DIAG	Ln TREAT
R^2	0.358	0.229	0.394	0.419	0.587
Upper South	-0.024	-0.053	0.012	-0.008	0.111
	(0.044)	(0.031)	(0.065)	(0.086)	(0.056)
Deep South	-0.004	-0.015	-0.136	-0.102	0.016
	(0.034)	(0.023)	(0.050)	(0.065)	(0.043)
Florida	0.071	0.133	0.380	0.666	0.626
	(0.041)	(0.028)	(0.060)	(0.079)	(0.052)
West South	0.052	0.044	-0.052	-0.002	0.117
	(0.033)	(0.023)	(0.049)	(0.065)	(0.042)
Big Sky	0.137	0.073	-0.097	-0.121	0.090
	(0.033)	(0.023)	(0.048)	(0.064)	(0.042)
West	0.098	0.105	0.158	0.164	0.331
	(0.027)	(0.019)	(0.040)	(0.053)	(0.034)
250-500	-0.056	-0.004	-0.137	-0.107	-0.023
	(0.023)	(0.016)	(0.035)	(0.046)	(0.030)
100-250	-0.069	-0.027	-0.191	-0.150	-0.072
	(0.025)	(0.017)	(0.037)	(0.049)	(0.032)
Ln LOED	-0.024	-0.041	-0.085	-0.064	-0.018
	(0.061)	(0.042)	(0.090)	(0.118)	(0.077)
Ln REALINC	-0.145	0.107	-0.110	0.285	0.240
	(0.121)	(0.084)	(0.178)	(0.235)	(0.153)
Pred. Ln MOR´	1.385	0.989	1.113	1.456	1.199
	(0.247)	(0.172)	(0.365)	(0.481)	(0.313)
Intercept	3.096	2.044	2.941	-2.750	-0.423
	(1.445)	(1.005)	(2.132)	(2.815)	(1.833)

Note: First stage used to predict regressions can be found in Appendix Table B6

Appendix Table B6. Mortality Regression Results, N=224, MSAs > 100,000

	(1)	(2)	(3)
R^2	0.473	0.517	0.645
Upper South	0.011		0.055
	(0.022)		(0.023)
Deep South	0.056		0.043
	(0.017)		(0.018)
Florida	-0.147		-0.088
	(0.015)		(0.017)
West South	0.017		0.051
	(0.016)		(0.016)
Big Sky	-0.053		0.004
	(0.017)		(0.016)
West	-0.087		-0.008
	(0.011)		(0.016)
250-500	-0.012		0.008
	(0.013)		(0.012)
100-250	-0.006		0.016
	(0.014)		(0.013)
Ln LOED		0.115	0.021
		(0.025)	(0.029)
Ln REALINC		-0.031	-0.178
		(0.055)	(0.064)
Ln CIGS		0.088	0.142
		(0.039)	(0.044)
Ln OBESE		0.169	0.138
		(0.032)	(0.036)
Ln POLUTN		0.057	0.045
		(0.021)	(0.024)
Ln BLACK		0.024	0.026
		(0.005)	(0.006)
Intercept	3.672	3.879	4.900
	(0.006)	(0.578)	(0.692)