FACTORS INFLUENCING THE LOCATION AND DISTRIBUTION OF PHYSICIANS IN THE NORTHEASTERN U.S.

Sam M. Cordes and Richard J. Blair

ABSTRACT

Regression analysis was used to analyze the geographic distribution of physicians in the Northeastern U.S. The ratio of general practitioners (GP's) to population, and specialists to population was calculated for each of the 299 counties in the region. The independent variables were categorized into three types of factors: economic, professional, and quality-of-life.

Results indicated that both types of physicians responded similarly to economic and quality-of-life variables, but responded differently to professional considerations. This suggests that the urban concentration of specialists vis-a-vis GP's is due primarily to the relative importance of professional considerations to specialists. Policy implications and directions for further research are presented.

INTRODUCTION AND OBJECTIVES

Government officials and others involved in health care policy are continually expressing concern over the availability and accessibility of medical care services in rural areas [Davis and Marshall; U.S. Congress]. The National Health Service Corps, a variety of loan forgiveness programs, rural preceptorship programs, the Indian Health Service, and the Hill-Burton program are just some of the manifestations of this concern. Of particular concern is the fact that the distribution of physicians is highly skewed in favor of urban areas. Specifically, the nation's most urban counties (counties in Standard Metropolitan Statistical Areas with 5,000,000 inhabitants or more) have approximately five times as many active, nonfederal medical doctors (M.D.'s) in patient care per 100,000 population as do the most rural counties (nonmetropolitan counties with less than 10,000 inhabitants) [Goodman, p. 16]. The success of such policies and programs as the National Health Service Corps and the various loan forgiveness programs is dependent upon isolating and thoroughly understanding those factors influencing physician location and distribution. Although a considerable amount of work has been directed toward gaining a better understanding of these factors, much additional research is needed.

In view of this need, the major objective of this article is to examine the intercounty distribution of both general practitioners (GP's) and specialists in the Northeastern U.S.

Sam M. Cordes is Associate Professor and Richard J. Blair is a former Research Assistant in the Department of Agricultural Economics and Rural Sociology, The Pennsylvania State University.

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REVIEW OF PREVIOUS WORK AND ITS LIMITATIONS

Two different research approaches have been used in attempting to isolate those factors influencing where a physician chooses to locate. One approach involves sampling physicians and collecting from them relevant primary data, such as why they chose their current place of practice. The second approach uses a geographic entity as the unit of analysis (e.g., states or Standard Metropolitan Statistical Areas), and amasses appropriate secondary data on the specific areas included in the study. This data base must, of course, include the number of doctors as the dependent variable. The set of independent variables included varies considerably, depending upon the researcher's theoretical framework and the availability of data. The first approach deals more directly with the question of physician motivation, but is limited by the accuracy of physician recall and other problems (including cost) associated with primary data collection. Although the second approach enables a large body of data to be collected rather inexpensively, its obvious limitation is that the identification of patterns of correlation does not mean that these patterns are causal.

In order to gain a better understanding of the factors influencing where a physician locates, a number of refinements are needed in both of the approaches. This study builds upon the second research approach mentioned above, but differs in at least four important ways from other studies which have used the same approach.

First, the county has not usually been used as the unit of analysis. Exceptions include Radtke's study in the Pacific Northwest, Perkinson's study of Michigan, and a Kansas study by Marshall, et al. Although the choice of the geographical unit of analysis is somewhat arbitrary, it is interesting to note that units as small as census tracts [Elesh and Schollaert; Kaplan and Leinhardt; Robertson] and as large as states [Benham et al.; Scheffler] have been used. In general, it would seem neither of these two units would approximate "medical service areas" as well as would either counties or selected groupings of counties such as Standard Metropolitan Statistical Areas (SMSA's). Although several studies have used SMSA's as the unit of analysis [Joroff and Navarro; Marden; Miller et al.; Reskin and Campbell], these studies obviously cannot address the issue of the distribution of physicians between rural and urban areas.

The second contribution of this study is that it is for the Northeastern U.S. To the authors' knowledge this is the first study of physician distribution patterns in this unique 299-county region[1]. Indeed, with the exception of the Radtke study, the entire notion of a regional analysis is missing.

The third important aspect of the study is that it disaggregates the total number of physicians in each county into two components: GP's and specialists. There are two reasons why such a division seems essential. One reason is that on a priori grounds alone there would be reason to suspect that different factors would have differing effects on the location decision of these two distinct types of physicians. The other reason relates directly to the rural-urban maldistribution of physicians. In particular, the data in Table 1 show quite clearly that the uneven distribution of office-based physicians[2] between rural and urban areas is due almost entirely to the uneven distribution of specialists. In fact, most rural areas fare somewhat better than urban areas in terms of the number of GP's per 100,000 population. With three exceptions, studies that have examined physician distribution patterns by type of physicians have focused on the interurban distribution of physicians [Elesh and Lazarz; Elesh and Schollaert; Marden; Miller et al.; Reskin and Campbell; Robertson]. In terms of the three exceptions [Ball and Wilson; Benham et al.; Scheffler], the data used are quite dated (1962, 1960, and 1963-67, respectively), and unlike the present study of the geographical unit of analysis was not the county. More importantly, a number of potentially important explanatory variables were not included in the analysis. Finally, the study by Benham et al. was plagued by a high degree of multicollinearity among the independent variables.

The fourth contribution of this study is that it makes an attempt to consider simultaneously the effect of economic, professional, and quality-of-life factors in explaining patterns of physician distribution. Other studies focus on only one [Rimlinger and Steele; Scheffler] or at most two [Ball and Wilson; Benham et al.; Elesh and Schollaert; Kaplan and Leinhardt; Marden; Perkinson; Reskin and Campbell; Robertson] of these factors.

AN EXPLORATORY ANALYSIS OF THE EFFECT OF POPULATION SIZE

In terms of the specific economic variables to include in such a study, even the lay economist would surmise that variation in the population of counties would have a profound impact on variations in the demand for physician's care. The data in Table 1 indicate that after controlling for population size considerable variation exists in the geographic distribution of specialists, but relatively little variation exists in the case of GP's. Although the data are suggestive, they are limited in that they are not for the Northeast nor do they indicate the amount of variation in the number of physicians per 100,000 population within each of the county groups.

Better insights can be gained by regressing the number of GP's and specialists in each county in the Northeast against population size. When a linear function was specified, both relationships were found to be positive and the effect of population was highly significant ($P < .01$). However, as suspected, the percent of the variation explained was greater for GP's than for specialists (.96 as compared to .69)[3]. Although impressive statistically these results leave two questions unanswered. First, does the strong impact of population size reflect only an economic or demand-influencing effect or is it also serving as a proxy for non-economic phenomenon, e.g., the quantity and quality of cultural

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[1]The Northeastern U.S. is defined in this study to include Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont and West Virginia. Although referred to as a 299-county region, it actually consists of 298 counties and the independent city of Baltimore.

[2]Hospital-based physicians account for 27 percent of all actively-practicing physicians in patient care (Goodman). Approximately 92 percent of these physicians are specialists and their inclusion would further increase the rural-urban disparity. In the subsequent analysis hospital-based physicians are excluded, although they were included in the original study from which this article was developed. However, in that study it became apparent that a model for explaining the distribution of hospital-based physicians (most of whom are likely to be on a salaried basis) is likely to be quite different from a model that explains the distribution of office-based physicians.

[3]Different types of specialists require different minimum population bases to become economically viable, e.g., neurosurgeons or thoracic surgeons may require a population base of at least 100,000 while a general surgeon or an internist may require a population base of 10,000 or less. Because of this phenomenon a nonlinear function of the form $Y = a + bX + cX^2$ was also used to examine the relationship between number of specialists (Y) and population size (X). This specification did not increase appreciably the percent of variation explained.

Table 1. Distribution of Nonfederal Office Based Physicians in the U.S. by Specialty and County Classification, 1976.

County Classification	Number of Office-Based Physicians Per 100,000 Population: General Practitioners	Specialists	Total
Nonmetropolitan counties with 0-9,999 inhabitants	29.7	9.1	38.8
Nonmetropolitan counties with 10,000-24,999 inhabitants	28.9	17.2	46.1
Nonmetropolitan counties with 25,000-49,999 inhabitants	26.3	39.9	66.2
Nonmetropolitan counties with 50,000 or more inhabitants	22.7	57.6	80.3
Counties considered potential SMSA's	18.9	73.3	92.2
Counties in SMSA's with 50,000 to 499,999 inhabitants	19.9	80.1	100.0
Counties in SMSA's with 500,000 to 999,999 inhabitants	18.0	84.1	102.1
Counties in SMSA's with 1,000,000 to 4,999,999 inhabitants	18.9	97.1	116.0
Counties in SMSA's with 5,000,000 or more inhabitants	22.7	109.4	132.1

Table 2. Distribution of Counties in the Northeastern U.S. by Physician-Population Ratio, 1970.

Number of Physicians Per 100,000 Population	Number of Counties: General Practitioners	Number of Counties: Specialists	Percent of Counties: General Practitioners	Percent of Counties: Specialists
0-15	27	54	9.0	18.1
16-30	199	48	66.6	16.0
31-45	59	55	19.7	18.4
46-60	9	50	3.0	16.7
61-75	4	38	1.4	12.7
76-90	1	18	.3	6.1
91-105	0	13	0.0	4.3
106-120	0	11	0.0	3.7
More than 120	0	12	0.0	4.0

	Unweighted Mean	Range	Standard Deviation
General Practitioners	26	0-85	11
Specialists	50	0-412	43

amenities and/or medical facilities? Second, what explains the additional variation that is not accounted for by population alone? The simple regression analysis previously noted indicates that at least with specialists this additional variation is considerable (unexplained variance = .31), and the data in Table 1 suggest that it is this unexplained variance that accounts for the uneven distribution of physicians between the nation's rural and urban areas.

Table 2 provides a somewhat different format for examining the relative importance of population size in explaining the intercounty distribution of GP's and specialists in the Northeast. This table shows the percent of counties in the Northeast that fall within each of nine different ranges of physician-population ratios. As expected, there is a much greater variation among counties in the specialist-population ratio than is true with GP's. For example, in the case of GP's, two-thirds of all counties fell within a single range of ratios (16-30 GP's per 100,000 population). In the case of specialists, no single range of ratios accounted for even one-fifth of the counties.

In sum, population size appears to be an extremely important variable in explaining the distribution of physicians--especially GP's. However, other factors must also be analyzed to gain a fuller and more policy-relevant understanding of the location decisions of physicians.

SPECIFICATION OF A MORE COMPLETE MODEL

Based on a review of the literature, the general model specified for this study is:

$$Y = f(X_i; Z_i; W_i),$$

where Y is the number of physicians in a county; X_i is a set of factors influencing the demand for physician services in the county; Z_i is a set of factors related to the professional appeal of the county; and W_i is a set of factors related to "quality-of-life" in the county. Linear multiple regression is used to test the model.

Operationalizing the Dependent Variable

Conceptually, the dependent variable can be specified in two ways--in terms of the absolute number of physicians in a county or as a physician-population ratio. If the absolute number of physicians is used then the population of the county must be entered as an independent variable. There are at least three reasons for preferring the ratio approach. First, in a policy sense the uneven distribution of physicians between rural and urban areas is almost always couched in terms of the variation in physician-population ratios. Second, in terms of statistical considerations population size is usually highly correlated with other relevant independent variables such as income. This problem of multicollinearity often suppresses the statistical significance of other independent variables. Hence, if population size can be removed as an independent variable by using the ratio approach the multicollinearity problem is reduced. Third, the statistical problem of heteroscedasticity can also be reduced by using a ratio approach. If, instead, the absolute number of physicians is used as the dependent variable, the variance of this variable would likely be larger among the more populated counties. This will, of course affect the efficiency of the regression coefficients. Given the above limitations of specifying the dependent variable in absolute terms, the dependent variables were specified as:

Y_1 = number of specialists per 100,000 population

Y_2 = number of GP's per 100,000 population

Data for these two variables were obtained from the 1970 annual tabulation of the American Medical Association and include only office-based, actively-practicing, nonfederal medical doctors engaged in direct patient care [Haug, et al.].

Operationalizing the Independent Variables

As noted earlier, the independent variables are divided into three categories. One category (variables X_1 through X_5) includes economic factors that may affect physician location, and the second category (variables Z_1 and Z_2) includes factors related to professional considerations. The third category includes variables W_1 and W_2 which are proxies for "quality-of-life." The complete listing of these nine variables follow.[4] [5]

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[4]The following independent variables were included inititally in the analysis: percent of population below the poverty level; percent of population female; population per square mile; percent of population employed in forestry, fisheries, mining and construction; and number of medical schools. These variables added little to the explanatory powers of the regressions, but created a considerable multicollinearity problem. Hence, they were dropped from the analysis. The strongest intercorrelation among the nine remaining independent variables was associated with MEDINC. The R^2 value was .72 when MEDINC was regressed against the other eight independent variables. The major contributor to this R^2 value was EDUCATION (r=.71) and 65YRS (r=.62). Despite these correlations, MEDINC was retained as an independent variable because of its conceptual importance. However, the multicollinearity effects did supress the importance of MEDINC in the GP regression. Specifically, when EDUCATION was deleted, MEDINC became statistically significant (in the direction hypothesized) at the 5 percent level (t=2.93). However, the R^2 for the equation dropped from .23 to .18.

[5]1970 Bureau of the Census data were used for independent variables X_1 - X_5 and W_1. 1970 data for independent variables Z_1 and Z_2 were

X_1 = Median family income (MEDINC). As with other goods and services it is expected that higher incomes will increase the effective demand for physician services. It is hypothesized that a positive relationship exists between X_1 and Y.[6]

X_2 = Percent of population under age five (5YRS). Because of childhood diseases and post-natal care, it is expected that this age group will demand a higher amount of services relative to most other age groups. It is hypothesized that a positive relationship exists between X_2 and Y.

X_3 = Percent of population age 65 and over (65YRS). This age group has a high need for physician services because of diseases and other medical needs associated with older age. Due to their participation in Medicare it should be relatively easy to translate this need into effective demand. It is hypothesized that a positive relationship exists between X_3 and Y.

X_4 = Percent of population nonwhite (NONWHITE). Because of the high percentage of physicians that are white, and various types of racism that are alleged to be inherent in the medical care delivery system there may be a reluctance by nonwhites to use the services of physicians. It it hypothesized that a negative relationship exists between X_4 and Y.

X_5 = Median education attainment (EDUCATION). Previous studies have shown that persons with low educational levels may not demand as much physician service as those with high educational levels. It is hypothesized that a positive relationship exists between X_5 and Y.

Z_1 = Number of hospitals per square mile (HOSPMI). This variable is used to measure the accessibility, within a county, of basic hospital support services. For obvious reasons physicians would be expected to be attracted to areas where the network of hospitals is extensive. Hence, it is hypothesized that a positive relationship exists between Z_1 and Y.

Z_2 = Whether or not the county has a hospital with over 200 beds (HOSP>200BEDS). Typically, a hospital with over 200 beds is sufficiently large to offer a wide range of relatively sophisticated services. It is hypothesized that the presence of such a hospital will be important to the specialist but <u>not</u> to the GP. This measure is entered as a dummy variable, where a county without a hospital having more than 200 beds is assigned a value of zero; counties with such a hospital are assigned a value of one.

W_1 = Population of the largest incorporated place in each county (POPLGSTPLACE). This variable is included as a proxy for measuring on a continuous scale "quality-of-life" as related to physicians' personal and family-related needs and life-style. The implicit assumption is that this aspect of quality-of-life and size of population increase simultaneously. It is hypothesized that a positive relationship exists between W_1 and Y.

W_2 = Distance in miles from the largest incorporated place in the county to the nearest incorporated place over 25,000 population (DISTT025,000POP). If the largest incorporated place in the county is over 25,000 then W_2 is set equal to zero. This variable is a proxy for the distance to a community with an "adequate" but modest "quality-of-life." Implicit in this assumption is that it takes a community of at least 25,000 population to provide an adequate "quality-of-life." It is hypothesized that a negative relationship exists between W_2 and Y.

Results

<u>Specialists</u>

The regression model explained 48 percent of the variation in the number of specialists per 100,000 population, and five of the nine independent variables were found significant (in the direction hypothesized) at the 5 percent level (Table 3). Three of these variables were those hypothesized to be important in influencing effective demand; MEDINC, 65YRS, and EDUCATION.

The two noneconomic variables found to be statistically significant in the direction hypothesized were #HOSPMI and HOSP>200BEDS. It is not surprising to find the specialist-population ratio strongly related to the accessibility of both basic hospital services as well as the presence of more sophisticated professional support.

Contrary to expectations, neither of the quality-of-life variables (POPLGSTPLACE and DISTTO25,000,POP) was found to be significant in the direction hypothesized. This unexpected finding suggests that specialists do <u>not</u> find quality-of-life, as measured here, better in larger-sized places, provided smaller places can provide them with adequate income and professional support. Of course the problem, at least from the perspective of those living in smaller communities, is that these communities are frequently unable to provide adequate income and professional support to specialists. Hence, the sign of the zero order correlation coefficient is positive for POPLGSTPLACE, and negative for DISTTO25,000POP.

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taken from Haug <u>et al</u>. Data for independent variable W_2 was derived from the 1970 Census and the 1970 Rand McNally highway atlas.

[6]Throughout this section, Y has reference to both specifications (Y_1 and Y_2) of the dependent variable.

Table 3. Y_1 = Physician-Population Ratio, Office-Based Specialists.

	Regression Coefficient (b)	t-Value*	Beta Coefficient (β)	Zeta-Order Correlation (r)
Constant	-86.818			
Economic Factors				
X_1=Median family income (MEDINC)	.00592	3.328	.27	.39
X_2=Percent < five years (5YRS)	-3.4297	1.361	-.07	-.22
X_3=Percent $\geq$ 65 years (65YRS)	3.2808	3.132	.19	.00
X_4=Percent nonwhite (NONWHITE)	.37002	1.225	.06	.21
X_5=Median education (EDUCATION)	4.7875	1.850	.12	.34
Professional Factors				
Z_1=Number of hospitals per square mile (#HOSPMI)	140.08	6.670	.38	.42
Z_2=Hospital > 200 beds (HOSP>200BEDS)	36.100	7.460	.41	.53
Quality of Life Factors				
W_1=Population of largest place (POPLGSTPLACE)	-.00002	2.070	-.12	.30
W_2=Distance to place over 25,000 (DISTTO25,000POP)	.13899	1.676	.10	-.31

*10% = 1.282, 5% = 1.645, 1% = 2.576

R^2 = .48.

General Practitioners

Only 23 percent of the variation in the GP-population ratio was explained by the model, and only two of the hypothesized variables were statistically significant (in the direction hypothesized) at the 5 percent level (Table 4). These findings are not particularly surprising when it is remembered that the GP-Population ratio exhibits relatively little variation (Table 2). Both of the significant variables were those hypothesized to be of importance in influencing effective demand: 65YRS and EDUCATION. It should be remembered that both of the economic variables were also significantly related in a positive direction to the specialist-population ratio.

As with specialists, neither of the quality-of-life variables was found to be statistically significant in the direction hypothesized. However, in terms of professional factors GP's and specialists did differ in that these factors were not statistically significant for GP's. This difference likely reflects the greater importance that specialists, vis-a-vis GP's, place on access to and the sophistication of hospital facilities. Another possible explanation is that the clustering of specialists around sophisticated medical support systems means GP's may locate elsewhere to avoid the competition of specialists. This possibility was tested by introducing the specialist-population ratio as an independent variable. The introduction of this variable had virtually no effect on the percent of variance explained nor was the variable statistically significant at the 5 percent level.

Conclusions, Implications, and Limitations

The three major conclusions stemming from

Table 4. Y_2 = Physician-Population Ratio, Office-Based General Practitioners.

	Regression Coefficient (b)	t-Value*	Beta Coefficient (β)	Zeta-Order Correlation (r)
Constant	-24.614			
Economic Factors				
X_1=Median family income (MEDINC)	.00034	.620	-.06	-.14
X_2=Percent < five years (5YRS)	-.50263	.661	-.04	-.19
X_3=Percent $\geq$ 65 years (65YRS)	1.5454	4.892	.36	.37
X_4=Percent nonwhite (NONWHITE)	.14470	1.588	.10	-.03
X_5=Median education (EDUCATION)	3.4771	4.480	.35	.10
Professional Factors				
Z_1=Number of hospitals per square mile (#HOSPMI)	1.4177	.224	.02	.03
Z_2=Hospital > 200 beds (HOSP>200BEDS)	-2.2538	1.544	-.10	-.17
Quality of Life Factors				
W_1=Population of largest place (POPLGSTPLACE)	-.00000	0.0	-.03	-.03
W_2=Distance to place over 25,000 (DISTTO25,000POP)	.05347	2.138	.15	.20

*10% = 1.282, 5% = 1.645, 1% = 2.576

R^2 = .23

the results of this study revolve around the similarities and differences between GP's and specialists. First, both types of physicians appear to distribute themselves in response to economic stimuli, with population size being the major economic determinant--especially in the case of GP's. Second, specialists, unlike GP's, are influenced to a considerable extent by the availability of sophisticated supportive facilities.

Third, in terms of personal and family needs (i.e., quality-of-life) neither type of physician finds it necessary to practice in or near large sized places, *ceteris paribus*. However, a disproportionately large number of specialists actually practice in these areas. This suggests that the ambivalence of specialists toward large urban areas in terms of personal and family needs is more than offset by the attractiveness of these areas in terms of professional considerations (i.e., more sophisticated supportive facilities). This offsetting circumstance would not be expected to affect GP's in the same manner because the need for sophisticated supportive facilities appears to be relatively unimportant. Hence, it is not surprising that the geographic distribution of GP's is relatively uniform (Table 1).

The implication that relatively small towns are *not* unattractive to physicians in terms of quality-of-life is quite contrary to established doctrine [Fuchs; Mechanic]. In addition to the results of this study, two simple questions can be posed which suggest that this "established doctrine" may be erroneous or greatly over-emphasized. First, if rural areas are patently unattractive in terms of quality-of-life, then why do they typically have at least as many GP's per 100,000 population as the more urban areas? Second, in the case of specialists, if rural areas are *patently* unattractive, why have those rural communities that have been blessed with sophisticated supportive facilities had little trouble attracting specialists? Examples include Marshfield, Wisconsin (16,955 persons, 159 specialists); Danville, Pennsylvania (6,205 persons, 198 specialists); Sayre, Pennsylvania (6,990 persons, 73 specialists); Wenatchee, Washington (17,850 persons, 62 specialists); Tupelo, Mississippi (23,817 persons, 63 specialists); and Madisonville, Kentucky (17,619 persons, 52 specialists)[7]. The ratio of specialists to population in these rural communities is greater than in most urban areas. In addition, a very recent study indicates that a variety of different types of specialists are beginning to locate with increasing frequency in nonmetropolitan communities (Swartz, et al.).

Policy Implications

Results of this study, when combined with recently enacted and probable future policy initiatives suggest a narrowing of the uneven distribution of physicians between rural and urban areas. Of particular importance is the recent increase in the percent of medical school graduates who are general or family practitioners. At least in the past, a disproportionately large share of these physicians, unlike specialists, located in rural areas. Another important policy initiative is national health insurance which continues to loom on the horizon. National health insurance will translate unmet medical care needs into effective demand, and the extent of unmet needs is generally thought to be higher in rural areas vis-a-vis urban areas, because of such factors as lower per capita incomes in rural areas and the lower likelihood of rural persons having private health insurance. Should national health insurance not be enacted, then direct subsidies or income guarantees to physicians--especially general and family practitioners--could likely be used to entice additional physicians into rural areas.

In the case of specialists, economic incentives would have to be accompanied by efforts to make rural areas more attractive in terms of their supportive facilities. This could turn into an expensive proposition and should be carefully assessed relative to such alternatives as (1) "circuit-riding" specialists (2) telecommunication linkages between medical schools and rural areas and (3) improved and innovative transportation systems so rural persons have easier access to specialty services in urban areas.

Limitations of Study

Several major limitations of this study should be noted. First, the focus was on the present stock of physicians which includes those who established their present practice 40 years ago or more. It is somewhat hazardous to infer that those factors which correlate highly with the present stock of physicians will also be causal in determining the location of future medical school graduates--especially since the complexion of medical classes is changing dramatically as efforts are made to recruit more racial minorities and women. A model that simultaneously analyzes the stock of physicians as well as their flows is badly needed.

Another limitation is that this study is for the Northeast and generalizing the findings--especially those related to quality-of-life--to other regions must be done with considerable caution. For example, it may be that a physician would prefer not to live in an urban area, ceteris paribus, but it does not follow that he or she would prefer to live 200 miles from an urban area. Unfortunately, this study cannot address this question because remoteness of this magnitude does not exist in the Northeast. Replication in other regions--especially in the Great Plains and Far West--therefore seems desirable. Additional research which analyzes the geographic distribution of specific specialities is also needed. This study showed very clearly that specialists and GP's were influenced differently by the various explanatory variables. However, even the GP-specialist dichotomy is quite crude and there is every reason to suspect that what effects the location of a pediatrician, for example, will not have the same effect on a neurosurgeon.

Finally, care must be taken to prevent a preoccupation with the geographic distribution of physicians. The immediate concern should be with access to medical care; and such access does not require an even distribution pattern for physicians--especially with the recent growth in the number of nurse practitioners and other types of "new health practitioners." Moreover, concern should ultimately extend beyond medical care to the more fundamental issue of health. Medical care is but one factor influencing health status, and it is likely to be relatively unimportant compared to such factors as adequate nutrition and individual life style.

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[7]Population data are 1977 estimates from the U.S. Bureau of the Census. Specialist data are from the 1979 American Medical Directory (Chicago: American Medical Association). The specialist figures reflect only physicians who are actively engaged in direct patient care (e.g., physicians who were administrators were eliminated from the tally). The specialist category includes internists, obstetricians, gynecologists, pediatricians, and general surgeons. These five specialists are sometimes labelled "primary care specialists" and are differentiated from "super specialists." If this is done, then the number of "super specialists" in the six communities noted are: Marshfield (108), Danville (84), Sayre (44), Wenatchee (36), Tupelo (38), and Madisonville (28).

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