

General Hospital and Nursing Home Beds in Urban and Rural Areas

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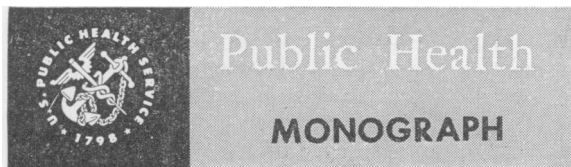
HOSPITAL and other medical facilities are distributed in particular patterns. Understanding the existing distribution patterns and the factors producing or accompanying them is an important step toward planning for facilities properly distributed to meet health needs.

This report analyzes the relative availability of general hospital and nursing home beds in terms of counties classified according to their urban or rural character. Within this framework it examines the distribution of beds in relation to per capita income, proportion of older people, and supply of medical personnel. This approach permits a more detailed examination of rural-urban differences than was possible through analysis of such differences based on general hospital service areas (1).

The study is based in part on data on general hospitals submitted for 1953 in State hospital plans for the Hospital Survey and Construction (Hill-Burton) Program. Information on skilled nursing homes was obtained in a 1954 national survey conducted by the Public Health Service. Detailed explanation of these and other data used in this report is given in Public Health Monograph No. 44.

Urban-Rural Classification

For the purpose of identifying the existing distribution patterns of beds in general hospitals and nursing homes, the county is a useful analytical unit, although it does not necessarily constitute a "trading area" in actual use of health facilities. However, ready statistical information pertaining to population and socioeconomic characteristics is available on a county basis. It is through correlation with such information that the distribution patterns of medical resources become understandable.



No. 44

The accompanying article supplements and reexamines, from another avenue of approach, the ground covered in Public Health Monograph No. 44, published concurrently with this issue of Public Health Reports. The monograph analyzes the availability of general hospital and nursing home beds in the framework of general hospital "service areas," which correspond to trading areas for hospital services. The authors are health program analysts with the Division of Hospital and Medical Facilities, Public Health Service.

Readers wishing the more extensive analysis may purchase copies of the monograph from the Superintendent of Documents, Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and of the major universities, and in selected public libraries..

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Solon, Jerry, and Baney, Anna Mae: General hospitals and nursing homes: Patterns and relationships in their geographic distribution. Public Health Monograph No. 44 (Public Health Service Publication No. 492). 56 pages. Illustrated. U. S. Government Printing Office, Washington, D. C., 1956. Price 40 cents.

The county classification system used here was first developed in the 1946 American Academy of Pediatrics study of child health services (2) and was brought up to date on the basis of 1950 data by Pennell and Altenderfer (3). In this classificatory scheme, size of population and nearness to densely populated areas determine the designation of each county as:

Greater metropolitan. Counties included in any one of 14 "standard metropolitan areas" of 1,000,000 population or more. A "standard metropolitan area" consists of a county, or group of adjoining counties, which forms an integrated economic and social unit around a central city or cities of 50,000 or more (4).

Lesser metropolitan. Counties included in "standard metropolitan areas" of less than 1,000,000 population.

Adjacent. Counties that touch a metropolitan county as defined above.

Isolated semirural. Any other county containing at least one incorporated place of 2,500 or more population.

Isolated rural. Counties having no incorporated community of 2,500 or more.

This urban-rural characterization of counties has an especially significant application to the manner in which medical facilities are distributed. The metropolitan and adjacent counties represent areas served by, or readily accessible to, medical facilities available in larger urban centers. The isolated counties, however, do not have easy accessibility to a metropolitan center and are therefore usually limited to the generally less comprehensive medical services which can be secured locally.

Table 1 shows the number of counties in each of the urban-rural categories and the corre-

sponding distribution of population. One-third of the counties in the United States, those identified as metropolitan and adjacent, with nearly three-fourths of the population, are accessible to the medical resources concentrated in large urban centers. The remaining two-thirds of the counties, designated as isolated, with about one-fourth of the population, are comparatively remote from the medical facilities of metropolitan centers.

Distribution of Beds

Metropolitan counties have the most general hospital beds, averaging over 4 per 1,000 population (table 2). Isolated rural counties have the fewest, with an average of less than 2 per 1,000 population.

Isolated semirural counties have relatively more general hospital beds (3.8 per 1,000 population) than do counties adjacent to metropolitan areas (2.8 per 1,000). Obviously, the location of a county adjacent to metropolitan medical services reduces the need for beds in the county proper.

Beds in skilled nursing homes show a somewhat different pattern of distribution (table 2). Metropolitan and adjacent counties have, proportionately, about equal numbers of nursing home beds (average of 1.3 to 1.4 per 1,000 population). The availability of nursing home beds diminishes as the counties become more rural (isolated semirural counties, 0.9 per 1,000 population, and isolated rural counties, 0.4 per 1,000).

Table 1. Distribution of counties and their population by urban-rural character of county, 1950

Character of county	Number of counties	Population	Percentage distribution	
			Counties	Population
All counties.....	3, 076	150, 697, 361	100. 0	100. 0
Metropolitan and adjacent.....	1, 020	109, 272, 372	33. 2	72. 5
Greater metropolitan.....	71	44, 946, 386	2. 3	29. 8
Lesser metropolitan.....	204	40, 631, 787	6. 6	27. 0
Adjacent.....	745	23, 694, 199	24. 2	15. 7
Isolated.....	2, 056	41, 424, 989	66. 8	27. 5
Semirural.....	1, 160	33, 177, 227	37. 7	22. 0
Rural.....	896	8, 247, 762	29. 1	5. 5

SOURCE: Based on data in reference 3.

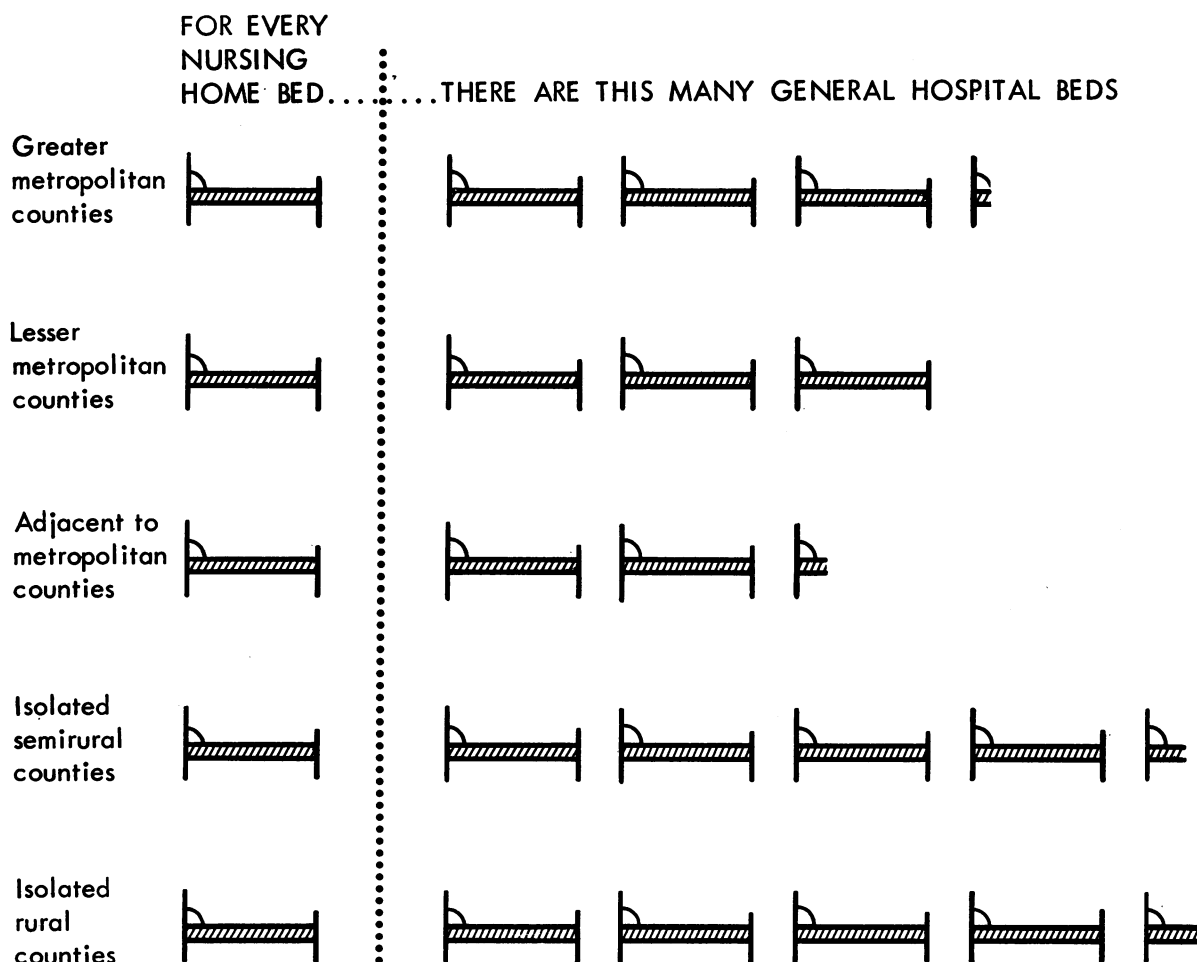
Table 2. Availability of beds in general hospitals and skilled nursing homes, by urban-rural character of county

Character of county	Number of beds		Beds per 1,000 population ²	
	General hospitals, 1953	Nursing homes, 1954 ¹	General hospitals	Nursing homes
All counties.....	564, 826	180, 000	3. 7	1. 2
Metropolitan and adjacent.....	425, 168	147, 700	3. 9	1. 4
Greater metropolitan.....	185, 738	59, 800	4. 1	1. 3
Lesser metropolitan.....	172, 524	58, 000	4. 2	1. 4
Adjacent.....	66, 906	29, 900	2. 8	1. 3
Isolated.....	139, 658	32, 300	3. 4	. 8
Semirural.....	125, 042	29, 000	3. 8	. 9
Rural.....	14, 616	3, 300	1. 8	. 4

¹ Partly estimated, based on actually reported 6,531 homes and 171,106 beds.

² Based on 1950 population, as shown in table 1. Ratios derived from sums of populations and beds of counties in respective groups.

Figure 1. Ratio of general hospital beds to skilled nursing home beds, by urban-rural character of county, 1953-54.



Nationally, there is one skilled nursing home bed for every 3.3 general hospital beds. Figure 1 expresses the relationship between the availability of general hospital beds and skilled nursing home beds in the several types of counties. One skilled nursing home bed is available in metropolitan counties for every 3.0 general hospital beds; in adjacent counties, for every 2.2; and in isolated counties, for every 4.3 general hospital beds.

Areas surrounding metropolitan counties thus are comparatively favored in the location of nursing homes. They maintain proportionately as many nursing home beds as do the neighboring metropolitan counties, on an average, although their supply of general hospital beds is much below that of the metropolitan counties. This suggests a differential geographic pattern of development between general hospitals and nursing homes. The greater concentration of both hospitals and nursing homes in urban areas as opposed to rural areas may be explained in large part on the basis of economic factors. Nursing homes, in addition, have developed to a greater extent in urban areas as a consequence of the distinctive housing and family living arrangements characteristic of cities. They have, however, gravitated largely to the fringes of the cities, whereas hospitals have tended to be centrally located. Differential land values have been a strong factor in inducing nursing homes to locate away from expensive in-city sites, particularly in seeking larger tracts of land to provide some grounds

around the home. This phenomenon has probably come about through the conversion to nursing homes of certain types of residences typically found in more outlying residential areas.

All of the patterning observed in the foregoing data represent central tendencies within a wide range of bed availability. In fact, among themselves, the counties of any one urban or rural type show a broad range of availability of beds.

Interrelationship in Availability of Beds

As we have noted in treating each of the types of counties as a whole, the distributions of beds in general hospitals and nursing homes are similar in some respects and dissimilar in others. Of further interest is the question of how the relative volumes of beds correspond within individual counties.

Table 3 presents the average availability levels of beds in skilled nursing homes for counties with different levels of supply of general hospital beds. Despite some tendency for levels of nursing home beds to increase with increasing supplies of general hospital beds, many departures from such a pattern occur. Furthermore, the counties represented within any one group by the given bed ratio are actually quite dispersed in their individual ratios. (The low degree of correspondence between the county supply levels of beds in general hospitals and nursing homes is reflected in a simple correlation coefficient of .09.)

Table 3. Relative availability of beds in skilled nursing homes, by level of availability of beds in general hospitals within each urban-rural county type, 1953-54

General hospital beds per 1,000 population in county	Average nursing home beds per 1,000 population					
	All counties	Greater metropolitan	Lesser metropolitan	Adjacent to metropolitan	Isolated semirural	Isolated rural
Total.....	1.2	1.3	1.4	1.3	0.9	0.4
None.....	0.8	2.2	1.0	0.9	0.6	0.5
Less than 1.0.....	.4	.6	.7	.8	.1	.1
1.0-1.9.....	.8	1.0	1.3	1.0	.5	.3
2.0-2.9.....	1.0	1.1	.9	1.2	.7	.5
3.0-3.9.....	1.2	1.3	1.2	1.4	.8	.3
4.0-4.9.....	1.4	1.4	1.5	1.7	.9	.3
5.0-5.9.....	1.1	.9	1.5	1.0	1.3	.1
6.0-6.9.....	1.3	1.6	1.4	1.3	1.1	.2
7.0 and over.....	1.4	1.5	1.5	1.4	1.1	.2

Table 4. Availability of beds in general hospitals and skilled nursing homes, by per capita income of county, by urban-rural county type, 1953-54

Per capita income of county, 1950	Total population ¹	Number of beds		Beds per 1,000 population	
		General hospitals	Nursing homes	General hospitals	Nursing homes ²
All counties.....	150, 697, 361	564, 826	171, 106	3. 7	1. 2
Less than \$500.....	4, 526, 178	5, 962	520	1. 3	0. 1
\$500-\$999.....	31, 416, 731	78, 496	16, 661	2. 5	. 5
\$1,000-\$1,499.....	61, 033, 532	235, 205	78, 216	3. 9	1. 3
\$1,500 and over.....	53, 710, 920	245, 163	75, 709	4. 6	1. 4
Metropolitan and adjacent counties.....	109, 272, 372	425, 168	140, 363	3. 9	1. 4
Less than \$500.....	1, 089, 100	1, 266	169	1. 2	. 2
\$500-\$999.....	11, 309, 532	23, 936	7, 714	2. 1	. 7
\$1,000-\$1,499.....	44, 539, 219	162, 182	58, 662	3. 6	1. 3
\$1,500 and over.....	52, 334, 521	237, 784	73, 818	4. 5	1. 4
Isolated counties.....	41, 424, 989	139, 658	30, 743	3. 4	. 8
Less than \$500.....	3, 447, 078	4, 696	351	1. 4	. 1
\$500-\$999.....	20, 107, 199	54, 560	8, 947	2. 7	. 4
\$1,000-\$1,499.....	16, 494, 313	73, 023	19, 554	4. 4	1. 2
\$1,500 and over.....	1, 376, 399	7, 379	1, 891	5. 4	1. 4

¹ 1950 census.

² Bed ratios for national and county-type totals are computed on estimated total number of beds (cf. table 2) rather than on actually reported beds as shown here.

County Characteristics

The availability of beds may be associated with certain measurable characteristics of counties other than their urban-rural character. Per capita income may be one such factor; its influence on the supply of general hospital beds has been demonstrated in earlier studies (2, 5). The proportion of the population aged 65 years and over may be influential, in view of generally greater use of both hospital and nursing home facilities by this age group. Another related factor may be the relative availability of medical personnel, including physicians and professional and practical nurses.

Per Capita Income

That the supply of beds in general hospitals and skilled nursing homes in counties tends to increase with per capita income is evident from table 4.

The volume of beds in nursing homes shows proportionately greater increases with increasing income levels than does the volume of beds in general hospitals. However, the individual counties do not adhere closely to the overall

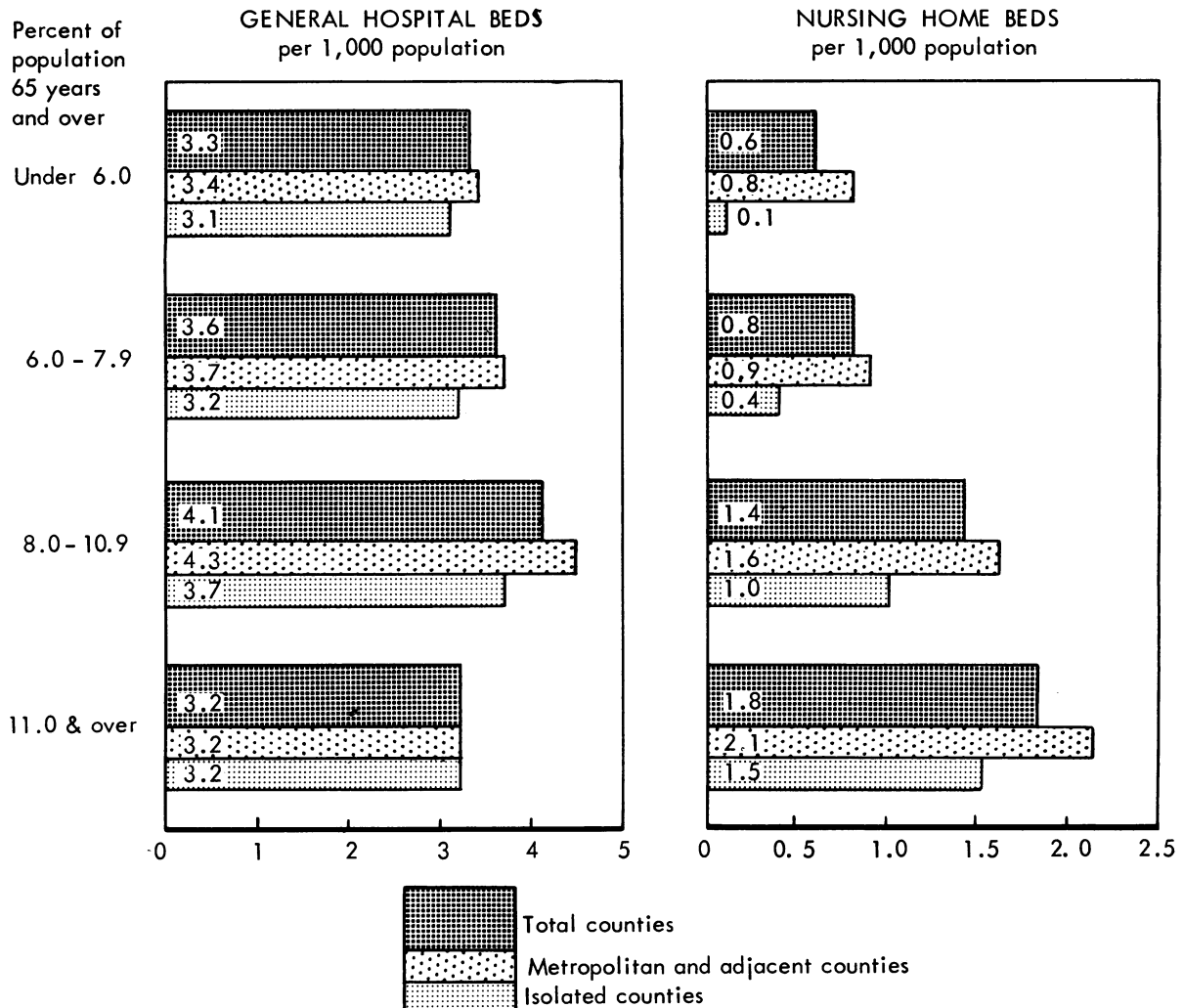
tendency which shows nursing home beds increasing with income level. Rather, the pattern represents an average of county experiences which are widely dispersed about the general trend. The increase of general hospital beds with increase in per capita income, on the other hand, is more consistently displayed county by county. (The more consistent association of general hospital beds with per capita income is reflected in a correlation coefficient of .45, compared with a correlation coefficient of .27 for skilled nursing home beds—both significant at the 1-percent confidence level.)

Older Population

The proportion of the county population aged 65 years and over is as significant as per capita income in relation to nursing home beds (correlation coefficient of .28). The supply of general hospital beds, however, shows no relation to the number of older people in the area. As figure 2 indicates, this situation is found in both urban and rural counties.

The association of aged population with the availability of nursing home beds is independ-

Figure 2. Average availability of general hospital and skilled nursing home beds among counties with different proportions of older people, by urban-rural county type.



ent of the influence of income level. The relationship with age is maintained even among areas of similar income. (Removing the effect of income, the partial correlation of nursing home beds with aged population is .26, similar to the simple correlation of .28 noted above.)

Medical Personnel

As figure 3 demonstrates, counties with relatively larger numbers of physicians and professional and practical nurses also have, on an average, more general hospital and nursing home beds. This holds true for the different types of urban and rural counties.

County per capita income probably has an

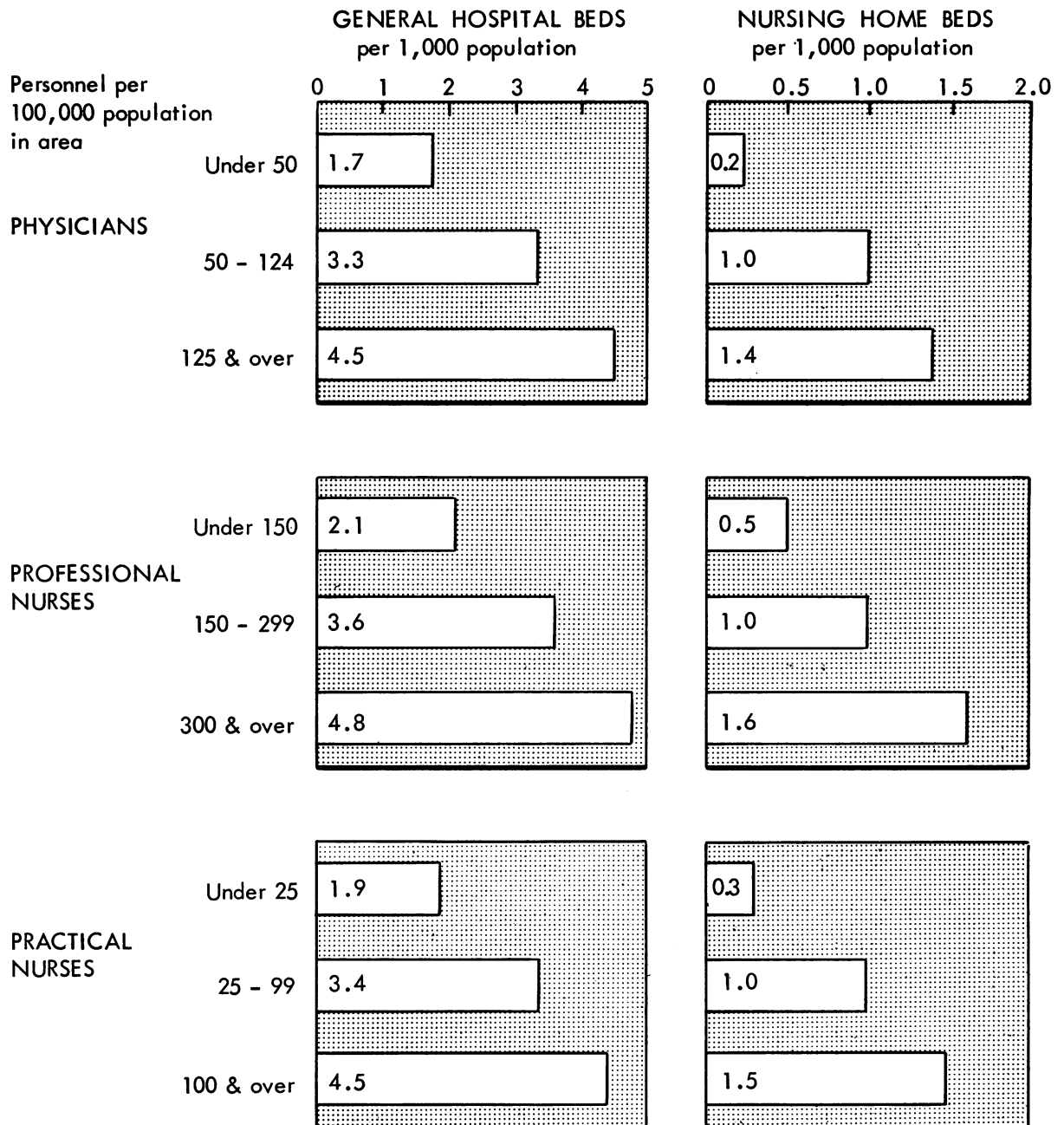
underlying influence here. There is a substantial association between county income levels and the supply of physicians and professional and practical nurses (the three types of medical personnel correlate, respectively, with county per capita income .58, .60, and .29).

To observe the effect of availability of medical personnel alone, with the effect of income removed, the category of professional nurses was examined in detail. This category, as just noted, correlates quite highly with per capita income. It also shows the highest correlation of the three types of medical personnel with the volume of general hospital and nursing home beds.

Ratio	Correlation with county bed-population ratio for—	
	General hospitals	Skilled nursing homes
Physician-population.....	.45	.25
Professional nurse-population.....	.55	.33
Practical nurse-population.....	.33	.22

Removing the influence of county per capita income does in fact reduce the extent of correlation between bed levels and the supply of professional nurses. However, a measure of association remains (partial correlations with general hospital and nursing home beds, respectively, of .39 and .21, compared with the

Figure 3. Average availability of general hospital and skilled nursing home beds among counties with different relative availability of medical personnel.



simple correlations of .55 and .33—all statistically significant).

Composite Relationships

Per capita income and complement of professional nurses emerge from the foregoing analysis as rather significant factors associated with the volume of general hospital and nursing home beds in counties. The relative number of older people in an area is an additional important factor in the supply of nursing home beds.

The supply of professional nurses appears as the most effective correlate of availability of general hospital beds among the several factors studied. The nurse factor operates in the same direction as county income level, itself a major correlate, and further effectively incorporates the influence of income level. (Multiple correlation of general hospital beds with both these factors combined yields a coefficient of .57, no improvement over the simple correlation of .55 with supply of professional nurses by itself.)

In the case of nursing home beds, the combined effect of per capita income, proportion of older population, and professional nurse supply is greater than the effect of any one of these alone (multiple correlation of .42, as compared with simple correlations with these factors, respectively, of .27, .28, and .33). Here again, however, the influence of income is adequately reflected in the factor of professional nurse supply. Consequently, the combined effect of aged population and professional nurses yields as high a correlation (.42) with nursing home beds as the correlation with income level included.

Summary

Metropolitan counties, relative to other types of counties, are best supplied with both general hospital and nursing home beds. Isolated rural counties are the least supplied with both types of beds. The intermediate types of counties exhibit opposing patterns between general hospital and nursing home beds: General hospital beds are in rather low supply in those counties adjacent to metropolitan counties and in high supply in isolated semirural counties. Nursing home beds, in contrast, exist in relatively large

supply in counties adjacent to metropolitan counties and are in much lower supply in isolated semirural counties.

Little correspondence is found, county by county, between the number of general hospital beds and the number of nursing home beds. Although some average tendency is observed for the volume of nursing home beds to increase as general hospital beds increase, great variability among counties obscures the actual relationship.

The availability of beds is moderately correlated with certain socioeconomic factors. Per capita income and supply of medical personnel form a complex which is significantly related to the availability of general hospital beds. Correlating not as highly, but significantly, with these factors is the supply of nursing home beds. The proportion of county population aged 65 years and over apparently influences the supply of nursing home beds positively but reveals no measurable effect on the volume of general hospital beds.

Beyond the relationships examined in this study, there is much that is yet unexplained in the volume of beds established in different areas. For better understanding we must look to more subtle factors in the medical-sociocultural environment.

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