

# Patient Load and Volume of Medical Services

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Measurement of the volume of medical services received by the population is needed in appraising the extent to which the demand for medical services is related to the supply of physicians. This measurement is important in a comprehensive study of the distribution of physicians whether our concern is with the general problem of geographic maldistribution or with the particular problem of apportionment of available manpower between the civilian population and the armed forces.

Previous studies (1-6) have shown that the size of the patient load is a useful index for gauging the degree to which physicians are able to meet the demand for medical services. But, significantly, they revealed that physicians vary markedly in the amount of services they give. Some of this variation is due to place of practice and to specialty, some to the characteristics of the individual physician. Because of this variation, the relative number of physicians in a population cannot measure, except crudely perhaps, the amount of medical services available to that population.

For this reason we have inquired further into the factors which are related to the size of the patient load and its variation. In a study of the weekly patient load of physicians in active private practice in western Pennsylvania, we have explored the relationship between patient

load, supply of physicians, and volume of services with the intent of showing how much the volume depends on the first two factors.

The study compares the patient load of physicians in western Pennsylvania with findings in other places. It translates the patient load into volume of services and adjusts this volume for the intercounty movement of population to obtain medical services. Neither the patient load nor the ratio of physicians to population can substitute for the volume of services as an indication of the relationship between supply and demand, yet information about both is needed in order to arrive at such a measure.

## Material and Method

The data are derived from a study of health manpower requirements undertaken for the National Security Resources Board by the Public Health Service and the Graduate School of Public Health, University of Pittsburgh.

On October 10, 1950, a questionnaire was mailed to every physician in the 29 westernmost counties of Pennsylvania. This questionnaire requested, among other items, information on the number of patients (different individuals) seen during one week in office, home of patient, and hospital. Table 1 shows the distribution by county of the replies from active practitioners. While 40 percent of all the physicians replied, only 34 percent of the active private physicians did so. Variation among the counties was considerable. Two counties, Cameron and Forest, each with four physicians, none of whom replied, have been omitted from this analysis. Among the remainder, the percentage of replies varied from 15 in Elk to 50 in Jefferson County and almost 50 among 100

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physicians in Mercer County. In Allegheny County, where nearly half of the study area's physicians are concentrated, 39 percent replied.

**Table 1. Distribution by county of all active private practitioners and those replying to questionnaire**

County	Population 1950	Active private practitioners		Replies	
		Number	Per 100,000 population	Number	Percent
Allegheny	1, 515, 237	1, 608	106	629	39. 1
Armstrong	80, 842	46	57	13	28. 3
Beaver	175, 192	139	79	41	29. 5
Bedford	40, 775	18	44	5	27. 8
Blair	139, 514	111	80	29	26. 1
Butler	97, 320	72	74	27	38. 5
Cambria	209, 541	166	79	54	32. 5
Cameron	7, 023	4	57	0	0
Centre	65, 922	45	68	12	26. 7
Clarion	38, 344	31	81	9	29. 0
Clearfield	85, 957	45	52	16	35. 6
Clinton	36, 532	26	71	6	23. 1
Crawford	78, 948	64	81	10	15. 6
Elk	34, 503	27	78	4	14. 8
Erie	219, 388	211	96	64	30. 3
Fayette	189, 899	133	70	24	18. 0
Forest	4, 944	4	81	0	0
Greene	45, 394	34	75	8	23. 5
Indiana	77, 106	47	61	15	31. 9
Jefferson	49, 147	40	81	20	50. 0
Lawrence	105, 120	84	80	26	31. 0
McKean	56, 607	58	102	17	29. 3
Mercer	111, 954	100	89	48	48. 0
Potter	16, 810	14	83	4	28. 6
Somerset	81, 813	45	55	9	20. 0
Venango	65, 328	50	77	18	36. 0
Warren	42, 698	41	96	15	36. 6
Washington	209, 628	159	76	47	29. 6
Westmoreland	313, 179	247	79	61	24. 7
Total	4, 194, 665	3, 669	87	1, 231	33. 6

Comparison of the age distribution of those who replied with that of all the active private practitioners in the area (table 2) shows the two distributions to be similar. As has been found in other studies, the younger men showed a greater disposition to reply. The distribution of specialties among those who replied is also similar to that of the total (table 3). More complete returns would have strengthened the conclusions coming out of this analysis. However, in view of the representative character of the replying physicians—at least with respect to age and specialty—the proportion of questionnaires returned appears adequate. Fur-

thermore, the findings are consistent with those observed elsewhere.

### Weekly Patient Load of General Practitioners

The average weekly patient loads (different individuals) of general practitioners in western Pennsylvania and the results of previous studies are shown in table 4. Part-specialists, those who are interested in, but do not limit their practices exclusively to, a special field of medicine, are included here as general practitioners.

Because of differences found elsewhere between rural and urban physicians, the data for Pennsylvania are grouped as follows in order to arrive at some approximation here of rural-urban differences: Pittsburgh, Allegheny County (including Pittsburgh), other metropolitan counties, and other counties. The other metropolitan counties consist of the four counties in the study area—Blair, Cambria, Erie, and Lawrence—which contain cities of 50,000 persons or more. The other counties are the remaining 22 in this study.

General practitioners in this area saw an average of 107 patients during the study week, 83 in the office, 8 in the hospital, and 16 in the patient's home. Pittsburgh and other Allegheny County physicians reported a lower average patient load than did the physicians in the remainder of the area. This agrees with previous findings that general practitioners in predominately urban areas have a lower patient load than those practicing in more rural places. In the present instance, the difference in totals is largely accounted for by the differences in number of patients seen in the office.

The patient load for all general practitioners in Pennsylvania is about the same as that observed in Georgia in December 1942, and somewhat lower than was found in the District of Columbia in September 1942 and in Maryland in October 1942. However, these three studies were made about a year after the United States entered World War II, when almost a quarter of the physicians in active private practice had been drawn into the armed forces (7). The present patient load in western Pennsylvania is appreciably higher than it was in the District of Columbia in June 1947. Then, in the Dis-

**Table 2. Age distribution of all active private practitioners and of those replying to questionnaire**

Age in years	Number of physicians		Percentage distribution	
	All	Replying	All	Replying
Under 35-----	534	197	14.5	16.0
35-44-----	1,083	414	29.5	33.6
45-54-----	795	282	21.7	22.9
55-64-----	532	173	14.5	14.1
65 and over-----	715	163	19.5	13.2
Unknown-----	10	2	.3	.2
Total-----	3,669	1,231	100.0	100.0

**Table 3. Distribution by specialty of all active private practitioners and of those replying to questionnaire**

Specialty	Number of physicians		Percentage distribution	
	All	Replying	All	Replying
General practice-----	2,463	748	67.1	60.8
Surgery-----	296	108	8.0	8.8
Obstetrics and gynecology-----	109	55	3.0	4.5
Eye, ear, nose and throat-----	252	85	6.9	6.9
Urology and proctology-----	61	22	1.6	1.8
Dermatology-----	40	20	1.1	1.6
Internal medicine-----	223	115	6.1	9.3
Neurology and psychiatry-----	44	17	1.2	1.4
Pediatrics-----	76	34	2.1	2.7
Pathology, radiology, and anesthesiology-----	105	27	2.9	2.2
Total-----	3,669	1,231	100.0	100.0

trict, the bulk of the physicians in service had been released, including many new physicians who had been trained during the war years, and the ratio of physicians to population had returned to its prewar level. Thus, the physicians in this area apparently are nearly as busy as physicians were in three other areas after 1 year of war, and busier than physicians in post-war Washington, where the receipt of medical services is at least as high as anywhere else in the country but where the ratio of physicians to population is also very high.

The size of the standard deviations that accompany these averages reflects the wide varia-

tion in patient load among general practitioners and among all physicians. The extent of this variation is about the same here as in the other areas studied, indicating the consistency of these data with the findings elsewhere.

One of the major elements contributing to the total variation in the patient load is the variation according to age of physician. That age is a factor in size of practice has been clearly demonstrated in the earlier studies. It re-emphasizes the inadequacy of the relative number of physicians as an index of services available to the population.

In Allegheny County and in the nonmetropolitan counties, the maximum patient load is found in the age group 35-44 years, with a decrease to a minimum in the group 65 years and over (fig. 1). This is the same pattern observed in all the previous studies and is reflected in a similar pattern of income among general practitioners (8).

The findings in relation to other metropolitan counties do not follow the same pattern. In these counties, the older physicians reported as high a patient load as the younger physicians. No explanation can be offered at this time except perhaps that this pattern may be a consequence of a higher demand for services in these counties than in the other parts of the study area.

### Weekly Patient Load of Specialists

As has been found in other studies, the patient load among physicians who limit their practices to special fields of medicine tends on the whole to be somewhat lower than among general practitioners, although ophthalmology and otorhinolaryngology, which are combined, and pediatrics appear to be exceptions. For these specialties and for neurology and psychiatry, the physicians in Allegheny County have a higher patient load than the same specialists in the other counties. For the other specialties the reverse is true (table 5).

### Patient Load and Number of Physicians

There has been a tendency to assume that physicians must be overworked in areas where

they are scarce and that those in communities with a relatively large number of physicians have little to do. As was pointed out in an earlier paper (9), patient load is not necessarily related to the supply of physicians.

Comparison of patient load (table 6, col. 1) with the ratio of physicians to population (table 1) reveals that in general there is little association between the two items. Armstrong and Indiana Counties, for example, have ratios of 57 and 61 physicians per 100,000 population, respectively, yet the general practitioners of Armstrong County, which has fewer physicians, reported a patient load of 110 as contrasted with 145 in Indiana County. At the same time, the general practitioners in counties with more than 90 physicians per 100,000 persons—Allegheny, Erie, McKean, and Warren—reported below-average patient loads. If one can generalize from these findings, it would appear that in counties with relatively few physicians, the patient load may be large or small, while in counties with a relatively large

number of physicians, the patient load tends to be low.

The small association between patient load and relative numbers of physicians is seemingly reflected in the absence of association between patient load and per capita income in the individual counties. Low patient loads are found in both wealthy and poor counties, in the former because they tend to have a large number of physicians and in the latter because of the low demand for services. Thus, average patient load was 92 in Allegheny, the wealthiest county in the group, and 81 in Greene, one of the poorer counties.

The conclusion from these findings must be that neither patient load nor supply of physicians will alone measure the demand for medical services. The latter indicates the medical resources potentially available to the population while the former measures the degree of activity of these physicians. The two together are necessary in order to obtain a measure of services actually received and should constitute

**Table 4. Average weekly patient load of general practitioners<sup>1</sup> by place of practice**

Place of practice and date of survey	Number of physicians giving information	Average weekly patient load				Standard deviations	
		Office	Hospital	Home of patient	Total	Office	Total
<b>Pennsylvania (October 1950):</b>							
Pittsburgh.....	227	65	6	16	87	52	65
Allegheny County (including Pittsburgh) ..	330	67	7	17	91	52	65
Other metropolitan counties.....	109	101	9	15	125	59	69
Other counties.....	308	95	9	16	120	56	64
<b>Total.....</b>	<b>747</b>	<b>83</b>	<b>8</b>	<b>16</b>	<b>107</b>	<b>57</b>	<b>67</b>
<b>District of Columbia:</b>							
September 1942.....	156	86	8	21	115	78	84
June 1947.....	157	64	3	11	78	56	56
<b>Maryland (October 1942):</b>							
Baltimore.....	288	82	6	31	119	64	88
Exclusive of Baltimore City.....	262	96	7	29	132	71	88
<b>Total.....</b>	<b>550</b>	<b>89</b>	<b>7</b>	<b>30</b>	<b>126</b>	<b>68</b>	<b>88</b>
<b>Georgia (December 1942):</b>							
Urban.....	170	78	11	23	112	53	73
Rural.....	436	79	6	26	111	59	77
<b>Total.....</b>	<b>606</b>	<b>79</b>	<b>7</b>	<b>25</b>	<b>111</b>	<b>57</b>	<b>76</b>

<sup>1</sup> For areas other than Pennsylvania, the data refer to male white general practitioners.

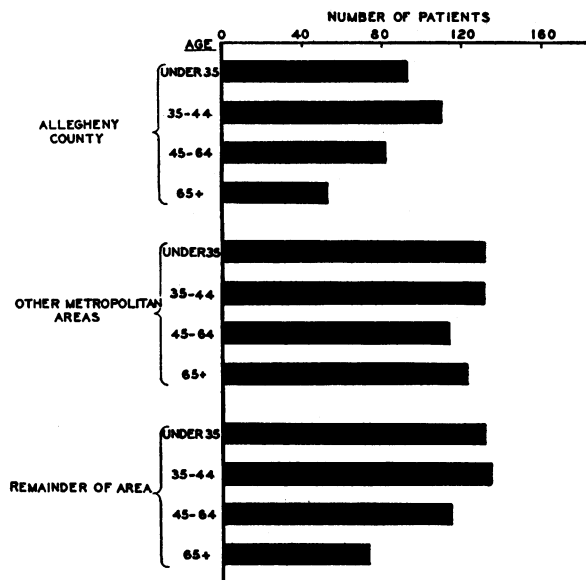


Figure 1. Patient load according to age group of physicians.

the basis for appraising the effective demand to be expected from a population.

Such a measure can be acquired directly from the consumers of medical care by interview, but this is a more costly and time-consuming method and would not be expected to yield more accurate results from a practical standpoint.

### Services Per Person

An estimate of the total volume of services obtained in one week by the population can be calculated by multiplying the average patient load by the number of physicians practicing in the community. Multiplication by 50, assuming that the physician's year is composed of 50 weeks, will yield an estimate of the total number of services received in one year. For purposes of comparison among different populations, total services are best reduced to a per capita basis by dividing total volume by the size of the population (table 6, col. 2).

There is marked variation among the counties, the range in annual services per person being 2.6 to 6.4. However, in 11 of the 27 counties the annual number of services fell between 4.0 and 5.0 per person; in the majority of counties the rate was more than 4.0 services.

Similar calculations in the previous studies

show that for all of Maryland and for urban Georgia the estimated annual services per person were 4.7 and 4.9, respectively, which are close to the average of 4.4 here. As would be expected, the rates for Baltimore and the District of Columbia were much higher, 5.9 and 6.2. These high rates of services reflect two factors: (a) the greater availability of medical personnel and the higher demand that accompanies higher income and educational levels; and (b) the movement of patients for medical care toward the metropolitan centers.

This factor of movement has to be taken into account if a real understanding is to be sought of the differences between areas in the amount of medical services received. Such information is available in the present study since the physicians supplied data on place of residence of

Table 5. Average weekly patient load of physicians engaged in practice limited to special fields, by type of county

Specialty and place of practice	Number of physicians giving information	Weekly patient load	
		Average	Standard deviation
<b>Internal medicine:</b>			
All.....	115	83	63
Allegheny County.....	79	78	67
Other metropolitan counties..	14	97	47
Other counties.....	22	94	63
<b>Surgery:</b>			
All.....	108	84	51
Allegheny County.....	60	82	45
Other metropolitan counties..	16	97	63
Other counties.....	32	80	46
<b>Obstetrics and gynecology.</b>			
All.....	55	86	54
Allegheny County.....	35	87	58
Other metropolitan counties..	9	80	37
Other counties.....	11	88	42
<b>Pediatrics:</b>			
All.....	34	99	53
Allegheny County.....	23	107	52
Other metropolitan counties..	4	96	23
Other counties.....	7	73	46
<b>Ophthalmology or otorhinolaryngology:</b>			
All.....	85	112	74
Allegheny County.....	44	123	73
Other metropolitan counties..	11	103	67
Other counties.....	30	100	70
<b>Neurology and psychiatry:</b>			
All.....	16	40	36
Allegheny County.....	13	42	36
Other metropolitan counties..	2	37	5
Other counties.....	1	19	-----

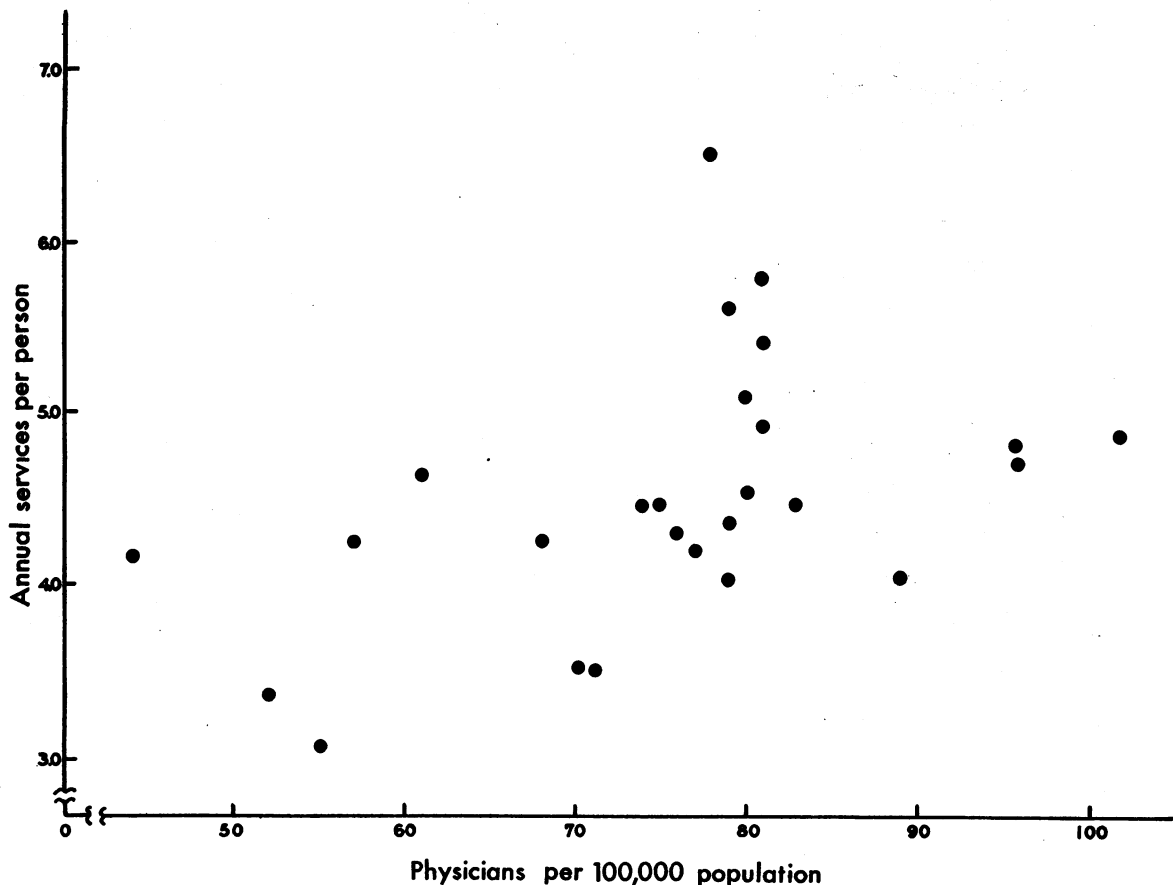


Figure 2. Scatter diagram showing adjusted services per person and ratio of physicians to population (each point represent a county).

the patients seen on one particular day. On the basis of these data, an adjustment for movement of patients from one county to another was made possible (table 6, col. 3).

The counties which contain large cities and attract patients from elsewhere show a decrease in number of services per person, while the more rural counties show an increase. The reason is that the data now apply to the residents of the respective counties. The unadjusted figure may be compared to birth and death rates by place of occurrence, while the adjusted figures are analogous to these rates by place of residence. The net result of this adjustment is to diminish the differences between counties. The great majority of counties, 18 of the 27, now show 4.0 to 5.0 services per person. Although rank order of the counties remains about the same after the adjustment, some striking changes occur in the actual rates of certain counties. For example, the rate for Armstrong

changes from 3.2 to 4.2. This marked increase is related to the extent to which the population travels to other counties, Allegheny County in particular, for medical care.

The rate, services per person, is calculated from the number of physicians and their patient load. As we have seen, there is very little association between these two. It remains now to determine how either of them or both are related to number of services per person.

Figure 2 is a scatter diagram showing adjusted services per person and ratio of physicians to population; each point represents a county. It can be seen from the figure that a tendency exists for services to increase as the ratio goes up. Where the supply of physicians is high, the number of services received per person also tends to be high. However, the scatter of the points shows that the degree of association is not sufficiently strong to permit one to assume that whenever there is a

larger supply of physicians, more services will be received by the population. Indeed, a recent study of two counties in New York State (10) demonstrated that the reverse could occur. In one county with 97 general physicians per 100,000 persons, 54 percent of a sample of residents reported a visit to the physician in the study year. The other county had 85 such physicians per 100,000 persons, yet 62 percent of the population reported at least one visit. The difference between percentages is attributed by the authors of the study largely to differences in the accessibility and geographic distribution of general physicians within the two counties. All these findings point to the limitations of the ratio of physicians to population as a measure of medical services.

An association is also found in western Pennsylvania between patient load and services per person, but the degree is even smaller.

Table 6. Average patient load of all physicians and estimated annual physician services per person, unadjusted and adjusted for intercounty movement of patients

County	Average weekly patient load	Services per person <sup>1</sup>	
		Unadjusted	Adjusted
Allegheny	91.7	4.63	4.41
Armstrong	110.0	3.17	4.22
Beaver	139.3	5.47	5.59
Bedford	168.4	3.52	4.17
Blair	148.1	5.01	4.51
Butler	108.2	3.85	4.43
Cambria	110.9	4.14	4.02
Centre	128.6	4.32	4.24
Clarion	128.8	5.46	5.39
Clearfield	104.6	2.68	3.37
Clinton	119.8	3.91	3.49
Crawford <sup>2</sup>	128.6	5.37	5.75
Elk <sup>2</sup>	146.5	6.41	6.46
Erie	103.2	4.85	4.68
Fayette	101.5	3.47	3.52
Greene	80.9	3.94	4.44
Indiana	144.8	4.41	4.61
Jefferson	130.4	5.11	4.91
Lawrence	122.0	5.16	5.07
McKean	98.7	4.87	4.82
Mercer	92.7	3.96	4.03
Potter	105.5	4.32	4.43
Somerset <sup>2</sup>	101.9	2.59	3.07
Venango	124.5	4.42	4.19
Warren	106.2	4.66	4.77
Washington	102.7	4.06	4.28
Westmoreland	105.3	4.02	4.34

<sup>1</sup> Since these are based on the number of different individuals seen in one week and not on visits, they underestimate somewhat the true number of services.

<sup>2</sup> Fewer than 20 percent of the physicians reported.

To some extent both of these findings are to be expected in view of the lack of association between patient load and ratio of physicians to population. To calculate or estimate services per person, both sets of data are needed.

### Summary and Discussion

The findings of this study of patient load among the physicians of 27 counties of western Pennsylvania may be summarized as follows:

1. The average weekly patient load (different individuals) of general practitioners in October 1950 was 107. The patient load was lower in Allegheny County and Pittsburgh than in the rest of the study area.

2. In general, the age pattern was the same as that observed in other studies, with peak patient load among physicians in the 35-44 age group.

3. Patient load of the individual counties was not appreciably related to per capita income or to the relative number of physicians in the county.

4. The estimated number of services per person, adjusted for the movement of patients from one county to another, was found to lie between 4.0 and 5.0 per year in the majority of counties.

5. The average number of services per person was associated with number of physicians in the county and to a lesser degree with patient load.

These findings have a bearing on several aspects of medical care problems. In the first place, they reveal that physicians, in this area at least, are as busy on the average as physicians were in several other parts of the country at the end of 1942 after a substantial number of physicians had been drawn from civilian life into the armed forces. Since no earlier data are available for the study area, we cannot say whether the work load of physicians has been increasing or not. However, a patient load nearly equivalent to that observed here was cause for anxiety among practicing physicians of the areas studied during the war. It would, therefore, appear that, by and large, the physicians in the present study area are working at nearly full capacity. To what extent this work load can be increased cannot be determined without more intensive investigation. One

item of information on this point is that in April 1945 the average weekly patient load of general practitioners in the District of Columbia had reached a peak of 133, and had become a matter of deep concern to the Medical Society of the District.

In view of the current discussions on the need for more physicians, further studies of patient load, both actual and potential, would go far to clarify the issues.

The patient load enables us to estimate the amount of physician services received by a population. It is this volume of services, rather than the number of physicians in the population, which should be used as an index of the adequacy of the amount of medical services that a population is receiving. This is important when we are considering problems of medical care generally, but it is particularly important now when we are faced with the possibility of having to withdraw large numbers of physicians from the civilian population. Under such circumstances, we must consider whether or not to decrease the services received by the civilian population, or if we wish to maintain the services at their present level, how far the number of physicians can be reduced and the patient load of the remaining physicians increased. In either instance we must know the number and kinds of these services, the number of physicians, and their patient load.

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### Dr. McCoy, Former Director of NIH

Dr. George W. McCoy, for 22 years director of the Hygienic Laboratory (now the National Institutes of Health) of the Public Health Service died in Washington, D. C., April 2, at the age of 75.

Dr. McCoy entered the Public Health Service in 1900. He served as director of the U. S. Plague Laboratory at San Francisco, 1908-11; director of the U. S. Leprosy Investigation Station in Hawaii, 1911-15; and director of the Hygienic Laboratory, 1915-37.

A leading authority on leprosy, Dr. McCoy was also widely recognized for his contributions in the fields of plague, tularemia, psittacosis, postvaccination complications, and biologics control. In collaboration with Dr. Charles W. Chapin, Dr. McCoy isolated, identified, and cultivated the causative organism of tularemia.

After his retirement from the Public Health Service in 1937, Dr. McCoy was professor of preventive medicine and public health and acting dean of the Louisiana State University School of Medicine until 1948.

Dr. McCoy received his doctor of medicine degree from the University of Pennsylvania Medical School and his doctor of science degree from Louisiana State University. Honors he received included the Sedgwick Memorial Medal of the American Public Health Association.