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LOCATION AND MOVEMENT OF PHYSICIANS—METHODS FOR ESTIMATING PHYSICIAN RESOURCES[1]

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Demands of the war program have crystallized the need for measures by which to estimate the amount of medical care available in a given community. Withdrawal of young physicians from civilian practice, reduction of the normal supply of new physicians, and concentration of population in war industrial areas serve to create additional physician shortages as well as to accentuate those already existing (*1, 2*). A more precise method for appraisal of present physician resources will facilitate comparison between areas and define the needs for the inadequately staffed community. Moreover, on the basis of such estimates, plans can be formulated for the encouragement of physicians, demobilized after the cessation of hostilities, to establish practice in localities where the need for medical services is most acute.

Earlier papers in this series have dealt with the number and age of physicians in 1923 and in 1938, their proportion in relation to population, the characteristics of the States and counties in which they locate in greater or in lesser numbers, and facts concerning their migrations. From such studies it is evident that even in time of peace there is great disparity between the number of physicians serving one community and those available to the people of another. In general, the wealthiest communities enjoy exceptionally generous provisions for medical care and attract large numbers of young physicians. Illness studies (*3, 4, 5, 6, 7, 8*), on the other hand, reveal the greater number of medical problems among the economically

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This is the fifth report in a series on the location and movement of physicians.

Previous papers in this series are:

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—general observations. Pub. Health Rep., 57:1363 (September 11, 1942). Reprint No. 2403.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physician s 1923 and 1938—turn-over as a factor affecting State totals. Pub. Health Rep., 57:1752 (November 20, 1942). Reprint No. 2422.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—effect of local factors upon location. Pub. Health Rep., 57:1945 (December 18, 1942). Reprint No. 2434.

Mountin, Joseph W., Pennell, Elliott H., and Nicolay, Virginia: Location and movement of physicians, 1923 and 1938—age distribution in relation to county characteristics. Pub. Health Rep., 58:483 (March 19, 1943). Reprint No. 2465.

underprivileged. It would seem, therefore, that in normal times concentration of physicians is correlated with financial ability to purchase care rather than with the need for care. Such inequalities in physician service among the various communities will doubtless continue to develop unless planned use of physician resources is instituted and money is available to insure a fair return to physicians rendering the service.

There has long been need of some instrument of measurement by which current and future medical resources might be estimated from base-year studies. The purpose of this paper is to demonstrate the application of life table techniques to the problem of projecting available physician totals to make estimates of future professional resources. In course of the presentation constants are developed for the adjustment of these estimates to take into account the retirement of physicians as age advances and to translate the resulting adjusted physician totals in terms of service equivalents.[2] Finally, average future full-service years are computed for physicians at different age levels and correspond to their average future life expectancy translated in terms of service equivalents.

A SURVIVAL PATTERN FOR PHYSICIANS

Fundamental to the problem of projecting from base-year studies totals that will provide estimates for both current and future years is the development of indexes which show the fraction of physicians counted in a base year who may be expected to survive until some specified future date. While factors such as change of occupation and movement to locations outside the country affect the final number remaining, mortality, more than any other factor, accounts for the major share of the changes which occur in normal times.[3] Accurate

[2] "Service equivalent" as used in this article is defined as the decimal fraction obtained by dividing the average weekly number of patients seen by a physician of designated age by the corresponding number seen by a physician at the peak of his career. Data presented in a later section reveal that the average general practitioner at ages 38 to 40 sees more patients than at any other time in his career. By taking patients seen as a measure of service capacity, it is assumed that a physician at this age represents one full-service-year equivalent. At age 64, for example, the fraction becomes 0.5 so that at this age the physician represents only one-half of a full-service equivalent. It then follows that a full-service year would be reflected by the 12 months' work of one physician at ages 38 to 40 whereas at age 64 it would take two physicians working 12 months each or one for 24 months to provide one full year of service. Throughout this paper the phrases "service capacity" and "service equivalent" are used interchangeably.

[3] In a report on the distribution of physicians in the United States, Leland (*3*) points out that "old age and death are the two most important factors in eliminating physicians." While emphasizing the lack of dependable data concerning the annual number of deaths in the medical profession he estimates, on the basis of obituaries published in the Journal of the American Medical Association, that the annual number "is somewhat in excess of 3,000, possibly as high as 3,500."

Even the upper limit of Leland's estimate is considerably below that used by the Council on Medical Education and Hospitals (*10*) in their presentation of licensure statistics in the April 25, 1936 issue of the Journal. In this report the statement is made that "altogether 5,500 were added to the profession as contrasted with approximately 4,000, the number removed by death in 1935."

The physician data prepared for this study reveal that there were approximately 57,000 physicians, or an average of about 3,800 per year, who were lost from the profession during the period 1923 to 1938. While it age-specific death rates for physicians, if available, would provide indexes by means of which estimated losses from physician groups in selected age categories might be computed. The paucity of such data, however, has led the author to use for this purpose the survival table [4] represented in the stationary population of the 1930–39 life table for white males, published by the United States Bureau of the Census (*11*). In light of the findings by Dublin and Lotka (*12*) that life expectancy for physicians at different ages is not far different from that for white males, it is believed that the survival table used is generally descriptive of the mortality experience of physicians.

An assumed stationary population forms the central concept of the life table. This population is derived mathematically from the number who will survive at each future age from 100,000 infants if they are subject year by year throughout life to the mortality rates over some designated period. To the generation so determined there is added each year another generation of 100,000 births subject to the same limiting definitions, until a stable population is reached. In such a mathematically derived stable population the number in each age group will not change with time provided there is no migration and the number of births and deaths are distributed evenly over the calendar year. Naturally, the resulting distribution may not correspond to any actual population group, but it does represent a standard from which the proportion surviving in future years from any designated year of age in some observed population may be computed. However, this premise is based upon the assumption that the future mortality experience of this observed population will correspond reasonably well with that used as a base in the development of the stationary population. The procedure may be extended also to categories broader than single years of age where the distribution within the broad interval for the observed population is essentially the same as that for the corresponding interval in the stationary population.

The stationary population shown in table 6, column 2 (appendix A), is taken directly from the life table for white males published by the Census Bureau (*11*). This population was mathematically derived on the basis of the mortality experience for white males during the period 1930–39. Only that portion of the table covering the age range in which physicians are most commonly found is reproduced.

For purposes of this paper the proportionate change over a given

is not possible from data at hand to determine the factors affecting these losses, the intermediate position of this annual figure between the estimates referred to above suggests that death was the major factor in the removal of physicians during the study period.

[4] The data in this table are preliminary and are based upon a 5-percent cross section of the 1940 Census. The Census Bureau emphasizes further that "basic data for both white and nonwhite populations at ages over 85 or 90 may be subject to relatively serious errors, and for these ages the life table values must be considered only as reasonably reliable estimates." However, it is believed that the numbers so involved are relatively too small for such errors to affect materially estimated totals for most local areas.

period in the stationary population for white males will be used as an index by which change over the same interval in observed physician totals may be predicted. For example, the stationary population for white males (table 6, col. 2) shows 83,415 white males at age 40 and 75,341 at age 51. The rate of survival obtained by dividing the number of white males in the older group by the number in the younger is 0.903.

This survival index may be applied to any given number of physicians who are 40 years of age in order to predict the most likely number of the group who will be alive 11 years later. That is, when the survival ratio found from the stationary population for white males is applied to a group of 50 physicians all of whom are 40 years of age, the results show that 45 of the physicians may be expected to survive the 11-year period.

The principle for computing survival ratios demonstrated above is expressed mathematically in formulas 1 and 3 of appendix B. By substituting appropriate figures in the latter from both the stationary population and the actual physician population, the number of survivors from any year of age may be determined for a specified future date.

Prediction of survival for physicians classified by single years of age is the most efficient means of estimating future physician resources. However, it may be that age distributions for physicians in study areas are not available by single years but rather have been compiled in 2-year, 5-year, or even in 10-year age groups. In this event, the numbers appearing opposite appropriate years of age in the stationary population must be grouped into age intervals exactly corresponding to those for the actual physician population. The summary survival rate[5] over any given period is then obtained by dividing the total for the age group in the stationary population corresponding to that in which the surviving physicians will be at the specified future date by the total for the age group corresponding to that in which they are at present. For illustration: In a certain city there are 50 physicians in the age group 45–49. How many of these will survive 5 years hence, at which time their ages will range from 50 to 54? The survival rate is obtained by simply dividing the total for the 50–54 age group in the stationary population by the total for the age group 45–49 in the same population—i.e., from table 4, column 2, as follows:

[5] Ratios reflecting proportional survival represent exact mathematical relationships between totals for selected age groups in the stationary population. They can, therefore, be applied with precision only to those populations whose mortality experience over the projecting interval coincides with that shown by the age-specific death rates for white males over the period 1930–39. Moreover, the distribution within the selected age category of the study group must correspond with that for the stationary population. In practice, however, application of these rates to enumerated totals for age groups of not too great extent (perhaps even up to 10 or 15 years) will provide reasonable estimates if it may be assumed that the future mortality of the study group will closely approximate that for the stationary population.

Year of age	Number in stationary population	Year of age	Number in stationary population
45-46	80,435	50-51	76,328
46-47	79,715	51-52	75,341
47-48	78,947	52-53	74,292
48-49	78,128	53-54	73,181
49-50	77,256	54-55	72,010
Total	394,481	Total	371,152

$$\text{Survival rate: } \frac{371{,}152}{394{,}481} = 0.941$$

Thus, the survival rate for the 5-year period is 0.941. Application of this rate to the 50 physicians in the actual physician population indicates that 50 × 0.941 or 47 of the 50 physicians in this age group, 45–49, may be expected to be alive 5 years hence.

The procedure followed above is summarized in formula 2 which may be used to obtain survival rates for any age interval. By substitution in formula 4 it is possible to compute directly the number of physicians of any known age who might be expected to remain alive over a given period.

Through application of formula 2, already referred to, survival indexes for the most commonly used age intervals are derived. These constants, presented in table 1, represent fractions of given groups of physicians who will survive 1 year, 3 years, 5 years, and 10 years hence. By use of this formula, constants may be developed for intervals of different size to estimate physician survival for any desired number of years in the future.

TABLE 1.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in 5-year age intervals who may be expected to survive in designated future years (based upon data from table 4)*

Age interval	1930–39 stationary population for white males in age interval	Fraction of population in age interval who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+5$ or X	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
25-29	441,201	0.997	0.990	0.983	0.961
30-34	433,619	.996	.987	.978	.949
35-39	424,047	.995	.983	.970	.930
40-44	411,492	.993	.977	.959	.902
45-49	394,481	.990	.967	.941	.862
50-54	371,152	.985	.953	.917	.808
55-59	340,191	.979	.933	.881	.731
60-64	299,775	.969	.902	.829	.627
65-69	248,622	.954	.857	.756	.495
70-74	188,007	.931	.793	.655	.344
75-79	123,060	.897	.702	.526	.203
80 and over	96,997	.823	.538	.333	.076

RETIREMENT FROM PRACTICE

Simple counts of physicians are frequently used to portray the extent of professional resources in an area. It should be recognized, however, that such totals provide only approximations to the number of physicians in active practice.

Some insight into the limitation of such totals for measuring the number of physicians participating in the care of sick patients is revealed by analyses prepared by the Directory Department of the American Medical Association (*13*). According to the fifteenth edition of the American Medical Directory, only 137,688, or slightly more than four-fifths, of the 1938 physicians are reported in private practice. An additional 9 percent are listed as interns, residents, or as otherwise devoting the greater part of their time to hospital service. Though not in private practice 2.5 percent of the physicians engage in public health or other work of a professional character, while about the same percentage serve the Federal government. The remaining group of physicians—about 5 percent of the total—are retired or are not in active practice.

Obviously, any correction used to eliminate from gross totals the number of physicians not actively engaged in medical practice will provide a more nearly correct picture of the number who can presumably be drawn upon to provide medical services in a given area. On the other hand, in the appraisal of professional resources, not only hospital physicians but also many engaged in work of a professional character other than private practice must be considered as important assets to the communities where they are located. Many of these physicians in normal times would doubtless take up the private practice of medicine within a few years.

The situation concerning physicians designated as retired and not in practice is entirely different. These physicians are, for the most part, advanced in years and, whether retirement was voluntary or the result of disability associated with age, their capacity for service has generally been greatly curtailed. The high degree of association of this phenomenon with advancing age makes desirable some adjustment of the survival table (stationary population) described in the previous section. This table may be adjusted so that it becomes a survival table for active individuals only. It is then possible, on the basis of findings from base-year studies, to estimate the probability of a physician being active in a current or future year.

Although published data showing the age distribution of physicians retired or not in practice in 1938 are not available, such an analysis has been prepared by this office on the basis of the 1940 American Medical Directory (*14*). Search of the Directory reveals nearly 10,000 physicians in this category. The number of "active" physicians in any given age category is obtained by subtracting from the total for the age group the number designated as "retired" and "not in practice." Comparison of the resulting total with the 1940 United States Census count of gainfully employed physicians (*15*) indicates that the Directory totals for active physicians at the older age levels are considerably in excess of the number reported as gainfully employed at the time of the Census enumeration. On the other hand, a larger number of gainfully employed young physicians were reported by the United States Census than are listed in the Directory. It seems likely that many older physicians fail to inform the Directory of their retirement, whereas at the younger age levels some of those reporting to the Census as being gainfully employed may not have met the requirements for a Directory listing in 1940.

To avoid confusion between active physicians and the degree of their activity, all physicians listed by the Directory but not designated as either "retired" or "not in practice" will henceforth be termed "gainfully employed" for purposes of this paper. Totals for gainfully employed physicians in each 5-year age group are divided by the total for all physicians in the corresponding age interval to obtain the "fraction gainfully employed" at each 5-year age level. The fractions are then plotted above an age scale. From the resulting curve the fraction gainfully employed in each year of age is read and the figures are given in table 5, column 2.

This fraction gainfully employed is essential both to the calculation of physicians presently employed and also to the estimations of survivors who will be employed at some future time. These constants are applicable to any physician population in which employment status is not known for determining the number gainfully employed. For example, the table reveals that 95 percent of the physicians are still gainfully employed at age 55. Therefore, application of this index to a group of 20 physicians who are 55 years of age indicates that 19 would be the most reasonable estimate of the number gainfully employed.

Estimation of fraction gainfully employed for other than single years of age makes necessary some assumption of a standard age distribution which may be applied over the interval so that average values may be computed. For this purpose, the fractions gainfully employed, for each year of age, are applied to the appropriate totals in the stationary population to provide a gainfully employed stationary population (table 6, col. 4). This gainfully employed population possesses the same attributes as characterize the original stationary population except that the totals correspond to gainfully employed physicians only. A fraction gainfully employed to be applied to physician totals for any age group may then be obtained simply by dividing the total in the gainfully employed stationary population for that age interval by the corresponding total in the stationary population. The procedure to be followed in translating numbers of unqualified physicians for any age interval to estimated numbers of employed physicians is given in formula 5.

A PHYSICIAN'S CAPACITY FOR SERVICE

Not only do the physicians per unit of population in one community surpass those of another, but there is also great variation among physicians as to the volume of service that each is able to render. For this reason a count of all physicians or even of those considered as gainfully employed in the practice of medicine represents at best a crude index to the volume of medical services available in a given community. Many physicians, though still active, may have reached so advanced an age that their service capacity is greatly reduced. Likewise, the patient load of younger practitioners in their early years is considerably less than that of physicians in their prime.

Although there is general agreement that age is an important factor in determining the service capacity of the average physician, only recently has it received attention in published figures. Leven (*16*) points out that the amount of idle time consumed in establishing practice represents a complete loss of at least 2 full years for the average physician. He finds that the first 7 years are characterized by a low financial return. Between the eighth and thirty-fifth years, income of physicians is above the average for all years. If practice is continued after this period the income again becomes subnormal. Diminished professional activity associated with advanced age is recognized by the Central Board of Procurement and Assignment Service for Physicians, Dentists, and Veterinarians, a division of the War Manpower Commission (*17*). In testimony before the Senate Subcommittee on Education and Labor dealing with medical manpower, Dr. Lahey stated that the 29,000 private physicians in this country between the ages of 65 and 102 are considered arbitrarily as being 33 percent efficient. Therefore, the appraisal of medical resources in an area or comparison between areas might become more meaningful if physician totals were translated into some standard service equivalent which takes into account the ages of the physicians serving the area.

Average gross income figures prepared by Leland (*18*) or even net income data published by the Department of Commerce (*19, 20*) might be used to develop more specific indexes of professional activity. Although physicians' income figures presented by Leland build up more slowly than do those shown by the Department of Commerce, both of these bodies of data reveal that income builds up from a low figure in the early years of practice to a maximum approximately 20 years later. After this a gradual decline occurs in the average income for physicians which is accelerated in the more advanced age groups. However, Ciocco, Pond, and Altman (*21, 22, 23, 24*) have developed criteria based on the patient loads of physicians in private practice which provide a more direct method for evaluating the service capacity of physicians at different age levels. In recent articles based on studies for the Procurement and Assignment Service these authors point out differences in numbers of patients carried by private practitioners of various ages. Their data verify the apparent fact that communities with equal numbers of physicians do not necessarily have the same facilities for medical care. For example, in a community where all physicians are over 65 years of age there is less service available than in a community of comparable size where an equal number of physicians are under 50.

By contrasting Ciocco's data [6] with those on income, it is evident that numbers of patients seen by active general practitioners build up to a maximum more quickly than income. Comparison of the patient load and income curves plotted by age of physician reveals a remarkable similarity in pattern. The income curve, however, shows a lag of some 5 to 8 years in the age at which the maximum is attained.

The activity of an average private practitioner reaches a peak of approximately 170 patients per week at about age 40. After the peak is reached the physician faces with the advancing years a continuous decline in patient load. By reducing values for average weekly patient load at each 5-year age level to relatives, with the maximum—170 patients at age 40—as unity, a series of adjustment decimal fractions are provided which reflect change in activity with age. When these data are plotted over an age scale and a smooth curve is fitted thereto, approximate measures of a physician's capacity for service at each year of life may be read from the curve.

Index values obtained through this procedure (table 5, col. 3) are interpreted as representing approximate service-year equivalents and reflect, as indicated in the table captions, "fraction service capacity" for gainfully employed physicians. This presupposes, of course, that a physician's service contribution in a community is proportional to the number of patients seen per week by the average gainfully employed physician at that age. In fitting the curve for patient load by age of physicians (fig. 1) it is assumed that no service is rendered in private practice by physicians under 25 years of age. A physician 25 years old renders service equivalent to approximately one-tenth of the maximum service that he will render in his fortieth year of age. The fraction reaches one-fourth when he is 26, one-half at age 28, three-fourths when he is 31, and 100 percent before he is 40. The

[6] The data used as the basis for these procedures represent unpublished numbers of patients seen per week by physicians in 5-year age intervals for the States of Maryland and Georgia.

decline is somewhat more gradual. The fraction reaches three-fourths when he is 53 years of age, one-half at 64 years, one-fourth at age 75, and drops below 10 percent at age 84.

Interpretation of professional equivalents for private practitioners under 30 years of age is subject to a number of qualifying factors. Physicians graduate in no fixed year of life; consequently, there is considerable variation as to the age at which they enter private practice.[7] This, in turn, renders difficult any attempt to estimate the

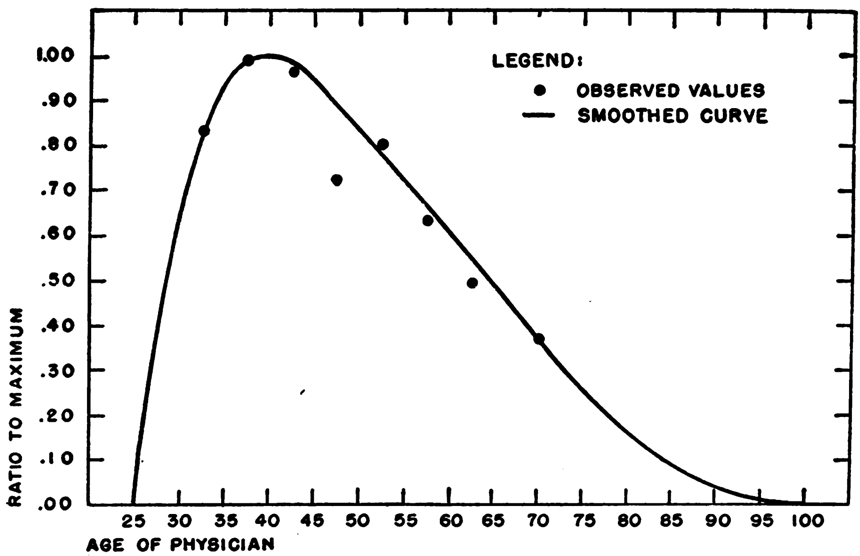

FIGURE 1.—Smooth curve portraying relative number of patients seen in a week in 1942 by active physicians of different ages engaged in private practice. (Number seen at age 40 equals 1.00.)

amount of service furnished by an average physician under 30. Again, data supplied by the private practitioners under 30 cannot be considered as representative of those for all physicians of the age group. In 1940 more than half of the 19,000 physicians less than 30 years old were engaged in hospital service, presumably in an intern or resident capacity. The fraction so classified varied from 83 percent of those 25 years of age to about 27 percent of those at age 29. Beyond these ages the fraction in hospitals represents only a minor part of the total. Naturally, services of these hospital physicians cannot be included in any estimate of average patient load for private practice. Finally,

[7] Data tabulated for physicians listed one or more times during the 15-year period from 1923 to 1938 indicate that the average age of physicians graduated in the years 1925 through 1936 was about 27 years. However, more than one-fourth of these physicians were under 25 at the time of their graduation. An additional one-fourth graduated at age 25. Three-fourths of all medical students had completed their medical school course before reaching their twenty-eighth birthday. Throughout the years changes in the age span including the middle 50 percent of all graduates indicate a tendency for the disparity between ages at graduation to decline. The interquartile range of ages for those graduated in 1923 covered a span of 3.5 years as contrasted with a span of 2.7 years for those graduated in 1936. Inspection of the age distribution for each year indicated that both the median and the average age at graduation were slightly lowered during the period. Under stress of war needs these tendencies have doubtless been accelerated.

young physicians do not as a rule acquire a capacity practice as soon as they finish their training. There is a period of several years over which practice is expanded to its peak. These factors are considered in sketching the younger age intervals on the patient-load curve for physicians as shown in figure 1.

The average private practitioner even up to age 38—the beginning of the peak period—possesses a service potential fully as great or perhaps greater than does a physician between the ages of 38 and 40. Yet, under conditions of competitive practice he is not fully occupied with private patients before the latter period. Nevertheless, in normal times these young physicians are potentially available for more complete utilization.

As the indexes read from figure 1 (tabulated year by year in table 5, col. 3) are based on reports from gainfully employed physicians, they may be used to measure the service capacity of that part of the physician population only. To obtain constants that are applicable to all physicians, the fraction service capacity for each year of age is multiplied by the fraction gainfully employed in the same age category. The resulting series of fractions represents an estimation of the service capacity of an average physician at each year of life when employment status is not known (table 5, col. 4).

If the ages of physicians in an area are known by single years, their combined service capacity may be found at once through the summation of values obtained by applying the appropriate index to the number of practicing physicians in each year of age. For example, in a community there might be eight physicians of unknown employment status whose ages are distributed by years as follows: 29, 40, 50, 50, 64, 64, 64, 79. When the number of physicians in each of the age categories is multiplied by the fraction representing service capacity for that age and the totals summated, results show that actually the eight physicians of various ages have a total service capacity equal to only 4.62 full-service physicians at age 40.

Year of age	Number of physicians	Fraction service capacity	Number of full-service-capacity physicians represented
29	1	0.59	0.59
40	1	.99	.99
50	2	.79	1.58
64	3	.45	1.35
79	1	.11	.11
Total	8		4.62

In the above example employment status is unknown and the fraction service capacity for all physicians is used (table 5, col. 4). Had the physicians all been gainfully employed, the fraction depicting service capacity for gainfully employed physicians would have applied (table 5, col. 3). In that case the total service equivalent for the eight physicians would have been 4.88 full-service physicians.

Obviously, the most precise evaluation of professional resources is determined by selecting appropriate service-equivalent ratios from the year-by-year table in the appendix, multiplying by the actual number of physicians in each year of age, and summating the figures so obtained. As the number of physicians in an area becomes large, however, essentially equivalent results will be found for age intervals of not too great extent by application of summary fractions.

Such summary fractions—service equivalents for other than single years of age—are computed in much the same manner as were the summary fractions for estimating the number gainfully employed. First, a service-equivalent stationary population is obtained by applying the decimal service equivalent value for each year of age (table 5, col. 4) to the total for the appropriate year of age in the gainfully employed stationary population (table 6, col. 4). Service equivalent fractions may then be computed for any desired age interval by taking the total for the age interval from this service-equivalent stationary population and dividing it by the total for the corresponding age group in the stationary population. Following this principle, table 2 is compiled to give a series of summary fractions representing the fraction of physicians who are gainfully employed,

TABLE 2.—*Decimal fractions developed from data presented in table 6 for use in projecting gainfully employed and service equivalent totals from physician counts distributed by 5-year age groups*

Age interval	Fraction gainfully employed in age interval	Fraction service capacity of gainfully employed individuals in age interval	Fraction service capacity of all individuals in age interval
(1)	(2)	(3)	(4)
x to $x+5$ or X	$\frac{L'x}{Lx}$	$\frac{L''x}{L'x}$	$\frac{L''x}{Lx}$
25–29	1.00	0.36	0.36
30–34	1.00	.81	.81
35–39	.99	.98	.97
40–44	.98	.98	.96
45–49	.98	.89	.87
50–54	.97	.77	.74
55–59	.95	.66	.62
60–64	.92	.54	.50
65–69	.88	.43	.38
70–74	.81	.31	.25
75–79	.71	.22	.15
80 and over	.51	.11	.06

the fraction service capacity of gainfully employed and the fraction service capacity of all physicians for each 5-year age interval. For example, table 2 shows that the average fraction service capacity of all physicians in the age group 55–59 years is 0.62. This fraction is obtained by dividing the total (table 6, col. 6) for the age group 55–59 in the service-equivalent stationary population by the total for the same age group in the total stationary population (table 6, col. 2) as follows:

Year of age	Number in service-equivalent stationary population	Number in stationary population
55–56	47,066	70,776
56–57	44,883	69,478
57–58	42,707	68,114
58–59	39,485	66,674
59–60	37,356	65,149
Total	211,497	340,191

Fraction service capacity: $\frac{211,497}{340,191}=0.62$

Other summary constants can be computed in like manner for age intervals of different size that coincide more nearly with data at hand. Such summary indexes will doubtless be used in the solution of most evaluation problems as distributions by single years of age are seldom available. When the fraction 0.62 is applied to an unqualified total of 19 physicians in the age group 55–59 ($19\times0.62=11.78$) the findings show that the 19 physicians are equivalent to about 12 full-service-capacity physicians at age 40. This method for conversion of unqualified physician totals in a specified age category to service equivalents is summarized in formula 6. Where physician totals are confined to employed physicians, similar conversions may be made by application of formula 7.

AVERAGE FUTURE EXPECTANCY

Procedures outlined in the preceding sections make possible both the projection of physician totals obtained from base-year studies to current and future years and the translation of such totals so as to take into account the significance of retirement and differences in service capacity associated with advancing age. In addition, the stationary populations derived for these purposes have properties which make possible the estimation of average future expectancies per physician. From a stationary population, average future years of life—commonly spoken of as life expectancy—may be computed for individuals in any year of age. In table 7 are presented data showing the total future years of life for all individuals in the stationary population by single years of age, corresponding totals adjusted to eliminate years of retirement, and, in a final section, the service equivalent of all remaining years of life. Division of these totals by the corresponding totals in the stationary population provides measures of average future years of life, average future years of gainful employment, and average service capacity years per individual.

These average expectancy values may be used to estimate the total potential resources for future years reflected in physician totals as of a given date, provided that no replacements are made and that all losses are measured by mortality rates for white males over the period from 1930 to 1939.

Reference to table 5, column 3, reveals that while the service equivalent value of an employed physician at age 30 under the prevailing system of practice is roughly that of a physician at age 56, an estimate of the future service that the younger physician may be expected to render throughout the balance of his career will be greatly in excess of that for the older man (table 7). At the former age a physician may expect to live 38 years, he may practice 35 years, and his service will be equivalent to 26 full-service years. At age 56, on the other hand, he may expect to live only 17 years, he will remain active for 15 years, and the full-service equivalent of his remaining practice will be only 7 years. Thus, the future service capacity is 3.7 times as large for the former as for the latter physician.

The future years of life, the future years of gainful employment, and the future years of maximum service are summarized by 5-year age intervals in table 3. Obviously the facilities represented by an individual physician are constantly changing with age, and his future professional expectancy may be thought of as continuously and progressively depreciating with advancing years. The future expectancy for service in a community, therefore, depends not only on the number of physicians located therein, but also—and to a very important degree—upon the age of the physicians making up the total.

TABLE 3.—*Average expectancy for years of life, years of gainful employment, and years of service capacity developed from data presented in tables 6 and 7 for estimating over-all resources for future years from physician counts distributed by 5-year age groups*

Age interva	Average future years remaining to individuals in age interval			Average future years remaining to gainfully employed individuals in age interval	
	Years of life	Years of gainful employment	Years of service capacity	Years of gainful employment	Years of service capacity
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+5$ or X	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
25-29	40.2	37.7	27.2	37.7	27.2
30-34	35.9	33.3	24.7	33.4	24.7
35-39	31.7	29.0	20.6	29.3	20.8
40-44	27.5	24.9	16.3	25.3	16.5
45-49	23.6	21.0	12.3	21.5	12.6
50-54	19.9	17.3	8.9	17.9	9.2
55-59	16.5	13.8	6.1	14.6	6.5
60-64	13.4	10.7	3.9	11.6	4.3
65-69	10.6	7.9	2.3	9.0	2.6
70-74	8.2	5.5	1.2	6.8	1.5
75-79	6.2	3.6	.5	5.1	.8
80 and over	4.2	1.8	.1	3.5	.3

SUMMARY

Findings by various groups working with problems of medical care in this country make it apparent that a plain numerical count of physicians does not provide a true picture of available resources. Existing data indicate that the number of patients seen per week by an average physician in private practice declines steadily after age 40. Furthermore, relatively few physicians formally retire until they are well advanced in age, although in many instances their activities so decline in the later years of active practice that their service contribution is very limited. In planning for the future, gross counts of physicians are of even less value because future expectancies for both total and professional years of life decline sharply with advance in age.

In this study, retirement and change in professional capacity associated with the aging of physicians are explored to determine their bearing on current estimates of resources. Life-table techniques are utilized to evaluate quantitatively their cumulative effect over a period of years.

The results of the investigations outlined are summarized as a series of formulas for use in measuring physician resources of a community at any given time.

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Appendix A—Tables

TABLE 4.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in single years of age who may be expected to survive in designated future years*

Year of age	1930–39 stationary population for white males in year of age	Fraction of population in year of age who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+1$	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
25–26	88,795	0.997	0.991	0.984	0.965
26–27	88,522	.997	.990	.984	.963
27–28	88,246	.997	.990	.983	.961
28–29	87,964	.997	.990	.982	.959
29–30	87,674	.997	.989	.981	.957
30–31	87,374	.996	.989	.980	.955
31–32	87,063	.996	.988	.979	.952
32–33	86,740	.996	.988	.978	.949
33–34	86,401	.996	.987	.977	.946
34–35	86,041	.996	.986	.975	.943
35–36	85,661	.995	.985	.974	.939
36–37	85,258	.995	.984	.972	.935
37–38	84,832	.995	.983	.971	.931
38–39	84,384	.994	.982	.969	.926
39–40	83,912	.994	.981	.967	.921
40–41	83,415	.994	.980	.964	.915
41–42	82,890	.993	.979	.962	.909
42–43	82,334	.993	.977	.959	.902
43–44	81,742	.992	.975	.956	.895
44–45	81,111	.992	.973	.952	.888
45–46	80,435	.991	.971	.949	.880
46–47	79,715	.990	.969	.945	.872
47–48	78,947	.990	.967	.941	.863
48–49	78,128	.989	.964	.937	.853
49–50	77,256	.988	.962	.932	.843

TABLE 4.—*Stationary population for white males based upon 1930–39 mortality and the decimal fraction of those in single years of age who may be expected to survive in designated future years*—Continued

Year of age	1930–39 stationary population for white males in year of age	Fraction of population in year of age who may be expected to survive in designated future years			
		1 year hence	3 years hence	5 years hence	10 years hence
(1)	(2)	(3)	(4)	(5)	(6)
x to $x+1$	L_x	$\frac{L_{x+1}}{L_x}$	$\frac{L_{x+3}}{L_x}$	$\frac{L_{x+5}}{L_x}$	$\frac{L_{x+10}}{L_x}$
50–51	76,328	.987	.959	.927	.832
51–52	75,341	.986	.956	.922	.821
52–53	74,292	.985	.953	.917	.808
53–54	73,181	.984	.949	.911	.795
54–55	72,010	.983	.946	.905	.780
55–56	70,776	.982	.942	.898	.765
56–57	69,478	.980	.938	.890	.749
57–58	68,114	.979	.933	.881	.731
58–59	66,674	.977	.927	.872	.713
59–60	65,149	.975	.922	.863	.693
60–61	63,536	.973	.915	.852	.672
61–62	61,834	.971	.909	.841	.650
62–63	60,042	.969	.902	.829	.627
63–64	58,163	.966	.894	.817	.603
64–65	56,200	.964	.886	.803	.577
65–66	54,155	.961	.877	.788	.550
66–67	52,023	.957	.868	.773	.522
67–68	49,805	.954	.857	.756	.493
68–69	47,506	.950	.846	.738	.463
69–70	45,133	.946	.834	.719	.433
70–71	42,693	.941	.821	.698	.402
71–72	40,193	.936	.807	.676	.370
72–73	37,641	.931	.792	.653	.339
73–74	35,050	.925	.775	.628	.309
74–75	32,430	.919	.757	.602	.279
75–76	29,797	.912	.739	.575	.250
76–77	27,167	.904	.719	.548	.222
77–78	24,563	.896	.698	.520	.196
78–79	22,007	.887	.677	.492	.171
79–80	19,526	.878	.654	.463	.148
80–81	17,145	.868	.631	.435	.127
81–82	14,889	.858	.608	.406	.108
82–83	12,777	.847	.583	.377	.091
83–84	10,825	.836	.558	.348	.076
84–85	9,047	.823	.532	320	.063
85–86	7,450	.810	.506	.293	.051
86–87	6,038	.797	.479	.267	.041
87–88	4,812	.783	.453	.242	.033
88–89	3,767	.768	.428	.218	.025
89–90	2,895	.754	.402	.196	.019
90–91	2,182	.739	.377	.175	.015
91–92	1,612	.723	.352	.154	.018
92–93	1,165	.706	.327	.135	.005
93–94	823	.689	.301	.117	.001
94–95	567	.672	.277	.099	.004
95–96	381	.651	.252	.084	.003
96–97	248	.633	.226	.069	----------
97–98	157	.611	.204	.057	----------
98–99	96	.583	.177	.042	----------
99–100	56	.571	.161	.036	----------
100–101	32	.531	.125	.031	----------
101–102	17	.529	.118	----------	----------
102–103	9	.444	.111	----------	----------
103–104	4	.500	----------	----------	----------
104–105	2	.500	----------	----------	----------
105–106	1	----------	----------	----------	----------

TABLE 5.—*Decimal fractions based upon 1940 physician data showing (a) physicians gainfully employed in single years of age, (b) service capacity of gainfully employed physicians based upon relative number of patients seen weekly by gainfully employed general practitioners, and (c) service capacity of all physicians expressed as the product of decimals showing fraction gainfully employed and their service capacity*

Year of age	Fraction of all physicians in year of age who were gainfully employed	Fraction service capacity of gainfully employed physicians in year of age	Fraction service capacity of all physicians in year of age	Year of age	Fraction of all physicians in year of age who were gainfully employed	Fraction service capacity of gainfully employed physicians in year of age	Fraction service capacity of all physicians in year of age
(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
x to $x+1$	r'_x	r''_x	$r''_x r'_x$	x to $x+1$	r'_x	r''_x	$r''_x r'_x$
25–26	1.00	0.10	0.10	65–66	.90	.47	.42
26–27	1.00	.24	.24	66–67	.89	.45	.40
27–28	1.00	.37	.37	67–68	.88	.42	.37
28–29	1.00	.48	.48	68–69	.87	.40	.35
29–30	1.00	.59	.59	69–70	.85	.38	.32
30–31	1.00	.68	.68	70–71	.84	.35	.29
31–32	1.00	.76	.76	71–72	.83	.33	.27
32–33	1.00	.83	.83	72–73	.81	.31	.25
33–34	1.00	.88	.88	73–74	.80	.29	.23
34–35	.99	.92	.91	74–75	.77	.27	.21
35–36	.99	.95	.94	75–76	.75	.25	.19
36–37	.99	.97	.96	76–77	.73	.23	.17
37–38	.99	.99	.98	77–78	.70	.21	.15
38–39	.99	1.00	.99	78–79	.68	.19	.13
39–40	.99	1.00	.99	79–80	.66	.17	.11
40–41	.99	1.00	.99	80–81	.63	.15	.09
41–42	.99	.99	.98	81–82	.60	.14	.08
42–43	.98	.98	.96	82–83	.57	.12	.07
43–44	.98	.97	.95	83–84	.53	.11	.06
44–45	.98	.95	.93	84–85	.51	.08	.04
45–46	.98	.93	.91	85–86	.47	.08	.04
46–47	.98	.91	.89	86–87	.44	.07	.03
47–48	.98	.89	.87	87–88	.41	.06	.02
48–49	.97	.87	.84	88–89	.37	.05	.02
49–50	.97	.84	.81	89–90	.33	.04	.01
50–51	.97	.81	.79	90–91	.31	.03	.01
51–52	.97	.79	.77	91–92	.28	.02	.01
52–53	.97	.77	.75	92–93	.25	.02	.01
53–54	.96	.75	.72	93–94	.22	.02	------------
54–55	.96	.72	.69	94–95	.18	.01	------------
55–56	.95	.70	.66	95–96	.15	.01	------------
56–57	.95	.68	.65	96–97	.12	.01	------------
57–58	.95	.66	.63	97–98	.09	.01	------------
58–59	.94	.63	.59	98–99	.05	.01	------------
59–60	.94	.61	.57	99–100	.02	------------	------------
60–61	.94	.59	.55				
61–62	.93	.56	.52				
62–63	.92	.54	.50				
63–64	.91	.52	.47				
64–65	.90	.50	.45				

Table 6.—*Stationary population for white males based upon 1930–39 mortality and corresponding gainfully employed and service capacity stationary populations developed for use in projecting future totals from base-year counts of physicians*

Year of age	Stationary population for white males		Gainfully employed stationary population		Service capacity of stationary population	
	In year of age	In year of age and all later years	In year of age	In year of age and all later years	In year of age	In year of age and all later years
(1)	(2)	(3)	(4)	(5)	(6)	(7)
x to $x+1$	L_x	T_x	r'_xL_x or L'_x	T'_x	$r'_xr''_xL_x$ or L''_x	T''_x
25–26	88,795	3,772,644	88,795	3,548,300	8,880	2,461,803
26–27	88,522	3,683,849	88,522	3,459,505	21,245	2,452,923
27–28	88,246	3,595,327	88,246	3,370,983	32,651	2,431,678
28–29	87,964	3,507,081	87,964	3,282,737	42,223	2,399,027
29–30	87,674	3,419,117	87,674	3,194,773	51,728	2,356,804
30–31	87,374	3,331,443	87,374	3,107,099	59,414	2,305,076
31–32	87,063	3,244,069	87,063	3,019,725	66,168	2,245,662
32–33	86,740	3,157,006	86,740	2,932,662	71,994	2,179,494
33–34	86,401	3,070,266	86,401	2,845,922	76,033	2,107,500
34–35	86,041	2,983,865	85,181	2,759,521	78,367	2,031,467
35–36	85,661	2,897,824	84,804	2,674,340	80,564	1,953,100
36–37	85,258	2,812,163	84,405	2,589,536	81,873	1,872,536
37–38	84,832	2,726,905	83,984	2,505,131	83,144	1,790,663
38–39	84,384	2,642,073	83,540	2,421,147	83,540	1,707,519
39–40	83,912	2,557,689	83,073	2,337,607	83,073	1,623,979
40–41	83,415	2,473,777	82,581	2,254,534	82,581	1,540,906
41–42	82,890	2,390,362	82,061	2,171,953	81,240	1,458,325
42–43	82,334	2,307,472	80,687	2,089,892	79,073	1,377,085
43–44	81,742	2,225,138	80,107	2,009,205	77,704	1,298,012
44–45	81,111	2,143,396	79,489	1,929,098	75,515	1,220,308
45–46	80,435	2,062,285	78,826	1,849,609	73,308	1,144,793
46–47	79,715	1,981,850	78,121	1,770,783	71,090	1,071,485
47–48	78,947	1,902,135	77,368	1,692,662	68,858	1,000,395
48–49	78,128	1,823,188	75,784	1,615,294	65,932	931,537
49–50	77,256	1,745,060	74,938	1,539,510	62,948	865,605
50–51	76,328	1,667,804	74,038	1,464,572	59,971	802,657
51–52	75,341	1,591,476	73,081	1,390,534	57,734	742,686
52–53	74,292	1,516,135	72,063	1,317,453	55,489	684,952
53–54	73,181	1,441,843	70,254	1,245,390	52,691	629,463
54–55	72,010	1,368,662	69,130	1,175,136	49,774	576,772
55–56	70,776	1,296,652	67,237	1,106,006	47,066	526,998
56–57	69,478	1,225,876	66,004	1,038,769	44,883	479,932
57–58	68,114	1,156,398	64,708	972,765	42,707	435,049
58–59	66,674	1,088,284	62,674	908,057	39,485	392,342
59–60	65,149	1,021,610	61,240	845,383	37,356	352,857
60–61	63,536	956,461	59,724	784,143	35,237	315,501
61–62	61,834	892,925	57,506	724,419	32,203	280,264
62–63	60,042	831,091	55,239	666,913	29,829	248,061
63–64	58,163	771,049	52,928	611,674	27,523	218,232
64–65	56,200	712,886	50,580	558,746	25,290	190,709
65–66	54,155	656,686	48,740	508,166	22,908	165,419
66–67	52,023	602,531	46,300	459,426	20,835	142,511
67–68	49,805	550,508	43,828	413,126	18,408	121,676
68–69	47,506	500,703	41,330	369,298	16,532	103,268
69–70	45,133	453,197	38,363	327,968	14,578	86,736
70–71	42,693	408,064	35,862	289,605	12,552	72,158
71–72	40,193	365,371	33,360	253,743	11,009	59,606
72–73	37,641	325,178	30,489	220,383	9,452	48,597
73–74	35,050	287,537	28,040	189,894	8,132	39,145
74–75	32,430	252,487	24,971	161,854	6,742	31,013

TABLE 6.—*Stationary population for white males based upon 1930–39 mortality and corresponding gainfully employed and service capacity stationary populations developed for use in projecting future totals from base-year counts of physicians*—Continued

Year of age	Stationary population for white males		Gainfully employed stationary population		Service capacity of stationary population	
	In year of age	In year of age and all later years	In year of age	In year of age and all later years	In year of age	In year of age and all later years
(1)	(2)	(3)	(4)	(5)	(6)	(7)
x to $x+1$	L_x	T_x	r'_xL_x or L'_x	T'_x	$r'_xr''_xL_x$ or L''_x	T''_x
75–76	29,797	220,057	22,348	136,883	5,587	24,271
76–77	27,167	190,260	19,832	114,535	4,561	13,684
77–78	24,563	163,093	17,194	94,703	3,611	14,123
78–79	22,007	138,530	14,965	77,509	2,843	10,512
79–80	19,526	116,523	12,887	62,544	2,191	7,669
80–81	17,145	96,997	10,801	49,657	1,620	5,478
81–82	14,889	79,852	8,933	38,856	1,251	3,858
82–83	12,777	64,963	7,283	29,923	874	2,607
83–84	10,825	52,186	5,737	22,640	631	1,733
84–85	9,047	41,361	4,614	16,903	369	1,102
85–86	7,450	32,314	3,502	12,289	280	733
86–87	6,038	24,864	2,657	8,787	186	453
87–88	4,812	18,826	1,973	6,130	118	267
88–89	3,767	14,014	1,394	4,157	70	149
89–90	2,895	10,247	955	2,763	38	79
90–91	2,182	7,352	676	1,808	20	41
91–92	1,612	5,170	451	1,132	9	21
92–93	1,165	3,558	291	681	6	12
93–94	823	2,393	181	390	4	6
94–95	567	1,570	102	209	1	2
95–96	381	1,003	57	107	1	1
96–97	248	622	30	50		
97–98	157	374	14	20		
98–99	96	217	5	6		
99–100	56	121	1	1		
100–101	32	65				
101–102	17	33				
102–103	9	16				
103–104	4	7				
104–105	2	3				
105–106	1	1				

TABLE 7.—*Total and average expectancy for years of life, years of gainful employment. and years of service capacity developed from 1930–39 stationary population for white males for use in estimating over-all resources for future years from base-year counts of physicians*

Year of age	Future years remaining at middle of year of age for individuals in stationary population							
	Years of life		Years of gainful employment			Years of service capacity		
	Total all individuals	Average all individuals	Total all individuals	Average: All individuals	Average: Gainfully employed individuals	Total all individuals	Average: All individuals	Average: Gainfully employed individuals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
x to $x+1$	$T_x-\frac{1}{2}L_x$	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$T'_x-\frac{1}{2}L'_x$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$T''_x-\frac{1}{2}L''_x$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
25–26	3,728,246	42.0	3,503,902	39.4	39.4	2,457,363	27.7	27.7
26–27	3,639,588	41.1	3,415,244	38.6	38.6	2,442,300	27.6	27.6
27–28	3,551,204	40.2	3,326,860	37.7	37.7	2,415,352	27.4	27.4
28–29	3,463,099	39.4	3,238,755	36.8	36.8	2,377,915	27.0	27.0
29–30	3,375,280	38.5	3,150,936	35.9	35.9	2,330,940	26.6	26.6
30–31	3,287,756	37.6	3,063,412	35.1	35.1	2,275,369	26.0	26.0
31–32	3,200,537	36.8	2,976,193	34.2	34.2	2,212,578	25.4	25.4
32–33	3,113,636	35.9	2,889,292	33.3	33.3	2,143,497	24.7	24.7
33–34	3,027,065	35.0	2,802,721	32.4	32.4	2,069,483	24.0	24.0
34–35	2,940,844	34.2	2,716,930	31.6	31.9	1,992,283	23.2	23.4
35–36	2,854,993	33.3	2,631,938	30.7	31.0	1,912,818	22.3	22.6
36–37	2,769,534	32.5	2,547,333	29.9	30.2	1,831,599	21.5	21.7
37–38	2,684,489	31.6	2,463,139	29.0	29.3	1,749,091	20.6	20.8
38–39	2,599,881	30.8	2,379,377	28.2	28.5	1,665,749	19.7	19.9
39–40	2,515,733	30.0	2,296,070	27.4	27.6	1,582,442	18.9	19.0
40–41	2,432,069	29.2	2,213,243	26.5	26.8	1,499,615	18.0	18.2
41–42	2,348,917	28.3	2,130,922	25.7	26.0	1,417,705	17.1	17.3
42–43	2,266,305	27.5	2,049,548	24.9	25.4	1,337,548	16.2	16.6
43–44	2,184,267	26.7	1,969,151	24.1	24.6	1,259,160	15.4	15.7
44–45	2,102,840	25.9	1,889,353	23.3	23.8	1,182,550	14.6	14.9
45–46	2,022,067	25.1	1,810,196	22.5	23.0	1,108,139	13.8	14.1
46–47	1,941,992	24.4	1,731,722	21.7	22.2	1,035,940	13.0	13.3
47–48	1,862,661	23.6	1,653,978	21.0	21.4	965,966	12.2	12.5
48–49	1,784,124	22.8	1,577,825	20.2	20.8	898,571	11.5	11.9
49–50	1,706,432	22.1	1,502,041	19.4	20.0	834,131	10.8	11.1
50–51	1,629,640	21.4	1,427,553	18.7	19.3	772,671	10.1	10.4
51–52	1,553,805	20.6	1,353,993	18.0	18.5	713,819	9.5	9.8
52–53	1,478,989	19.9	1,281,421	17.2	17.8	657,207	8.8	9.1
53–54	1,405,252	19.2	1,210,263	16.5	17.2	603,117	8.2	8.6
54–55	1,332,657	18.5	1,140,571	15.8	16.5	551,885	7.7	8.0
55–56	1,261,264	17.8	1,072,387	15.2	15.9	503,465	7.1	7.5
56–57	1,191,137	17.1	1,005,767	14.5	15.2	457,490	6.6	6.9
57–58	1,122,341	16.5	940,411	13.8	14.5	413,695	6.1	6.4
58–59	1,054,947	15.8	876,720	13.1	14.0	372,590	5.6	5.9
59–60	989,035	15.2	814,763	12.5	13.3	334,179	5.1	5.5
60–61	924,693	14.6	754,281	11.9	12.6	297,882	4.7	5.0
61–62	862,008	13.9	695,666	11.2	12.1	264,162	4.3	4.6
62–63	801,070	13.3	639,293	10.6	11.6	233,146	3.9	4.2
63–64	741,967	12.8	585,210	10.1	11.1	204,470	3.5	3.9
64–65	684,786	12.2	533,456	9.5	10.5	178,064	3.2	3.5
65–66	629,608	11.6	483,796	8.9	9.9	153,965	2.8	3.2
66–67	576,519	11.1	436,276	8.4	9.4	132,093	2.5	2.8
67–68	525,605	10.6	391,212	7.9	8.9	112,472	2.3	2.6
68–69	476,950	10.0	348,633	7.3	8.4	95,002	2.0	2.3
69–70	430,630	9.5	308,786	6.8	8.0	79,447	1.8	2.1
70–71	386,717	9.0	271,674	6.4	7.6	65,882	1.5	1.8
71–72	345,274	8.6	237,063	5.9	7.1	54,101	1.3	1.6
72–73	306,357	8.1	206,363	5.5	6.7	43,871	1.2	1.4
73–74	270,012	7.7	175,874	5.0	6.3	35,079	1.0	1.2
74–75	236,272	7.3	149,368	4.6	6.0	27,642	.9	1.1

Table 7.—*Total and average expectancy for years of life, years of gainful employment, and years of service capacity developed from 1930–39 stationary population for white males for use in estimating over-all resources for future years from base-year counts of physicians*—Continued

Year of age	Future years remaining at middle of year of age for individuals in stationary population							
	Years of life		Years of gainful employment			Years of service capacity		
	Total all individuals	Average all individuals	Total all individuals	Average: All individuals	Average: Gainully employed individuals	Total all individuals	Average: All individuals	Average: Gainfully employed individuals
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
x to $x+1$	$T_x-\frac{1}{2}L_x$	$\frac{T_x-\frac{1}{2}L_x}{L_x}$	$T'_x-\frac{1}{2}L'_x$	$\frac{T'_x-\frac{1}{2}L'_x}{L_x}$	$\frac{T'_x-\frac{1}{2}L'_x}{L'_x}$	$T''_x-\frac{1}{2}L''_x$	$\frac{T''_x-\frac{1}{2}L''_x}{L_x}$	$\frac{T''_x-\frac{1}{2}L''_x}{L'_x}$
75–76	205,158	6.9	125,709	4.2	5.6	21,477	.7	1.0
76–77	176,676	6.5	104,619	3.8	5.3	16,403	.6	.8
77–78	150,811	6.1	86,106	3.5	5.0	12,317	.5	.7
78–79	127,526	5.8	70,026	3.2	4.7	9,090	.4	.6
79–80	106,760	5.5	56,100	2.9	4.4	6,573	.3	.5
80–81	88,424	5.2	44,256	2.6	4.1	4,668	.3	.4
81–82	72,407	4.9	34,389	2.3	3.8	3,232	.2	.4
82–83	58,574	4.6	26,281	2.1	3.6	2,170	.2	.3
83–84	46,773	4.3	19,771	1.8	3.4	1,417	.1	.2
84–85	36,837	4.1	14,596	1.6	3.2	917	.1	.2
85–86	28,589	3.8	10,538	1.4	3.0	593	.1	.2
86–87	21,845	3.6	7,458	1.2	2.8	360	.1	.1
87–88	16,420	3.4	5,143	1.1	2.6	208	---	.1
88–89	12,130	3.2	3,460	.9	2.5	114	---	.1
89–90	8,799	3.0	2,285	.8	2.4	60	---	.1
90–91	6,261	2.9	1,470	.7	2.2	31	---	---
91–92	4,364	2.7	906	.6	2.0	16	---	---
92–93	2,975	2.6	535	.5	1.8	9	---	---
93–94	1,981	2.4	299	.4	1.7	4	---	---
94–95	1,286	2.3	158	.3	1.5	1	---	---
95–96	812	2.1	78	.2	1.4	---	---	---
96–97	498	2.0	35	.1	1.2	---	---	---
97–98	295	1.9	13	.1	.9	---	---	---
98–99	169	1.8	3	---	.6	---	---	---
99–100	93	1.7	---	---	---	---	---	---
100–101	49	1.5	---	---	---	---	---	---
101–102	24	1.4	---	---	---	---	---	---
102–103	11	1.2	---	---	---	---	---	---
103–104	5	1.2	---	---	---	---	---	---
104–105	2	1.0	---	---	---	---	---	---
105–106	1	1.0	---	---	---	---	---	---

Appendix B—Formulas

SECTION 1.—GENERAL FORMULAS [1]

Formula 1.—Fraction of physicians in a designated year of age who may be expected to survive over some specified number of years.

$$\frac{L_{x+d}}{L_x}$$

Let: x = lower limit of year of age

$x+1$ = upper limit of year of age

d = number of years in the specified survival period

L_x = stationary population in the designated year of age x to $x+1$

L_{x+d} = stationary population in the year of age $x+d$ to $x+1+d$

[1] Values for L_x, L'_x, L''_x may be obtained from table 6.

FORMULA 2.—Fraction of physicians in a designated broad age interval who may be expected to survive over some specified number of years.

$$\frac{L_{X+d}}{L_X}$$

Let: L_X=stationary population in the designated broad age interval (obtained by summating stationary population for the years of age within the broad interval)
d=number of years in the specified survival period
L_{X+d}=stationary population surviving d years hence from those in the broad age interval (obtained by summating stationary population for the years of age d years older than those entering in the L_X summation)

FORMULA 3.—Number of physicians in a designated year of age who may be expected to survive over some specified number of years.

$$S_{x+d}=P_x\left\{\frac{L_{x+d}}{L_x}\right\}$$

Let: S_{x+d}=survivors from an enumerated physician total in the year of age x to $x+1$ over a specified number of years d
P_x=enumerated physician total for the designated year of age x to $x+1$
$\frac{L_{x+d}}{L_x}$=see formula 1

FORMULA 4.—Number of physicians in a designated broad age interval who may be expected to survive over some specified number of years.

$$S_{X+d}=P_X\left\{\frac{L_{X+d}}{L_X}\right\}$$

Let: S_{X+d}=survivors from the enumerated physician total in the broad age interval X over a specified number of years d
P_X=enumerated physician total in the broad age interval X
$\frac{L_{X+d}}{L_X}$=see formula 2

FORMULA 5.—Estimated number of gainfully employed physicians in an unqualified total for a designated broad age interval.

$$E_X=P_X\left\{\frac{L'_X}{L_X}\right\}$$

Let: E_X=estimated gainfully employed physicians in the designated broad age interval X
P_X=enumerated physician total in the designated broad age interval X
L_X=stationary population in the broad age interval X
L'_X=gainfully employed stationary population in the broad age interval X

FORMULA 6.—Estimated number of service equivalents in an unqualified total for a designated broad age interval.

$$C_X=P_X\left\{\frac{L''_X}{L_X}\right\}$$

Let: C_X=estimated service equivalents in the designated broad age interval X
P_X=enumerated physician total in the designated broad age interval X
L_X=stationary population in the broad age interval X
L''_X=service-equivalent stationary population in the broad age interval X

FORMULA 7.—Estimated service equivalents of gainfully employed physicians in a designated broad age interval.

$$CE_X=GE_X\left\{\frac{L''_X}{L'_X}\right\}$$

Let: CE_X=estimated service equivalents of gainfully employed physicians in the designated age group X

GE_X=enumerated total gainfully employed physicians in the designated broad age interval X

L'_X=gainfully employed stationary population in the broad age interval X

L''_X=service-equivalent stationary population in the broad age interval X

SECTION 2.—SPECIAL FORMULAS FOR ESTIMATING AVERAGE FUTURE YEARS OF EXPECTANCY

In table 6 future years of employment, T'_x, and future years of service capacity, T''_x, have been accumulated from L'_x and L''_x, respectively. These columns may be used for the determination of average future expectancies, as is the T_x column of the standard life table.

The value T_x (table 6) corresponds to the estimate of future years of life for individuals in the year of age x to $x+1$ as of the beginning of the age interval. When it is assumed that individuals are equally spaced in time and expectancies are desired for the average individual in an age group, the T_x total is adjusted to take into account the fact that as of a given time some individuals in the age interval have only just reached that age whereas others have nearly reached their next birthday. On the average, individuals in the age interval x to $x+1$ have already lived one-half of the time over which they may be classified in the interval. Therefore, the future years of life remaining to individuals in the age interval x to $x+1$ actually correspond to the usual T_x diminished by one-half of the years they might live in the interval x to $x+1$, or $T_x-\frac{1}{2}L_x$ (table 7). As T'_x, T''_x, L'_x, and L''_x are derived from the same base as is T_x, like adjustments are made in these values. Therefore, total future years of gainful employment for the group L'_x is $T'_x-\frac{1}{2}L'_x$, while total future years of service capacity is $T''_x-\frac{1}{2}L''_x$.

From these values L_x, L'_x, L''_x, $T_x-\frac{1}{2}L_x$, $T'_x-\frac{1}{2}L'_x$ and $T''_x-\frac{1}{2}L''_x$ average future expectancies which have special bearing upon the problem of estimating physician resources can be computed from the following formulas.

FORMULA 8.—Average estimated future years of life per physician in a designated broad age interval.

$$\frac{T_X-\frac{1}{2}L_X}{L_X}$$

Let: T_X=sum of the T_x values for years of age included in the designated broad age interval X

L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 9.—Average estimated future years of gainful employment per physician in a designated broad age interval.

$$\frac{T'_X-\frac{1}{2}L'_X}{L_X}$$

Let: T'_X=sum of the T'_x values for years of age included in the designated broad age interval X

L'_X=sum of the L'_x values for years of age included in the broad age interval X

L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 10.—Average estimated future years of gainful employment per gainfully employed physician in a designated broad age interval.

$$\frac{T'_X-\frac{1}{2}L'_X}{L'_X}$$

Let: T'_X=sum of the T'_x values for years of age included in the designated broad age interval X

L'_X=sum of the L'_x values for years of age included in the broad age interval X.

FORMULA 11.—Average estimated future service-year equivalents per physician in a designated broad age interval.

$$\frac{T''_X - \frac{1}{2}L''_X}{L_X}$$

Let: T''_X=sum of the T''_x values for years of age included in the designated broad age interval X
L''_X=sum of the L''_x values for years of age included in the broad age interval X
L_X=sum of the L_x values for years of age included in the broad age interval X.

FORMULA 12.—Average estimated service-year equivalents per gainfully employed physician in a designated broad age interval.

$$\frac{T''_X - \frac{1}{2}L''_X}{L'_X}$$

Let: T''_X=sum of the T''_x values for years of age included in the designated broad age interval X
L''_X=sum of the L''_x values for years of age included in the broad age interval X
L'_X=sum of the L'_x values for years of age included in the designated broad age interval X.

DEATHS DURING WEEK ENDED FEBRUARY 19, 1944

[From the Weekly Mortality Index, issued by the Bureau of the Census, Department of Commerce]

	Week ended Feb. 19, 1944	Corresponding week, 1943
Data for 89 large cities of the United States:		
Total deaths	9,698	10,331
Average for 3 prior years	9,633	
Total deaths, first 7 weeks of year	73,512	71,316
Deaths under 1 year of age	628	679
Average for 3 prior years	597	
Deaths under 1 year of age, first 7 weeks of year	4,375	5,037
Data from industrial insurance companies:		
Policies in force	66,306,324	65,363,449
Number of death claims	14,178	13,574
Death claims per 1,000 policies in force, annual rate	11.2	10.8
Death claims per 1,000 policies, first 7 weeks of year, annual rate	12.1	10.7

PREVALENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 26, 1944

Summary

The incidence of meningococcus meningitis continues high and increased slightly during the week. A total of 552 cases was reported currently as compared with 529 for the preceding week, 484 for the corresponding week last year, and a 5-year (1939–43) median of 51 cases. Slight increases were recorded for 5 geographic areas, decreases in 3, while the East North Central area reported the same number of cases each week. A total of 4,488 cases has been reported to date this year, as compared with 2,959 for the corresponding period last year.

Of the other common communicable diseases listed in the weekly table following, the incidence of only measles and scarlet fever is above that both for last week and the median expectancy. The cumulative figure for measles is higher than for any prior year since 1938, while the number of cases of scarlet fever reported to date exceeds that for any prior year since 1939. The incidence of both influenza and poliomyelitis is below the median expectancy. To date, new low records have been established for both diphtheria and whooping cough, the number of cases of the latter disease reported to date being less than half the figures for last year and the 5-year median.

More cases of typhoid fever have been reported to date this year than for the same period for any prior year since 1939, largely accounted for by recent outbreaks in Indiana and Kentucky. Of 65 cases reported for the current week, as compared with 91 for the preceding week, 12 cases occurred in Indiana, 8 in Ohio, and 7 in Texas.

Mortality in large cities for the current week is below both the figure for last week and the 3-year (1941–43) average. A total of 9,591 deaths was reported in 90 large cities, as compared with 9,744 last week and a 3-year average of 9,617. The deaths in these cities to date this year total 83,358, as compared with 81,891 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median

In these tables a zero indicates a definite report, while leaders imply that, although none was reported, cases may have occurred.

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43	Week ended— Feb. 26, 1944	Week ended— Feb. 27, 1943	Median 1939–43
NEW ENGLAND												
Maine	1	0	0	3	1	9	182	8	138	1	17	0
New Hampshire	0	0	0	......	......	......	22	51	15	1	0	0
Vermont	0	0	0	8	......	......	195	349	5	2	1	0
Massachusetts	10	1	2	......	......	......	453	743	411	9	13	4
Rhode Island	0	0	0	......	1	......	333	34	34	3	17	1
Connecticut	0	1	1	......	1	3	360	437	238	6	4	0
MIDDLE ATLANTIC												
New York	13	22	25	[1] 5	[1] 10	[1] 44	2,338	1,596	1,596	58	43	5
New Jersey	2	1	8	19	10	42	1,436	1,109	208	17	35	2
Pennsylvania	10	16	16	16	5	......	2,410	3,398	1,027	37	30	5
EAST NORTH CENTRAL												
Ohio	5	7	16	24	10	24	2,103	217	177	30	6	1
Indiana	6	3	13	10	40	40	298	421	87	6	5	0
Illinois	20	13	19	36	31	54	1,213	553	376	26	12	2
Michigan [2]	5	4	4	14	......	......	1,581	285	285	24	12	0
Wisconsin	2	1	1	134	49	183	1,690	834	662	11	6	0
WEST NORTH CENTRAL												
Minnesota	5	5	4	2	......	7	1,381	42	291	10	0	0
Iowa	4	2	4	48	2	42	342	276	195	4	1	0
Missouri	8	7	8	......	3	4	382	423	78	25	27	1
North Dakota	1	0	1	4	20	23	241	67	42	1	0	0
South Dakota	4	4	2	......	1	1	85	107	7	1	0	0
Nebraska	4	5	3	22	39	......	48	247	82	2	1	0
Kansas	2	5	5	8	6	45	513	320	320	5	5	2
SOUTH ATLANTIC												
Delaware	1	0	1	......	1	......	17	25	2	3	1	0
Maryland [2]	3	4	2	18	4	103	870	38	77	11	15	2
District of Columbia	0	0	1	2	2	8	121	94	44	4	2	2
Virginia	6	10	15	746	803	1,604	872	436	223	29	46	4
West Virginia	7	2	6	68	15	42	295	17	49	4	3	3
North Carolina	3	11	10	67	50	64	1,339	56	343	19	13	0
South Carolina	4	6	4	800	986	986	366	44	44	10	9	1
Georgia	4	6	5	122	106	147	381	65	232	7	3	1
Florida	2	10	5	13	4	13	209	20	138	9	12	0
EAST SOUTH CENTRAL												
Kentucky	6	7	7	214	11	115	142	865	55	13	9	2
Tennessee	2	4	6	151	57	83	624	316	133	30	11	3
Alabama	9	11	11	205	389	620	512	60	172	14	21	3
Mississippi [2]	0	9	9	......	......	......	......	......	......	10	23	1
WEST SOUTH CENTRAL												
Arkansas	6	5	7	223	102	286	139	122	107	6	4	1
Louisiana	3	7	6	163	12	12	258	99	83	9	4	1
Oklahoma	4	6	6	209	155	193	105	57	57	10	5	1
Texas	33	34	36	2,142	1,606	1,667	1,192	697	577	27	16	1
MOUNTAIN												
Montana	0	2	2	25	......	11	208	129	125	2	1	0
Idaho	0	4	1	......	......	......	30	88	74	0	1	0
Wyoming	0	0	1	9	85	52	65	147	67	1	0	0
Colorado	3	12	8	112	53	61	403	445	147	3	3	1
New Mexico	4	0	0	11	5	5	51	28	28	1	2	0
Arizona	4	1	3	189	147	156	224	14	21	2	3	1
Utah [2]	0	0	0	316	103	43	48	384	155	0	3	0
Nevada	0	0	0	......	......	......	0	6	0	0	5	0
PACIFIC												
Washington	3	3	3	4	......	3	150	999	271	7	11	1
Oregon	2	1	2	64	80	37	94	505	235	6	6	0
California	15	42	23	199	91	126	752	481	481	36	36	3
Total	226	294	294	6,425	5,096	8,987	27,073	17,754	16,918	552	503	51
8 weeks	2,031	2,480	2,639	301,265	36,354	39,064	141,035	96,436	96,436	4,488	2,959	437

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever [3]		
	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43	Week ended—		Median 1939–43
	Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943		Feb. 26, 1944	Feb. 27, 1943	
NEW ENGLAND												
Maine	0	0	0	27	14	13	0	0	0	0	0	0
New Hampshire	0	0	0	28	13	4	0	0	0	1	0	0
Vermont	0	0	0	27	12	12	0	0	0	1	0	0
Massachusetts	0	0	0	415	531	233	0	0	0	0	1	1
Rhode Island	0	0	0	13	18	18	0	0	0	0	0	0
Connecticut	0	0	0	79	80	80	0	0	0	1	0	1
MIDDLE ATLANTIC												
New York	1	0	1	589	645	645	0	0	0	4	5	5
New Jersey	1	1	1	193	134	187	0	0	0	0	1	1
Pennsylvania	0	0	1	610	277	408	0	0	0	3	3	4
EAST NORTH CENTRAL												
Ohio	0	1	1	396	275	275	0	0	0	8	3	3
Indiana	0	1	1	164	110	186	8	1	1	12	0	0
Illinois	0	0	1	360	261	432	1	3	3	1	4	3
Michigan [2]	1	1	1	262	124	241	1	0	0	3	1	1
Wisconsin	0	0	1	371	291	174	0	1	4	0	1	0
WEST NORTH CENTRAL												
Minnesota	0	1	0	181	68	106	0	0	2	0	0	0
Iowa	0	0	0	128	103	102	0	1	9	0	0	1
Missouri	0	0	0	201	133	97	0	0	2	1	1	1
North Dakota	0	0	0	48	11	27	0	0	0	0	0	0
South Dakota	0	0	0	37	9	22	0	2	1	0	0	0
Nebraska	0	0	0	82	47	47	0	0	0	0	0	0
Kansas	0	0	0	124	73	82	0	3	3	0	1	1
SOUTH ATLANTIC												
Delaware	0	0	0	6	7	13	0	0	0	0	0	0
Maryland [2]	0	0	0	180	102	62	0	0	0	0	0	0
District of Columbia	0	0	0	227	35	20	0	0	0	0	0	0
Virginia	0	2	2	102	44	41	0	0	0	2	1	1
West Virginia	0	1	1	70	47	47	0	0	0	3	2	2
North Carolina	0	0	1	39	25	44	0	0	0	0	0	0
South Carolina	0	0	0	6	5	5	1	0	0	3	2	2
Georgia	0	0	0	11	26	20	0	0	0	1	5	2
Florida	2	0	1	19	29	5	0	0	0	0	0	1
EAST SOUTH CENTRAL												
Kentucky	0	0	0	82	45	74	0	1	1	0	0	3
Tennessee	0	0	0	179	85	85	0	0	0	2	5	3
Alabama	1	0	0	18	18	23	0	0	1	1	1	1
Mississippi [2]	0	0	1	11	12	10	0	0	0	4	2	1
WEST SOUTH CENTRAL												
Arkansas	0	0	1	9	6	6	4	0	2	0	1	1
Louisiana	1	0	0	7	12	12	1	0	0	1	5	5
Oklahoma	3	0	0	32	28	28	0	0	1	0	2	2
Texas	2	1	1	87	66	58	3	0	1	7	0	2
MOUNTAIN												
Montana	0	0	1	34	22	33	0	0	0	0	0	0
Idaho	0	0	0	30	2	9	0	0	0	2	0	0
Wyoming	0	0	0	11	102	13	0	0	0	0	0	0
Colorado	0	0	0	63	106	42	0	0	1	0	0	0
New Mexico	0	2	0	10	7	7	0	1	1	0	3	0
Arizona	0	0	0	17	12	9	0	0	0	0	1	0
Utah [2]	1	1	1	139	66	37	0	0	0	0	0	0
Nevada	0	0	0	0	2	0	0	0	0	0	0	0
PACIFIC												
Washington	5	0	0	247	62	53	3	0	0	0	0	0
Oregon	1	0	0	120	12	18	0	0	0	1	1	1
California	5	3	2	333	153	153	3	0	0	3	1	2
Total	24	15	25	6,424	4,367	4,367	25	13	36	65	53	65
8 weeks	209	228	228	40,428	30,415	30,415	113	229	375	651	409	617

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended Feb. 26, 1944, and comparison with corresponding week of 1943 and 5-year median—Con.

Division and State	Whooping cough, Week ended—Feb. 26, 1944	Whooping cough, Week ended—Feb. 27, 1943	Whooping cough, Median 1939-43	Week ended Feb. 26, 1944: Anthrax	Dysentery: Amebic	Dysentery: Bacillary	Dysentery: Unspecified	Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
NEW ENGLAND												
Maine	12	53	37	0	0	0	0	0	0	0	0	0
New Hampshire	5	5	1	0	0	0	0	0	0	0	0	0
Vermont	23	7	19	0	0	0	0	0	0	0	0	0
Massachusetts	49	138	138	1	0	1	0	0	0	0	0	0
Rhode Island	4	31	31	0	0	0	0	0	0	0	0	0
Connecticut	7	62	60	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York	116	310	354	0	0	14	0	0	0	0	0	0
New Jersey	50	176	176	0	0	0	0	0	0	0	0	0
Pennsylvania	204	352	352	0	1	1	0	0	0	0	0	0
EAST NORTH CENTRAL												
Ohio	93	203	203	0	0	0	0	0	0	0	0	0
Indiana	25	61	26	0	2	0	0	0	0	0	0	0
Illinois	54	131	131	0	0	0	0	1	0	0	0	0
Michigan [2]	112	228	225	0	1	5	0	0	0	0	0	0
Wisconsin	103	223	199	0	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota	34	67	40	0	2	2	0	0	0	0	0	0
Iowa	14	19	19	0	0	0	0	0	0	0	0	0
Missouri	28	16	26	0	0	0	0	1	0	0	0	0
North Dakota	4	13	13	0	0	0	1	0	0	0	0	0
South Dakota	3	0	0	0	0	0	0	0	0	0	0	0
Nebraska	35	14	12	0	0	0	0	0	0	0	0	0
Kansas	21	43	39	0	0	2	0	0	0	0	0	0
SOUTH ATLANTIC												
Delaware	0	15	5	0	0	0	0	0	0	0	0	0
Maryland [2]	23	110	82	0	0	0	0	0	0	0	0	0
District of Columbia	2	26	24	0	0	0	0	0	0	0	0	0
Virginia	55	130	65	0	0	0	87	1	0	1	0	0
West Virginia	45	39	27	0	0	0	0	0	0	0	0	0
North Carolina	123	155	155	0	0	0	0	0	0	0	0	1
South Carolina	47	40	158	0	0	1	0	0	0	0	0	0
Georgia	26	32	23	0	0	2	0	0	0	0	0	5
Florida	24	23	14	0	0	1	0	0	0	0	0	5
EAST SOUTH CENTRAL												
Kentucky	57	34	47	0	0	1	0	0	0	0	0	0
Tennessee	40	62	55	0	0	0	1	0	0	0	0	1
Alabama	33	77	84	0	0	0	0	0	0	0	0	5
Mississippi [2]	------	------	------	0	0	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas	3	29	10	0	0	2	0	0	0	0	0	0
Louisiana	0	4	4	0	2	2	0	0	0	0	0	0
Oklahoma	6	15	13	0	0	0	0	0	0	0	0	0
Texas	124	472	111	0	29	155	0	4	0	0	0	12
MOUNTAIN												
Montana	17	36	15	0	0	0	0	0	0	0	0	0
Idaho	0	0	5	0	0	0	0	0	0	0	0	0
Wyoming	2	2	4	0	0	0	0	2	0	0	0	0
Colorado	30	18	40	0	0	2	0	0	0	0	0	0
New Mexico	5	15	20	0	0	0	1	0	0	0	0	0
Arizona	29	15	36	0	0	0	17	0	0	0	0	0
Utah [2]	9	25	25	0	0	0	0	0	0	0	0	0
Nevada	0	1	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	22	24	37	0	1	0	0	0	0	0	0	0
Oregon	36	15	15	0	0	0	0	0	0	0	0	0
California	62	332	247	0	1	4	0	0	0	0	0	0
Total	1,816	3,898	3,898	1	39	195	107	9	0	1	0	30
8 weeks	14,465	30,944	32,255	7	182	1,733	488	72	5	2	80	354
8 weeks, 1943				11	149	1,542	296	74	4	1	146	436

[1] New York City only. [2] Period ended earlier than Saturday.
[3] Including paratyphoid fever cases reported separately as follows: Illinois, 1; South Carolina, 1, Texas, 1.

WEEKLY REPORTS FROM CITIES

City reports for week ended February 12, 1944

This table lists the reports from 88 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0	------	0	4	0	1	0	8	0	0	0
New Hampshire:												
Concord	0	0	------	0	1	1	0	0	0	0	0	0
Vermont:												
Barre	0	0	------	0	0	0	0	0	1	0	0	0
Massachusetts:												
Boston	6	0	------	0	38	5	13	0	93	0	0	23
Fall River	1	0	------	0	3	0	3	0	3	0	0	4
Springfield	0	0	------	0	60	0	1	0	13	0	0	5
Worcester	0	0	1	1	3	2	10	0	70	0	0	3
Rhode Island:												
Providence	0	0	1	1	227	1	8	0	13	0	0	3
Connecticut:												
Bridgeport	0	0	1	1	8	1	2	0	1	0	0	1
Hartford	0	0	2	0	0	0	1	0	4	0	0	0
New Haven	0	0	------	0	33	0	2	0	6	0	0	3
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	2	3	1	4	0	10	0	0	2
New York	9	3	14	0	1,110	41	71	0	415	0	1	35
Rochester	0	0	------	0	0	4	0	0	2	0	0	1
Syracuse	0	0	------	2	0	1	1	0	7	0	0	7
New Jersey:												
Camden	0	0	1	1	0	1	1	0	22	0	0	0
Newark	0	0	13	1	41	4	2	0	13	0	0	14
Trenton	0	0	2	0	5	2	4	0	12	0	0	2
Pennsylvania:												
Philadelphia	0	0	12	7	21	9	39	0	67	0	0	6
Pittsburgh	1	0	5	4	308	4	18	0	21	0	0	6
Reading	0	0	------	1	3	0	2	0	3	0	0	1
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	3	0	3	1	10	5	4	0	30	0	0	1
Cleveland	0	0	6	1	655	10	13	0	67	0	1	31
Columbus	0	0	1	1	85	0	2	0	7	0	0	8
Indiana:												
Fort Wayne	0	0	------	0	47	0	1	0	2	0	4	0
Indianapolis	7	0	------	3	14	3	8	0	53	0	0	8
South Bend	0	0	------	0	9	0	0	0	4	0	0	3
Terre Haute	0	0	------	1	0	0	5	0	0	0	0	0
Illinois:												
Chicago	3	0	4	0	21	28	37	0	145	0	1	26
Springfield	0	0	------	0	89	1	5	0	5	0	0	0
Michigan:												
Detroit	3	0	2	2	70	13	19	0	71	0	0	8
Flint	0	0	------	0	16	0	3	0	2	0	0	0
Grand Rapids	0	0	------	0	184	2	1	0	14	0	0	0
Wisconsin:												
Kenosha	0	0	------	0	1	0	0	0	12	0	0	6
Milwaukee	0	0	1	1	22	2	8	0	85	0	0	26
Racine	1	0	------	0	8	0	0	0	2	0	0	9
Superior	0	0	------	0	22	1	4	0	14	0	0	0
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	20	0	3	0	13	0	0	9
Minneapolis	3	0	------	0	462	3	4	0	42	0	0	0
St. Paul	0	0	------	0	352	1	7	0	45	0	0	6
Missouri:												
Kansas City	2	0	------	3	7	3	9	0	19	0	0	1
St. Joseph	0	0	------	0	1	1	0	0	1	0	0	1
St. Louis	0	0	3	1	83	10	9	0	22	0	1	3

City reports for week ended February 12, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—Continued												
North Dakota:												
Fargo	0	0	------	0	34	1	0	0	13	0	0	0
Nebraska:												
Omaha	1	0	------	0	2	0	4	0	21	0	0	0
Kansas:												
Topeka	0	0	------	0	5	1	0	0	2	0	0	3
Wichita	0	0	------	0	160	5	0	0	2	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	10	0	4	0	0	0	0	0
Maryland:												
Baltimore	0	0	4	2	384	3	20	0	50	0	0	25
Cumberland	0	0	------	0	0	0	0	0	2	0	0	0
Frederick	0	0	------	0	0	0	0	0	1	0	0	0
District of Columbia:												
Washington	0	0	3	0	72	2	15	1	231	0	0	6
Virginia:												
Lynchburg	0	0	21	0	2	0	3	0	4	0	0	0
Richmond	1	0	1	1	143	0	6	0	7	0	0	0
Roanoke	0	0	------	0	73	0	0	0	0	0	0	0
West Virginia:												
Charleston	0	0	------	0	4	0	0	0	5	0	0	0
Wheeling	0	0	4	0	2	0	0	0	6	0	0	2
North Carolina:												
Winston-Salem	0	0	------	0	73	0	2	0	1	0	0	1
South Carolina:												
Charleston	0	0	46	0	29	5	5	0	1	0	0	0
Georgia:												
Atlanta	0	0	52	1	28	0	4	0	7	0	0	1
Brunswick	0	0	------	0	49	0	0	0	0	0	0	0
Savannah	0	0	5	3	8	1	1	0	1	0	0	0
Florida:												
Tampa	0	0	1	0	15	0	3	0	4	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	1	0	49	6	8	9	6	0	14	0	0	10
Nashville	0	0	------	2	8	7	6	0	5	0	0	0
Alabama:												
Birmingham	0	0	62	2	60	0	3	0	3	0	0	0
Mobile	0	0	13	0	5	3	2	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	7	0	60	1	2	0	0	0	0	2
Louisiana:												
New Orleans	5	0	32	5	27	10	9	1	4	0	2	0
Shreveport	0	0	------	0	0	0	6	0	0	0	0	0
Texas:												
Dallas	1	0	1	1	29	1	4	0	4	0	0	1
Galveston	1	0	------	0	4	0	0	0	1	0	0	0
Houston	3	0	------	0	21	1	13	0	1	0	0	0
San Antonio	2	0	3	3	9	3	8	0	2	0	0	1
MOUNTAIN												
Montana:												
Billings	0	0	------	0	4	0	0	0	0	0	0	1
Great Falls	0	0	11	0	8	0	0	0	6	0	0	0
Helena	0	0	------	0	1	0	1	0	0	0	0	0
Missoula	0	0	------	0	1	0	2	0	5	0	0	0
Idaho:												
Boise	0	0	------	0	1	0	0	0	3	0	0	0
Colorado:												
Denver	1	0	5	0	84	0	9	0	22	0	1	13
Pueblo	0	0	------	0	61	0	2	0	2	0	0	6
Utah:												
Salt Lake City	0	0	------	1	8	0	4	0	32	0	0	5

City reports for week ended February 12, 1944—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0		0	9	0	6	0	42	0	0	2
Spokane	0	0	2	2	30	1	5	0	18	0	0	0
Tacoma	0	0		1	8	1	1	0	64	0	0	5
California:												
Los Angeles	5	0	39	4	124	4	9	2	43	0	0	5
Sacramento	0	0	1	1	6	0	2	0	2	0	0	0
San Francisco	0	0	9	2	47	9	6	0	60	0	0	6
Total	60	3	443	72	5,762	228	498	4	2,131	0	11	364
Corresponding week, 1943	55	2	255	50	3,542	118	525	4	1,409	0	5	1,000
Average, 1939-43	87		2,028	[1] 80	[2] 3,618		[1] 577		1,380	14	15	1,063

Dysentery, bacillary.—Cases: Rochester, 1; Chicago, 2; Charleston, S. C., 6; Memphis, 2; Los Angeles, 3.
Typhus fever.—Cases: Savannah, 2; Memphis, 1; Nashville, 1; Birmingham, 1; New Orleans, 1; Houston, 1; San Antonio, 1.

[1] 3-year average, 1941-43.
[2] 5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 88 cities in the preceding table (estimated population, 1942, 34,680,400)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	17.4	0.0	12.5	7.5	939	24.9	102.1	0.0	528	0.0	0.0	105
Middle Atlantic	4.5	1.3	21.0	8.0	667	30.0	63.5	0.0	256	0.0	0.4	33
East North Central	10.0	0.0	10.0	5.9	734	38.1	64.4	0.0	300	0.0	3.5	74
West North Central	11.8	0.0	5.9	7.8	2,207	49.0	70.5	0.0	353	0.0	[illegible]	59
South Atlantic	1.7	0.0	238.4	12.2	1,552	19.1	109.6	1.7	557	0.0	0.0	61
East South Central	6.0	0.0	738.5	59.6	482	113.2	101.2	0.0	137	0.0	0.0	60
West South Central	35.3	0.0	126.5	26.5	441	47.1	123.5	2.9	35	0.0	5.9	12
Mountain	8.1	0.0	129.0	8.1	1,354	0.0	145.1	0.0	564	0.0	8.1	202
Pacific	8.3	0.0	89.4	17.5	393	26.3	50.8	3.5	401	0.0	0.0	32
Total	9.0	0.5	66.8	10.9	869	34.4	75.1	0.6	321	0.0	1.7	55

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Dengue fever.—During the first 2 weeks of January 1944, 28 cases of dengue fever were reported in Honolulu, T. H., while for the last 2 weeks of January, 11 cases were reported, bringing the total number of reported cases of dengue fever in Honolulu to 1,379 up to January 31, 1944.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 29, 1944.—During the week ended January 29, 1944, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox	-------	16	-------	468	381	72	26	141	183	1,287
Diphtheria	-------	16	13	63	3	5	5	-------	-------	105
Dysentery (bacillary)	-------	-------	-------	6	-------	-------	-------	-------	-------	6
Encephalitis, infectious	-------	-------	-------	1	-------	-------	-------	-------	-------	1
German measles	-------	2	-------	28	20	3	6	11	11	81
Influenza	1	147	6	-------	926	8	1	-------	296	1,385
Measles	1	37	1	1,135	313	41	81	243	20	1,872
Meningitis, meningococcus	-------	4	-------	8	6	-------	1	-------	1	20
Mumps	-------	22	-------	170	217	49	7	48	90	603
Scarlet fever	-------	18	-------	148	229	73	30	61	80	639
Tuberculosis (all forms)	-------	3	7	228	41	10	2	19	46	356
Typhoid and paratyphoid fever	-------	-------	-------	22	-------	-------	-------	-------	-------	22
Undulant fever	-------	-------	-------	1	-------	-------	-------	-------	1	2
Whooping cough	-------	30	-------	260	161	6	20	13	46	536

CUBA

Habana—Communicable diseases—4 weeks ended February 5, 1944.—During the 4 weeks ended February 5, 1944, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	27	-------	Poliomyelitis	1	-------
Leprosy	1	-------	Scarlet fever	1	-------
Malaria	2	-------	Tuberculosis	6	3
Measles	21	-------	Typhoid fever	49	1
Paratyphoid fever	1	-------			

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual prevalence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during the current year. All reports of yellow fever are published currently.

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Plague

Egypt—Suez.—During the week ended January 29, 1944, 22 cases of plague with 8 deaths were reported in Suez, Egypt.

Smallpox

British East Africa—Kenya.—Smallpox has been reported in Kenya, British East Africa, as follows: week ended January 22, 1944, 202 cases; week ended January 29, 1944, 229 cases. The highest incidence has occurred in Central, Nyanza, and Rift Valley Provinces.

Egypt—Port Said.—During the week ended January 29, 1944, 46 cases of smallpox with 1 death were reported in Port Said, Egypt.

India.—Smallpox has been reported in India as follows: Bombay—week ended January 22, 1944, 180 cases, 50 deaths as compared with 112 cases and 26 deaths during the preceding week. Calcutta—weeks ended January 1, 1944, 75 deaths, January 8, 109 deaths, January 15, 116 deaths, January 22, 133 deaths.

Mexico—Torreon.—During the week ended February 12, 1944, 14 cases of smallpox were reported in Torreon, Mexico.

Niger Territory.—During the period January 1–10, 1944, 170 cases of smallpox with 8 deaths were reported in Niger Territory.

Sudan (French).—During the period January 1–10, 1944, 109 cases of smallpox with 3 deaths were reported in French Sudan.

Turkey.—During the period November 16 to December 15, 1943, 1,152 cases of smallpox were reported in Turkey.

Typhus Fever

Hungary.—For the two weeks ended February 5, 1944, 107 cases of typhus fever were reported in Hungary.

Rumania.—During the period February 1–7, 1944, 525 cases of typhus fever were reported in Rumania.

Slovakia.—For the 3 weeks ended January 29, 1944, 70 cases of typhus fever were reported in Slovakia.

Spain.—Typhus fever has been reported in Spain as follows: week ended December 18, 1943, 14 cases, week ended December 25, 4 cases.

Turkey.—During the month of December 1943, 123 cases of typhus fever were reported in Turkey, including 7 cases reported in Istanbul.

COURT DECISION ON PUBLIC HEALTH

Milk regulations—validity.—(West Virginia Supreme Court of Appeals; *State* v. *Bunner et al.*, 27 S.E.2d 823; decided November 23, 1943.) The milk regulations of the public health council of West Virginia, among other things, made it unlawful for any person not possessing a permit from the health officer to sell any milk and provided that only a person who complied with the requirements of the regulations was entitled to receive and retain a permit. The defendants were charged with having sold a pint of milk from their store without having a permit from the health officer. A county criminal court sustained the defendants' demurrer to the indictment and the State, after being refused a writ of error by the circuit court of the county, appealed to the Supreme Court of Appeals of West Virginia.

One of the objections raised by the defendants was that the State statute under which the regulations were adopted was unconstitutional because it attempted to vest in the public health council an unwarranted power to legislate by prescribing public health regulations. By the statutes the council was required to promulgate regulations and was authorized to establish and amend regulations under the public health laws. A violation of the regulations so promulgated, when the regulations were reasonable and not inconsistent with law, was a misdemeanor. It was also provided in the statutes that the council "shall adopt regulations to provide clean and safe milk and fresh milk products." The appellate court took the view that standards and limitations with respect to the regulations or "legislation" which the council was empowered to adopt were contained in the statutes. Such standards were found by the court in those provisions which required regulations to be reasonable and consistent with law and which mentioned clean and safe milk. The defendants' contention that the statute was invalid because it improperly delegated legislative power was rejected by the court.

With respect to the regulations the defendants argued that the requirement of a permit was void because the legislative act did not expressly confer upon the public health council power to require a permit. The court pointed out that a permit requirement was a very simple, effective, and mild method of control and that in the instant case no fee was charged and no difficulty or delay was involved. "When issued, a permit can be nothing more than a formal certification by the health officer that the milk proposed to be sold by a named vendor has been produced under conditions prescribed by the health council." The court was of the opinion that the regulation in that respect was valid.

The defendants also took the position that the regulation conferred upon the health officer arbitrary power to grant or refuse a permit because it did not state upon what conditions an applicant was entitled to a permit and did not in terms require the granting of a permit to all who were duly qualified. However, the appellate court did not so construe the regulation. It was expressly provided that only a person who complied with the requirements was entitled to a permit, and, according to the court, this clearly stipulated that one who had not complied should not receive a permit and equally stated that one who had complied should be so entitled. It was immaterial that the regulation did not prescribe any exact method of making application. It did provide that the permit should be from the health officer, thus designating the person to whom application should be made.

The statutes provided that every general regulation adopted by the public health council "shall state the day on which it takes effect" and the defendants urged the invalidity of the regulations because they failed to show on their face the time when they should go into effect. The only provision in the regulations purporting to show their effective date was one which stated that "this regulation shall be in full force and effect immediately upon its adoption and its publication, as provided by law." The State argued that, although no date in words and figures was mentioned, the allusion in the regulations to the date of adoption was a sufficient reference to the health council's minutes, a public record, where the exact day could be found, and that this sufficiently complied with the statutory requirement. "Possibly," said the court, "this would be true if the date of adoption alone fixed the time when the regulations should become effective; but the regulations do not so say. The provision is that the regulations shall be in effect, not simply upon their adoption but upon their adoption and publication as provided by law. The crucial date, therefore, is not that of the adoption but that of the completion of the publication of the regulations and there is no attempt therein to state when the publication shall be complete. Hence, there is a complete failure to comply with this statutory requirement." According to the court the statutory provision was clearly mandatory.

Further, the indictment was held defective because it failed to allege that the regulations came into effect on or before the date of their alleged violation by the defendants. While the indictment did allege the adoption of the regulations on November 6, 1939, the only reference to their publication was that they were duly published by distribution and circulation in the manner determined by the council. The indictment thus failed to show when the regulations were published.

The judgments of the county criminal and circuit courts in favor of the defendants were affirmed.

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