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OCCUPATIONAL MORTALITY AMONG MALES IN ENGLAND AND WALES, 1921–1923

A Summary of the Report of the Registrar General

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Because of the fact that the recently issued report on occupational mortality among males in England and Wales [1] will not be generally available in this country, a summary of this report has been prepared. It is, of course, not possible to present the material in any detail, and research workers in the field of industrial hygiene will desire to study the original volume, because of its great significance. At the same time, the outstanding features are of sufficient general interest to warrant a discussion of them. No attempt at a thorough analysis or digest has been made, both because the delay would detract from the timeliness of this paper, and because a really adequate study must be made by persons closely familiar with occupational health conditions in England.

Since death rates by occupation for the general population have not been available in the United States in recent years, the English data prove particularly valuable to us in a field in which we have no comparable material. In many particulars, the occupational mortality rates in England are not generally applicable here, but they are exceptionally suggestive. In a way they mean more to us than corresponding rates for the United States could mean, because in England the worker is more likely to remain in a specific occupation throughout his life, and thus his death may be more properly ascribable to the occupation given on the death certificate.

The current English report departs radically from preceding volumes—so much so that it must be accepted forthwith that few comparisons with the previous material are legitimate. The primary cause of this was the adoption by the English Census Bureau of a revised occupational classification in 1921. An attempt is now made to distinguish occupations on purely occupational lines. For instance, cutlery grinders are now given by themselves. An excess mortality from all causes of 230 per cent is found for them, whereas in the previous report they were combined with all others concerned in the manufacture of cutlery, showing an excess of only 63 per cent.

[1] Registrar General's Decennial Supplement, England and Wales, 1921, Part II, Occupational Mortality, Fertility, and Infant Mortality. London: 1927.

In view of the changes in the census classification, no attempt was made in the present registrar general's report to keep the data comparable in other particulars with preceding reports. Among the changes that should be mentioned are the following: The comparative mortality figures are now calculated so as to yield 1,000 deaths at the death rates for different ages, from 20 to 65 years, prevailing among all occupied and retired civilian males in 1921–1923 for the same ages. In 1910–1912 these figures were based on all males; for 1900–1902, ages 25–65. In this paper, as a matter of simplicity, the comparative mortality figures themselves have not been used,[2] except in one or two tables, but it must still be kept in mind that the standardized rates are for ages 20–65 instead of 25–65, and refer to all occupied and retired males, instead of all males. A rearrangement of occupations by social class was made, there being now five such classes (I, upper and middle; II, intermediate between upper and middle and skilled labor; III, skilled labor; IV, intermediate between skilled and unskilled labor; V, unskilled labor). The years 1921–1923 have been used instead of 1920–1922 (which would have been consistent with previous reports). It was felt that industrial conditions were still abnormal in 1920 as a result of gradual demobilization following the war, and, furthermore, the new census classification as to occupation and the 1920 international list of causes of death could not have been used for the year 1920.

It should be noted that in the present volume retired have been included with the occupied, since they were formerly employed in the occupation with which they are grouped. Also the tables are limited to civilians. As a matter of brevity, the term "all occupied" in this paper has frequently been substituted for "all occupied and retired civilian males."

First, a summary of what is contained in the British report is desirable, since only certain phases of it can be covered in this paper. After a discussion of the mortality by social class, the important causes of death are considered, with tables giving the occupations with the highest and lowest comparative mortality figures for each disease. Then the opposite point of view is taken and each important occupation is discussed seriatim. The next section deals with occupational fertility—i. e., the number of births to men in each occupation for the year 1921. These data were previously carried in the general report of the registrar general. A further section discusses infant mortality, treated in the same way. Many of the detailed tables also take up occupational fertility and infant mortality, but only brief reference will be made to this material in the present review. Then follows a series of tables dealing with the various

[2] The standardized rates used were obtained by multiplying the "comparative mortality figures" by a factor, the rate for all causes among all occupied and retired males.

phases of the material, including registered and calculated deaths from all causes according to the detailed occupations employed by the census bureau; mortality for all causes in various ages by the abbreviated occupational classification used generally in the volume, expressed as a ratio to all occupied and retired; comparative mortality figures by occupation and causes, both where the rate for all causes is taken as 1,000 and where the rate for each cause is taken as 1,000; various ranking tables according to occupation; mortality at various ages by cause and social class, expressed as a ratio to all occupied and retired; and finally a detailed set of "abstracts" giving the number of deaths and the specific death rates by age, cause, and occupation. One can hardly fail to realize from this brief summary the great value which the report possesses and the more elaborate treatment of the material than in previous reports.

The present paper is divided into six parts, for convenience:

I. Social distribution of mortality.
II. A comparison for all occupied males with 1910-1912.
III. Industrial comparisons for mortality, fertility, and infant mortality.
IV. Specific occupational comparisons according to major causes of death.
V. Summary of standardized rates by occupation.
VI. Mortality by age from a few causes in larger occupations.

In interpreting occupational mortality, one must be forewarned as to possible fallacies. Perhaps this can most readily be done by quotation from the bulletin itself:

> It can not be assumed that the deaths tabulated for any occupation have occurred exclusively amongst the men tabulated to that occupation. So far as this is the result of ordinary changes of occupation by men in normal health, as from agricultural laborer to policeman or farm bailiff, the returns are probably not prejudiced, * * * for as such changes of occupation are always going on the census figure may be regarded, at all events in normal times, as representing an unprejudiced and typical sample of the occupational population during the period supplying the deaths, and with which they may therefore be fairly compared, even if they are not individuals actually included in the census occupational population in question * * *.
>
> But a more important source of discrepancy between the census and registration figures collated in the tables is probably to be found, not in economic, but in health considerations. The reader must be reminded, as in previous reports of this series, that the weakly puddler or blacksmith may be forced to adopt a less strenuous occupation before his death. If so the occupation at death (the last occupation before work ceased) may differ from that at census if change of occupation has occurred shortly after the census, and death shortly after the change * * *. But even when the death corresponds with the occupational return at census the same fallacy may apply in only slightly less degree. For the former puddler may be obliged by bronchitis, skin cancer, or other chronic disease incidental to his calling to become a costermonger for years before his death, in which case the deaths correspond with the census return, although

really pertaining by origin to another occupation. The only difference in this case is the transfer of one life from puddlers to costermongers in correspondence with the death, but at most ages this goes a very short way toward compensating for the death transfer. This type of error must evidently tend toward understatement in some degree of the mortality of strenuous occupations, and corresponding overstatement of those open to men of impaired physique, but no measure of the extent of this tendency can be applied * * *.

Besides these general instances there are doubtless many others applying particularly to certain occupations, but under our present system of national records no means of avoiding this difficulty has ever suggested itself * * *.[3]

There are two additional sources of error which require specific mention. For one thing, there is a tendency for the classification of occupations to become yearly more specific so far as the census returns are concerned, and it is probable that the same minuteness does not always apply to the occupation as recorded by the physician on the death certificate. Hence, for certain specific occupations the population may be too great to correspond with the mortality, giving unreasonably low rates. This perhaps explains why the mortality from all causes for farmers' sons and other relatives assisting in the work of the farm is only 22 per cent of that for all occupied (when age has been taken into account), while the rate for farmers is 71. Many other examples could be cited.

A second source of error seems to us to be of very great significance. In a sense it is covered by the comment above as to the transfer of a puddler to the occupation of costermonger by reason of some disease incident to his former occupation. But the effect is too vast to be explained purely on the basis of diseases incident to strenuous occupations. There is in industry a general tendency for the stronger bodied to go into the more strenuous occupations, and for the weaker to seek the less strenuous. The high mortality among costermongers can not be explained, it seems to the writer, on the basis of deaths associated with some prior occupation which these men had. In general it appears to be the result of a selective process of such subtle and sweeping effect that occupational mortality figures must always be judged with this factor in mind. Drivers of horse-drawn vehicles have extraordinarily high mortality rates from nearly every cause. They must have been on the average more or less inferior physically throughout their lives. They may never have been employed in any very active occupation. In many occupations this selective factor seems to have been at work, and when it is combined also with complications due to varying rates by social class or economic conditions, we are faced with difficult problems indeed.

A final caution as to interpreting mortality records in general. All studies of autopsy material indicate that the correct cause of death is

[3] At another point of the bulletin reference is made to the fact that as life advances there is a tendency to omit the occupation on the census return, whereas it would appear on the death certificate. This is very important and tends to increase the mortality rates of the advanced ages, but has not been considered here, because it has been felt safer to omit mortality rates for the advanced ages.

by no means always placed upon the certificate. Understatement of syphilis and some other causes is to be expected from obvious reasons; but the difficulty is of much wider scope, involving many causes of death, and of varying effect in the different social classes and in particular occupations. It is no doubt also responsible for more or less correlation between causes of death, because of a confusion in the record. There is, moreover, the obstacle of deaths due to more than one disease entity. All rates must be scrutinized for errors of this character before conclusions are drawn, and conclusions must always be accepted with reservation.

Since this review of the British mortality was undertaken particularly to be of use to the industrial hygienist in the United States, international difference in certifying causes of death becomes a point which can not be disregarded. The high mortality rates for chronic bronchitis in these tables may surprise a reader who is not familiar with such differences. As a matter of fact, the death rates for chronic bronchitis in this country are usually about one-fourth of those in England and Wales. In regard to this point, Newsholme [4] states:

> The contrast * * * between death rates in England and in the United States shows a great unexplained excess of mortality from bronchitis in England. * * * In the United States the certification of chronic bronchitis is discouraged: Thus in New York medical certificates stating chronic bronchitis as the cause of death are sent back for revision.

It should be added that if the two causes of death are given on the same death certificate, one must be lost sight of in the compiled figures. In the United States this is handled according to a series of rules in the Census Bureau; in England the opinion of the physician is usually followed. This may in part explain the difference in the mortality rates from bronchitis.

With regard to other points of incomparability, it may be stated that in the United States cerebral hemorrhage is favored over arterial disease, while in England it is treated as secondary to and therefore a complication of arterial disease. Quoting further from Newsholme:

> Arteriosclerosis is not provided with a separate column in the American statistics; in England it appears to be superseding cerebral hemorrhage as a cause of death. Renal disease is a common cause of cerebral hemorrhage, and the fact that deaths under this heading are seven times, while deaths under cerebral hemorrhage are only two and one-half times, as many in the United States as in England, points to considerable incomparability in the data.

I. Social Distribution of Mortality

The mortality in different occupations is affected in a marked manner by the social status of the workers, involving, as this does, economic differences and environmental distinctions outside the factory. The registrar general has recognized this fact by classifying the oc-

[4] Elements of Vital Statistics. Sir Arthur Newsholme. 1923.

cupations according to social class. Inaccurate as such a classification necessarily is, considerable interest attaches to the mortality rates in the several social classes, especially in their bearing on the rates in specific occupations. Some effect of occupational hazards, direct and indirect, on the rates for each social class must be allowed for, but the extent of this effect is indeterminate.

First are presented the standardized mortality rates, by social class, for the ages 20–65 according to cause of death. The standardized rate is used in preference to a crude rate, since it affords a convenient average which more or less eliminates differences due to variations in the age distributions of the populations involved. The social classification seems clear without further comment, beyond noting that the allocation into the social class was done by specific occupation, not by individuals.[5] The diseases are arranged in an order based on the tendencies of the rates to vary from class to class, at the top being those in which the rates are highest in social classes IV and V.

TABLE 1.—*Standardized mortality of the five social classes, from all causes and from certain causes, at ages 20 to 65 years, 1921–1923*

Cause	Death rate per 100,000				
	Class I, upper and middle	Class II, intermediate	Class III, skilled labor	Class IV, intermediate	Class V, unskilled labor
Bronchitis	11.6	24.9	42.5	54.3	80.0
Old age	.5	.8	1.4	1.3	3.0
Respiratory tuberculosis	73.2	126.3	146.2	150.2	209.5
Hernia	1.7	2.3	2.8	3.7	4.1
Valvular heart disease	33.0	52.3	55.9	61.6	74.0
Chronic rheumatism, etc	1.9	2.7	3.2	3.0	3.6
Ulcer, stomach	6.7	8.1	9.3	10.1	12.2
Pneumonia	64.5	65.5	69.7	83.4	116.9
Other tuberculosis	9.2	12.4	12.4	12.4	13.5
Syphilis, etc	18.0	22.6	23.9	23.8	34.7
Other respiratory	10.9	13.9	13.5	15.0	18.4
Cancer	93.8	108.1	116.3	113.3	144.4
Influenza	27.8	31.2	31.1	37.4	39.3
Other nervous	23.8	27.8	27.2	28.5	36.9
Accident	36.5	31.6	42.8	58.4	54.2
Acute nephritis	2.7	4.4	4.1	3.6	4.4
Cerebral hemorrhage	36.3	42.3	40.9	38.7	44.4
All causes	743.0	862.0	870.0	921.0	1,151.0
Chronic interstitial pneumonia [a]	1.0	.9	1.6	1.2	1.1
Other genito-urinary	7.5	7.1	6.9	8.1	10.4
Chronic nephritis	31.4	35.6	30.6	28.7	33.6
Other heart	63.8	65.5	54.0	55.3	69.2
Other causes	49.4	44.7	43.9	42.0	44.8
Intestinal obstruction	5.9	5.0	4.0	4.9	5.7
Ulcer, duodenum	6.4	5.9	4.7	5.1	6.0
Suicide	25.7	23.4	20.1	19.8	21.7
Other digestive	20.6	17.5	14.5	14.0	17.1
Alcoholism	1.1	2.7	.5	.7	.7
Arteriosclerosis	29.2	20.4	17.5	15.9	21.5
Diseases of prostate	3.7	4.0	3.5	2.7	2.9
Other circulatory	3.6	2.8	2.2	2.6	2.3
Diabetes	13.9	16.2	10.2	8.4	7.4
Diseases of liver	14.3	16.4	5.8	6.5	7.6
Appendicitis	13.8	11.6	7.2	6.9	5.7

[a] Fibroid phthisis, fibrosis of the lungs, silicosis, miners' phthisis, etc.

[5] The social classes VI, VII, and VIII of the previous report have been combined with one or another of the five classes now used.

The table runs the gamut from bronchitis, with a rate of 11.6 in class I and 80 in class V, to appendicitis, where the figures are 13.8 and 5.7, respectively. One must remember that in some cases the distinctions are artificial, due to differences in diagnosis in the various social classes and to other factors. This influence is shown vividly by the rates for "old age," the rate for class V being six times as high as that for class I, due to more precise statement of the cause of death among the better classes at these advanced ages.

As would be necessary, those diseases which one thinks of as being more or less industrial in origin appear at the top of the table, having higher rates in the social classes most acutely affected by the strain and specific hazards of industry.

Taken roughly, the table suggests that deaths from respiratory conditions are strikingly greater in the lower social levels. The greatest difference lies in bronchitis, but respiratory tuberculosis, pneumonia, influenza, and "other" respiratory diseases all are correlated similarly with social class. Of valvular heart disease this is also true, but not of circulatory diseases in general. The marked difference in hernia is rather surprising. Digestive diseases (except ulcer), diabetes, diseases of the liver, etc., are higher among the better classes, the difference apparently being related to "financial capacity for overindulgence in dietic indiscretions," as Doctor Collis states in his review of the registrar general's report.[6]

Summary of the rates in this table by certain groups of diseases ((*a*) all tuberculosis; (*b*) pneumonia and bronchitis; (*c*) circulatory; (*d*) digestive) shows some striking differences according to social class. In class I the highest rate for any of these four is that of the circulatory disease group, with digestive diseases second, while classes III and V have all tuberculosis for their highest rates, with circulatory second for class III and pneumonia-bronchitis second for class V.

The data relating to cancer have received careful and detailed consideration in the registrar general's report. Possibly sufficient reference will be to quote a paragraph from Doctor Collis's review:[7]

> Apart from cancer of the skin with its definite occupational causation, cancer of the lip, tongue, jaw, esophagus, and stomach as far as the pylorus is found, for each site named and in the order stated, to increase in prevalence from class I to class V; but, when the pylorus is passed, cancer is found attacking the remainder of the digestive tract, and indeed other organs as well, quite indiscriminately when distributed according to social class. Why cancer of the upper alimentary tract displays this remarkable social incidence is not at once obvious.

Mortality from alcoholism needs a more thorough study than can be given to it in this summary; but the presence of alcoholism, digestive diseases, and diseases of the liver at the bottom of the table

[6] Journal of Industrial Hygiene, May, 1928 (Vol. X, No. 5), p. 140. [7] Cited previously.

suggests that intemperance is now to a large extent a privilege of the better social classes, who can afford to be intemperate.

These fragmentary comments do not exhaust all of the meaning in this unique table, but other phases must be left to the reader.

It is not possible to devote space to any elaborately drawn picture of the mortality by age in the several social classes. A table of the rates for five of the commonest forms of death showing markedly higher rates among the poorer classes must suffice. These are the causes of death which are of peculiar interest from an occupational standpoint.

TABLE 2.—*Mortality by age for the five social classes, from all causes and from certain causes, 1921–1923*

Cause and social class	Death rate per 100,000, by age group					
	[1]15–19	20–24	25–34	35–44	45–54	55–64
All causes, all classes	247	352	399	639	1,156	2,572
Class I	142	237	261	484	985	2,247
II	205	307	376	589	1,090	2,469
III	243	347	380	590	1,070	2,508
IV	248	367	420	669	1,173	2,482
V	299	408	498	880	1,507	3,061
Respiratory tuberculosis	69	136	133	160	166	150
Class I	28	50	57	87	86	82
II	62	121	132	137	125	103
III	71	140	129	151	160	155
IV	59	135	132	164	168	147
V	89	158	161	238	256	228
Cancer, all sites	3	6	11	40	166	494
Class I	3	4	10	24	146	386
II	4	6	12	35	150	458
III	3	6	11	40	160	495
IV	3	5	11	40	163	469
V	3	5	13	51	211	596
Bronchitis	1	3	6	20	56	191
Class I	3	--------	1	5	17	47
II	[1]0	2	4	11	31	103
III	1	3	5	16	50	189
IV	1	4	8	26	66	225
V	2	4	10	41	109	313
Pneumonia	21	28	40	72	103	170
Class I	8	16	26	63	93	144
II	16	20	33	62	87	145
III	20	27	37	63	91	153
IV	22	31	45	80	109	174
V	24	41	61	111	154	251
Valvular heart disease	10	16	22	36	72	188
Class I	3	6	7	17	35	135
II	9	14	18	31	63	177
III	11	15	20	34	69	184
IV	9	16	23	40	76	196
V	15	21	32	50	95	217

[1] Less than 0.5.

What is brought out particularly is the fact that the greatest relative difference occurs in middle life when the effect of industrial activity is most felt. For instance, at 35–44 years the cancer death rate for class V is more than twice that for class I, but after 50 years the difference between the two is not marked at all. So with valvular heart diseases, and in lesser degree with bronchitis. The difference

is not so marked in the case of pneumonia. For all causes, the following table brings out this tendency succinctly. First is given the ratio of the death rate in class III to that in class I; then the ratio of that in class V to that in class III.

TABLE 3.—*Ratio of one social class to another by age, all causes*

Class	Age group					
	16–19	20–24	25–34	35–44	45–54	55–64
III to I	171	146	146	122	109	112
V to III	123	118	131	149	141	122

Class I evidently has an exceptionally low rate under 20 years of age, for more or less obvious reasons. Class V shows the greatest differences from class III at 40 years of age, the ratio declining here more slowly than in the comparison between classes III and I.

With this brief comment, the subject of mortality according to social class must be passed over; but its effect on occupational mortality must be kept in mind during the remainder of this paper. The abbreviated occupational groups which form the basis of most of the comparisons frequently involve specific occupations falling into more than one social class, but where possible the factor of social class will be taken into account. The social class will be shown in roman numerals following the name of the occupation. Where any particular group really includes occupations falling into two social classes, the social class with the larger number of persons is shown. Where the group is composed of both skilled and unskilled workers, it is shown in the intermediate class.

II. A Comparison for all Occupied and Retired Males with 1910–1912

The reason why the registrar general has made no particular effort to keep the present report comparable with the preceding has already been discussed. Although certain occupations may be legitimately compared for the two periods, a detailed knowledge of the classification of occupations would be necessary and much caution in interpretation. It has seemed preferable for the present purpose to omit any such comparisons, and to give, as suggestive of the changes which have taken place, simply the rates for the two periods by disease for all occupied and retired males. This comparison is made in Table 4.

TABLE 4.—*Mortality by age among occupied and retired males, 1910–1912, compared with 1921–1923*

	Death rate per 100,000 by age group					
	[2] 15–19	20–24	25–34	35–44	45–54	55–64
All causes:						
1910–1912	220	352	471	794	1,465	3,004
1921–1923	247	352	399	639	1,156	2,572
Respiratory tuberculosis:						
1910–1912	58	132	168	208	230	220
1921–1923	69	136	133	160	166	150
Cancer, all sites:						
1910–1912	3	5	11	43	169	435
1921–1923	3	6	11	40	166	494
Diabetes:						
1910–1912	3	5	6	8	15	44
1921–1923	3	5	6	7	13	32
Alcoholism:						
1910–1912	[1] 0	[1] 0	2	6	8	8
1921–1923	------	------	[1] 0	1	2	1
Cerebral hemorrhage:						
1910–1912	1	2	4	17	69	221
1921–1923	1	2	3	11	49	194
Valvular heart:						
1910–1912	9	11	15	34	75	177
1921–1923	10	16	22	36	72	188
Bronchitis:						
1910–1912	1	2	5	18	67	245
1921–1923	1	3	6	20	56	191
Pneumonia:						
1910–1912	17	30	45	79	125	210
1921–1923	21	28	40	72	103	170
Other diseases of respiratory system:						
1910–1912	2	4	6	14	30	67
1921–1923	2	3	5	10	21	41
Hernia:						
1910–1912	[1] 0	1	1	1	4	12
1921–1923	[1] 0	1	1	1	4	11
Cirrhosis of liver:						
1910–1912	[1] 0	[1] 0	2	12	34	57
1921–1923	[1] 0	[1] 0	1	4	15	31
Chronic nephritis:						
1910–1912	3	5	11	27	71	151
1921–1923	3	5	9	17	45	108
Suicide:						
1910–1912	4	9	14	23	35	50
1921–1923	3	7	9	20	34	48
Accident:						
1910–1912	40	44	49	63	80	106
1921–1923	36	36	33	39	53	76

[1] Less than 0.5.

[2] In 1921–1923, this group is 16–19.

The marked decline in mortality for all causes (which is found except for ages under 25 years) is disclosed in most causes of death. Notable among the exceptions are valvular heart disease and cancer. It is interesting in the latter case that there is no increase found except at the higher ages, where possibly the effect of improved diagnosis would be most felt. Are we to infer that the British data do not lend much strength to the supposition that cancer mortality is actually on the increase?

Respiratory diseases (tuberculosis and pneumonia) show the most signal improvements. This fact is encouraging; but the data for the present time indicate overwhelmingly the importance of such causes of death in the occupational experience of England. Nor is there reason to believe that respiratory diseases are of any less industrial consequence in the United States.

The decline in cirrhosis of the liver, reflecting with considerable precision the drinking proclivities of a nation, at least with regard to spirituous liquors, is of interest. Chronic nephritis shows a decrease which is of the same order of magnitude.

In connection with the use of cirrhosis of the liver as a possible index of alcoholism, the following quotation is taken from the registrar general's report:

> This disease was included in the abstracts as the best available index to alcoholism in occupational mortality tabulation. In former reports of this series two such measures were employed, alcoholism returned as such and cirrhosis of the liver. But conditions have changed. Whereas in 1910–1912 the deaths of 1,339 men aged 20–65 were allocated to alcoholism the corresponding number in 1921–1923 was only 315. As 100 deaths a year in a population of 10,000,000 can form only a very imperfect index to the occupational incidence of alcoholism, reliance for this purpose is now placed entirely on cirrhosis of the liver, to which 2,649 deaths within the same limits of age (20–65) were allocated in the three years. It may, of course, be objected that cirrhosis is not necessarily alcoholic in origin, but evidence of its close association with alcoholism in these returns is discussed on page * * * [see next paragraph]. The mortality comparisons for cirrhosis * * * show that its incidence varies largely in accord with the financial means available for overindulgence.
>
> Publicans form part of a remarkable group of four occupations, all concerned with alcohol, which return the four highest * * * [rates for cirrhosis of the liver, the other occupations being brewers, barmen, and cellar men]. The significance of this fact admits of no doubt, and together with the correspondence between cirrhosis mortality and financial resources (vide infra), it constitutes the evidence of close association of cirrhosis with alcoholism * * *.

III. Industrial Comparisons for Mortality, Fertility, and Infant Mortality

For most of the comparisons as to occupation, the registrar general has used a selected group of 164 occupations which do not include quite all of the occupied males in the country. Out of 9,705,000 occupied and retired workers in England and Wales, aged 20–65, 7,933,000 are included in this selected group. Before taking up this latter group, there seems to be some advantage in considering for a moment the whole industrial population within the age limits of 20 and 65 from the point of view of industry rather than from that of occupation. The volume gives such a table, in which the detailed occupations as listed by the British census are classified into 31 industrial groups. For the present purpose, these industrial groups, with certain important subdivisions, have been chosen.

The table deals only with all causes of death and employs the ratio to all occupied and retired males (based on the standardized rate). As the table also gives the corresponding ratio for births and the infant mortality rate (according to industry and occupation of the father), these figures have been included because of their general industrial interest. With respect to the birth ratio, it may be explained that it is exactly comparable with the death ratio used in

the table, and is thus, so to speak, a "comparative fertility figure." [8] The number of workers in each industry is also supplied.

TABLE 5.—*Industrial mortality, legitimate fertility,[a] and infant mortality [a]*

Class and occupation	Ratio to all occupied and retired males		Infant mortality per 1,000 births (1921)	Number of persons (20–65 years)
	Deaths (1921–1923)	Births (1921)		
All males, occupied and retired	100	101	79	9,704,860
Class I	82	85	38	225,618
Class II	94	85	55	1,974,884
Class III	95	97	77	4,218,715
Class IV	101	109	89	1,984,906
Class V	125	128	97	1,300,737
I. Fishermen	91	130	99	24,485
II. Agricultural occupations	68	107	60	876,400
III. Mining and quarrying occupations:				
1. In coal and shale mines	101	25	103	786,242
2. In metalliferous mines and workings	139	132	98	19,287
3. In other mines and quarries	90	109	84	42,116
IV. Workers in treatment of nonmetalliferous mine and quarry products (exclusive of gas works):				
1. Makers of coke and by-products (exclusive of tar distilling)	72	97	124	8,294
2. Makers of other products	78	104	73	14,128
V. Makers of bricks, pottery, and glass:				
1. Makers of bricks, pottery, and earthenware	126	114	99	49,190
2. Makers of glass and glassware	128	121	86	20,233
VI. Workers in chemical processes; makers of paints, etc.:				
1. Workers in chemical processes	89	93	93	31,512
2. Makers of paints, oils (not mineral), etc	90	106	91	20,638
VII. Metal workers (not electroplate or precious metals)	96	98	79	1,229,392
VIII. Workers in precious metals and electroplate	99	91	72	23,482
IX. Electrical apparatus makers and fitters (not elsewhere enumerated), and electricians	85	89	66	112,758
X. Makers of watches, clocks, and scientific instruments	91	74	64	19,261
XI. Workers in skins and leather, and makers of leather and leather substitute goods (not boots or shoes):				
1. Furriers, skinners, tanners, and leather dressers	106	103	78	24,285
2. Makers of leather and leather substitute goods	92	85	62	21,686
XII. Textile workers	105	80	86	274,188
XIII. Makers of textile goods and articles of dress	108	90	70	235,267
XIV. Makers of foods, drinks, and tobacco products:				
1. Makers of foods	88	90	70	120,119
2. Makers of drinks	126	107	81	36,091
3. Makers of tobacco products, cigars, cigarettes, snuff	114	88	65	5,698
XV. Workers in wood and furniture	88	91	70	395,598
XVI. Makers of and workers in paper; printers, bookbinders, photographers, etc	94	84	62	136,926
XVII. Builders, bricklayers, stone and slate workers; contractors	99	119	83	442,446
XVIII. Painters and decorators (not pottery)	111	100	75	177,842
XIX. Workers in other materials:				
1. Workers in rubber, vulcanite, ebonite	91	96	64	15,054
2. Workers in bone, horn, ivory, celluloid, etc	112	81	71	2,420
3. Workers in other materials	109	87	59	9,364
XX. Workers in mixed or undefined materials (not elsewhere enumerated)	94	104	89	80,087
XXI. Persons employed in gas, water, and electricity undertakings (not elsewhere enumerated)	97	108	85	44,564
XXII. Persons employed in transport and communication:				
1. Railway workers	83	94	76	275,258
2. Road transport workers	110	107	83	459,415
3. Water transport workers	158	143	97	247,623
4. Other workers in transport and communication	110	96	75	157,752
XXIII. Commercial, finance, and insurance occupations (exclusive of clerks):				
1. Commercial occupations	103	85	64	813,898
2. Persons employed in finance and insurance	90	73	48	91,920
XXIV. Persons employed in public administration and defense (excluding professional men and typists):				
1. Public administration	80	81	55	236,801

[a] According to occupational classification of infant's father.

[8] Ratio to the number of births which would have occurred if the fertility rates at the various age groups in the several occupations had borne the same relations to each other as those stated for all married males in the 1921 census, the rates being increased to yield the number of births registered in 1921.

TABLE 5.—*Industrial mortality, legitimate fertility, and infant mortality*—Contd.

Class and occupation	Ratio to all occupied and retired males		Infant mortality per 1,000 births (1921)	Number of persons (20–65 years)
	Deaths (1921–1923)	Births (1921)		
XXV. Professional occupations (excluding clerical staff)	83	80	41	276,164
XXVI. Persons employed in entertainments and sport	121	82	73	57,568
XXVII. Persons engaged in personal service (including institutions, clubs, hotels, etc.)	121	79	80	285,326
XXVIII. Clerks and draftsmen (not civil service or local authority); typists	99	75	51	447,367
XXIX. Warehousemen, storekeepers and packers	97	88	74	179,986
XXX. Stationary engine drivers, dynamo and motor attendants	86	102	90	139,911
XXXI. Other and undefined workers	132	122	94	736,666

This summary will serve chiefly as a background for further tables. One can not single out from it occupations with special hazard to health, but he can get a clear idea as to the fluctuations in industry around the rate for all occupied males. Industries with relatively low rates will not appear in subsequent tables. It is interesting to note that agricultural occupations have a mortality which is 32 per cent below the average. No discussion of the data for fertility and infant mortality by occupation of the father will be undertaken in this survey, but it is of moment to recognize that we find the same correlation with social status in the birth and infant mortality rates (based on the occupation of the father) as was found previously in the case of the death rate from all causes.

IV. Specific Occupational Comparisons According to Major Causes of Death

In studying mortality in relatively small occupational groups, a single summary figure is a prerequisite. What we are looking for are clues to hidden industrial hazards; and at the present stage of knowledge of industrial hygiene and its application, these must be looked for mostly in small groups of workers. The hazards of larger groups have been rather well understood for a long time, because interest of the general public has centered upon them. To obtain a satisfactory age curve for any disease, it appears that approximately 50,000 persons are required in the group—much larger than any group that is likely to contain hidden industrial hazards. Accordingly, this paper will place chief emphasis on the standardized rate—i. e., on an average figure for each occupation which makes allowance for differences in age distribution. These data will be supplemented by such age curves as are suggestive. A study of occupational mortality by age, however, is not so much a research into the hazards of specific occupations as it is into the manner in which industrial life in general reflects itself in the different causes of death.

To industrial hygienists in this country, the tables presented here are very suggestive, because they give actual rates—i. e., the number of deaths in a known population. American occupational mortality

statistics have never successfully been calculated on such a basis. Furthermore, the effect of age has been eliminated by determining what the rates would be if applied to a single age distribution for all of the occupations. This correction is of extreme importance in dealing with this subject, since the groups frequently differ widely as to age.

At the risk of burdening this paper with an excess number of tables, it has been felt almost necessary to give the occupational mortality by disease in successive tables, with a summary at the end in which the rates for different diseases in one occupation can be brought together. (Sec. V.) This method makes it possible to arrange the occupations in the order of the rates, singling out for special attention those which have very excessive rates.

However, it was important not to confuse the reader by including in the tables rates which are not particularly high or which were based on too small numbers to be statistically significant. Accordingly, the only rates included in this series of tables are those which are significantly above the rates for all occupied and retired males. The criterion used was the probable error,[9] and no rates appear where the difference between the rate and that for all occupied and retired males is less than three times the probable error. It was not necessary to calculate the probable error of the difference itself, since the rate for all occupied and retired males is based on a very large population and has no appreciable error from the point of view of simple sampling.

In using such a criterion no inference is possible that these occupations have significantly high rates as a result of the occupation per se. As explained previously, social and environmental conditions not associated with the industry and the question of selection of workers enter into the magnitude of the rates. However, the method does eliminate any occupation having a high rate due purely to small numbers. That this elimination is of considerable importance will be evident to anyone who has dealt with official vital statistics.

An exception to the rule was made in the case of occupations in social class V. So frequently were the rates for this class well above those for all occupied that it seemed well to include only class V occupations where the rates were significantly above those for that class (using three times the probable error as before) instead of above those for all occupied and retired males. None of the diseases specifically considered in this series of tables have lower rates in class V than in the other classes.

[9] When added to and subtracted from an average or rate, the probable error fixes the limits within which it is an even chance that the true average or rate would be found. In the case of an average it is obtained by multiplying the standard deviation by 0.6745 over the square root of the number of items. In the case of death rates, it is obtained similarly, using the formula for the standard deviation given from simple sampling—i. e., the square root of the product of p and q divided by n, where p is the chance that the death will occur (or the death rate per person), q the difference between this figure and unity, and n the population. Adjustment has been made for the fact that the data cover three years and are therefore more stable than data for a single year.

TUBERCULOSIS

It is fitting that the first disease to be considered is respiratory tuberculosis, which is the industrial disease of greatest importance at the present time in spite of its rapid decrease in the general population. The table follows.[10] It gives also the rank of the occupations, as do the succeeding tables.

TABLE 6.—*Standardized mortality from respiratory tuberculosis in occupations with rates above average, males aged 20–65, 1921–1923, in England and Wales*

Occupation group No.	Occupation	Mortality rate (standardized)
13a	Tin and copper mine, underground workers, not superintending staff (III)	1,886.0
13	Tin and copper miners, not superintending staff (III)	1,323.5
40a	Grinders in the cutlery trade (IV)	1,178.5
40	Metal grinders (IV)	636.7
95	Slate masons and slate workers (III)	512.5
18	Potters' mill workers; slip makers; potters (III)	411.4
153	Barmen (IV)	402.5
38	File cutters (III)	365.3
101	Drafters and brush makers (III)	355.5
127	Costermongers, hawkers, and street sellers (V)	342.4
37	Cutlers (III)	336.6
20	Earthenware, china, etc., kiln and oven men (III)	335.6
118	Stevedores (IV)	333.9
41	Metal glazers, polishers, buffers, and moppers (IV)	317.8
30	Brass foundry furnacemen and laborers (IV)	317.6
35	Brass finishers and turners (III)	308.2
160a	Warehousemen, textiles and clothing (III)	306.3
94	Masons, stone cutters and dressers (III)	304.0
76	Tobacco factory operatives (III)	299.6
120	Other dock laborers [a] (V)	284.7
66	Cutters of textile goods and clothing (not machine cutters) (III)	280.9
71	Skilled boot and shoe operatives, not clickers or cutters (III)	272.4
70	Boot and shoe clickers and cutters (III)	272.2
24	Other skilled glassworkers [b] (III)	270.0
122	Porters (V)	269.2
36	Coppersmiths (III)	266.1
68	Hat formers, plankers and stiffeners (III)	259.5
164	General undefined laborers (V)	246.8
80	French polishers (wood polishers) (III)	245.5
154	Waiters (III)	242.2
157	Chimney sweeps (III)	240.4
15	Slate miners and quarriers (IV)	238.4
54	Wool and worsted card, comb or frame (not spinning frame) tenters (IV)	238.0
75	Cellarmen (IV)	236.0
130	Insurance agents and canvassers (III)	234.7
148	Actors (III)	229.4
48	Skilled lime and tanyard workers, curriers, and leather dressers (III)	225.4
156	Hairdressers, etc. (III)	217.0
23	Skilled glasshouse workers (III)	215.3
67	Tailors; tailors' pressers and machinists (III)	212.5
115	Omnibus and tram conductors (IV)	212.3
149	Musicians (III)	207.1
152	Inn, hotel keepers, publicans (II)	201.1
162	Packers (IV)	198.9
112	Drivers of horse-drawn vehicles (IV)	197.0
69	Boot and shoe makers and repairers (not factory workers) (III)	195.5
124b	Salesmen, etc., in businesses for the sale of grocery and provisions (III)	193.1
124c	Salesmen, etc., in businesses for the sale of textiles and clothing (III)	193.1
84	Hand compositors (III)	192.9
87	Printing machine minders and assistants; machine rulers (III)	186.6
44	Tinsmiths and sheet-metal workers (III)	186.6
158	Clerks (not civil service or local authority); typists (II)	185.6
160	Warehousemen (III)	172.9
110	Railway porters and lampmen (IV)	172.1
32	Machine tool workers and metal spinners (IV)	165.4
124	Salesmen and shop assistants (III)	162.9
	All occupied and retired males	149.6

[a] Exclusive of stevedores, and coal-boat loaders and dischargers.
[b] Exclusive of skilled glasshouse workers, and glass blowers and finishers (not machine hands).

[10] The standardized rates in this table and the succeeding tables will not be found in the registrar general's report. They were obtained by multiplying the comparative mortality figures by a factor—the rate for all causes among all occupied and retired males.

In the present occupational classification of the English census, it has been possible to distinguish between underground and other tin and copper miners, and between grinders in the cutlery trade and others in the group previously termed "cutlery, scissors grinder." As a result we find the sensationally high rates, respectively, of 1,886 and 1,178 per 100,000 population, while the "all occupied and retired" rate is 150. These occupations show the result of a specific hazard—silica dust—as do several others in this list. In fact, the table suggests that dust is the one industrial hazard of a specific nature causing high rates from respiratory tuberculosis. However, there are general or indirect causes affecting the rates in many occupations. Impossible as it is to separate out the factors responsible in occupations such as barmen, costermongers, stevedores, porters, etc., it is clear that there are excessive rates in many occupations and that an important problem for the industrial hygienist is the isolating of the factors responsible. With regard to this point, the British report states that "the mortalities for separate occupations are very largely governed by their social circumstances."

If the general living conditions are the cause of the high rates in some particular occupations, there might be expected to be noted also a high death rate from all causes. Some meaning thus attaches to the relation between the rate for tuberculosis and that for all causes for a particular occupation. A supplementary table has been prepared to give the ratio of the standardized respiratory tuberculosis rate to that for all other causes. The rate for respiratory tuberculosis was first deducted from that for all causes to make the ratio more sensitive. These ratios must not be confused with proportionate mortality. They have been based on rates adjusted for differences in age in the various occupations. Such differences are a very serious obstacle in proportionate mortality figures for a disease like tuberculosis, because the difference is likely to produce one effect on the tuberculosis death rate and the opposite on the "all-cause" rate. Occupational groups with a large proportion of young persons will have a high percentage of deaths from tuberculosis and a low percentage from all causes; the reverse will be true of occupations with a large proportion of old persons. This error is largely corrected in the present comparison, where the ratio is based on standardized rates. The table has been carried down only to ratios of 25, to save space and concentrate attention on the occupations having real hazards. Occupations with ratios below this limit are quite likely to reflect living or social conditions rather than industrial hazards.

TABLE 7.—*Ratio of standardized respiratory tuberculosis rate to that for all other causes,*[1] *by occupations*

Occupation group No.	Occupation	Ratio	Rank in previous table	Rank here
13a	Tin and copper mine, underground workers (III)	90.6	1	1
13	Tin and copper miners, not superintending staff (III)	79.4	2	2
40a	Grinders in the cutlery trade (IV)	64.2	3	3
40	Metal grinders (IV)	54.3	4	4
95	Slate masons and slate workers (III)	54.1	5	5
101	Drafters and brush makers (III)	41.7	9	6
37	Cutlers (III)	40.2	11	7
76	Tobacco factory (III)	39.8	19	8
15	Slate miners and quarriers (IV)	38.1	32	9
18	Potters' mill workers; slip makers; potters (III)	37.7	6	10
70	Boot and shoe clickers and cutters (III)	36.9	23	11
36	Coppersmiths (III)	36.5	26	12
71	Skilled boot and shoe operatives (III)	36.2	22	13
66	Cutters of textile goods and clothing (III)	35.7	21	14
35	Brass finishers and turners (III)	35.2	16	15
130	Insurance agents and canvassers (III)	32.8	35	16
41	Metal glazers and polishers (IV)	31.7	14	17
94	Masons, stone cutters, and dressers (III)	31.5	18	18
160a	Warehousemen, textiles and clothing (III)	30.8	17	19
115	Omnibus and tram conductors (IV)	30.6	41	20
157	Chimney sweeps (III)	30.5	31	21
67	Tailors, tailors' pressers, and machinists (III)	29.7	40	22
30	Brass foundry furnacemen and laborers (IV)	29.4	15	23
124b	Salesmen—sale of groceries and provisions (III)	29.3	47	24
118	Stevedores (IV)	29.2	13	25
127	Costermongers, hawkers, and street sellers (V)	29.1	10	26
153	Barmen (IV)	29.1	7	27
48	Skilled lime and tanyard workers, curriers, etc. (III)	28.5	37	28
80	French polishers (III)	27.9	29	29
38	File cutters (III)	27.5	8	30
84	Hand compositors (III)	26.5	49	31
24	Other skilled glassworkers (III)	26.3	24	32
120	Other dock laborers (V)	25.5	20	33
68	Hat formers, plankers, stiffeners (III)	25.5	27	34
87	Printing-machine minders and assistants (III)	25.4	50	35
44	Tinsmiths and sheet-metal workers (III)	25.3	51	36
20	Earthenware, china, etc., kiln and oven men (III)	25.1	12	37
	All occupied and retired males	19.5	-------	-------
	Social class V	22.2	-------	-------

[1] All other causes equals 100.

The significance of dust as a cause of occupational tuberculosis is stressed in this table. Of the first 20 occupations in the list, not more than 2 or 3 can be regarded as nondusty. Quite evidently the dust is primarily silica. Many dusty occupations which previously ranked some distance down the list have now taken a position near the top, such as tobacco-factory employees (rank 19 to rank 8), slate miners, and quarriers (32 to 9), boot and shoe clickers, and cutters (23 to 11). On the other hand, occupations where the hazard is nonspecific or where conditions outside the factory are responsible have been moved down, such as barmen (rank 7 to rank 27), costermongers (10 to 26), stevedores (13 to 25), other dock laborers (20 to 33). These are groups in which alcoholism may be thought to play an important rôle.

It is still apparent that there is an excess of tuberculosis in certain occupations where some other specific hazard besides dust may exist—e. g., in tailors and cutters of textile goods, boot and shoe clickers

and skilled boot and shoe operatives, hand compositors and machine compositors, printing-machine minders, and bookbinders.

CHRONIC INTERSTITIAL PNEUMONIA

This cause of death is used as a generic title for such forms of disease as fibroid phthisis, fibrosis of the lungs, silicosis, miners' phthisis, etc., when returned as nontuberculous. Thus it may be most appropriately discussed at this point rather than under acute pneumonia. The disease is purely occupational in nature (where correctly returned), and only 398 deaths were so classified in all occupations in the three years. The table follows:

TABLE 8.—*Standardized mortality from chronic interstitial pneumonia in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
13a	Tin and copper mine—underground workers, not superintending staff (III)	499.9
13	Tin and copper miners, not superintending staff (III)	330.3
40a	Grinders in the cutlery trade (IV)	60.6
94b	Masons, sandstone (III)	56.1
14c	Stone miners, quarriers and sandstone (IV)	34.1
40	Metal grinders (IV)	30.7
94a	Masons, limestone (III)	28.0
94	Masons, stonecutters and dressers (III)	26.7
12	Iron-ore mine, underground workers, not superintending staff (III)	16.4
18	Potters' mill workers; slip makers; potters (III)	*15.7
21	Brick, tile, etc., kiln and oven men (III)	*14.3
14	Stone miners and quarriers (IV)	10.6
9	Coal mine, persons making and repairing roads (IV)	5.4
22	Other persons engaged in the manufacture of bricks, tiles, and pottery (V)	*4.0
14b	Stone miners, quarriers and limestone (IV)	3.7
7	Coal mine, hewers and getters (III)	3.1
	All occupied and retired males	1.2

* Difference less than 3 times the probable error.

The starred rates are included, although not three times the probable error. They are still suggestive of a hazard, since we are dealing with a cause of death which presumably does not occur except where a hazard exists. It should be stated, though, that not more than four deaths occurred in any one of these occupations.

In regard to these figures, the British report makes a comment which should be included here:

The enormous preponderance of Cornish miners' mortality in this list may not altogether represent the facts, for it is very natural that in a case like this, where many instances of a disease rare elsewhere are met within a limited area, it should there be more completely distinguished in certification from other similar forms of disease. Nearly all of the mortality represented in the above list, it will be noticed, is associated in one way or another with stone, whether this is worked in mining for tin and copper, coal, iron ore, or in stone mining and quarrying and dressing. The potters' risk may be attributed to the flint dust used, and the metal grinders' to the dust from grindstones, but it is difficult to conceive of any special occupational risk accounting for the four deaths of artists. It

will be noticed that the risk for coal miners is highest in the case of the makers and repairers of road, who drive shafts and passages through the rock, giving access for the hewers to the working places where the coal itself is cut.

The reader will not fail to notice the contrast between the rates among workers in sandstone compared with those among workers in limestone.

Owing to the large numbers involved, it is of importance to note especially the rates for coal miners. (Occupational groups 7 and 9.)

BRONCHITIS

The table for bronchitis follows:

TABLE 9.—*Standardized mortality from bronchitis in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
40a	Grinders in the cutlery trade (IV)	330.5
55	Cotton strippers and grinders and card-room jobbers (IV)	253.2
18	Potters' mill workers; slip makers; potters (III)	246.7
13a	Tin and copper mine, undergound workers, not superintending staff (III)	227.1
20	Earthenware, china, etc., kiln and oven men (III)	222.1
13	Tin and copper miners, not superintending staff (III)	176.4
23a	Glass blowers and finishers, not machine hands (III)	146.0
40	Metal grinders (IV)	143.2
51	Cotton blow room operatives, skilled (IV)	137.1
127	Costermongers, hawkers, and street sellers (V)	122.1
27a	Puddlers (III)	121.9
23	Skilled glasshouse workers (III)	120.3
22	Other persons engaged in the manufacture of bricks, tiles, and pottery (V)	120.0
101	Drafters and brush makers (III)	115.1
120	Other dock laborers (V)	113.7
24	Other skilled glassworkers (III)	113.4
122	Porters (V)	98.7
104	Gas stokers (IV)	96.2
112	Drivers of horse-drawn vehicles (IV)	92.8
64	Dye mixers and dyers (IV)	90.9
153	Barmen (IV)	90.6
94	Masons, stone cutters, and dressers (III)	90.5
41	Metal glazers, polishers, buffers, and moppers (IV)	89.0
58	Cotton doublers, winders, warpers, beamers, etc. (III)	88.9
164	General and undefined laborers (V)	88.3
29	Iron foundry furnacemen and laborers (IV)	82.6
11	Coal mine—workers above ground, not superintending staff (IV)	81.0
35	Brass finishers and turners (III)	80.3
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	79.6
28	Metal molders (III)	78.2
10	Coal mine, other workers below ground (IV)	75.6
60	Cotton weavers (III)	74.9
43	Riveters and their laborers (III)	72.5
8	Coal mine, persons conveying material to the shaft (IV)	70.4
56	Cotton spinners and piecers (III)	65.0
7	Coal mine, hewers and getters (III)	64.7
9	Coal mine, persons making and repairing roads (IV)	64.4
162	Packers (IV)	63.5
110	Railway porters and lampmen (IV)	60.8
27	Persons engaged in smelting, rolling, converting of iron and steel (IV)	58.5
	All occupied and retired males	45.4

Like respiratory tuberculosis, bronchitis varies closely with social class, the standardized rate in class V being seven times that in class I, and there are no doubt several occupations in this table which have an excessive rate because of the living and economic conditions of the group; but it is striking that the highest rates appear among skilled workers and reflect, as in the case of tuberculosis, specific

hazards like dust. The high rate among cotton workers suggests that other dusts besides silica are important here, while they did not seem important as predisposing to tuberculosis.

It is to the point to contrast the bronchitis mortality of cotton workers with that of woolen workers in similar jobs, the standardized rates being as follows:

	Cotton	Wool
Carders	74. 8	98. 8
Spinners	65. 0	23. 3
Doublers	88. 9	35. 9
Weavers	74. 9	38. 3
All occupied	45. 4	

If dust is to be regarded as more or less responsible for the high mortality among carders, in both wool and cotton, it is suggested that high temperature (with accompanying high humidity) is a major factor. As the British report states, "Of the three occupations involving high working temperatures in the cotton industry the spinners suffer a bronchitis mortality nearly three times as high in cotton as in wool, doublers about two and a half times, and weavers nearly twice as high."

PNEUMONIA

A table for pneumonia is next given:

TABLE 10.—*Standardized mortality from pneumonia in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
30	Brass foundry furnacemen and laborers (IV)	194. 1
40a	Grinders in the cutlery trade (IV)	189. 9
118	Stevedores (IV)	189. 5
51	Cotton blow room operatives, skilled (IV)	177. 4
29	Iron foundry furnacemen and laborers (IV)	176. 8
53	Cotton card and frame (not spinning frame) tenters (IV)	169. 8
27a	Puddlers (III)	158. 7
120	Other dock laborers (V)	156. 1
127	Costermongers, hawkers, and street sellers (V)	154. 1
153	Barmen (IV)	149. 0
40	Metal grinders (IV)	146. 8
122	Porters (V)	139. 3
24	Other skilled glass workers (III)	134. 1
28	Metal molders (III)	133. 1
164	General and undefined laborers (V)	131. 2
152	Inn, hotel keepers, publicans (II)	125. 4
112	Drivers of horse-drawn vehicles (IV)	124. 3
104	Gas stokers (IV)	123. 5
35	Brass finishers and turners (III)	120. 1
27	Persons engaged in smelting, rolling, converting of iron and steel (IV)	117. 8
154	Waiters (III)	116. 1
139	Registered medical practitioners (I)	113. 4
43	Riveters and their laborers (III)	105. 3
10	Coal mine, other workers below ground (IV)	104. 7
44	Tinsmiths and sheet metal workers (III)	103. 8
116	Grooms and horse keepers (IV)	101. 4
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	96. 0
162	Packers (IV)	95. 9
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	95. 1
11	Coal mine—workers above ground, not superintending staff (IV)	94. 6
	All occupied and retired males	77. 9

Among the occupations with high mortality from pneumonia are several in which the workers are exposed to trying alternations of temperature, such as puddlers and iron and brass foundry workers, and cotton workers. Of not less importance is the group of occupations exposed to dust of one sort or another, such as metal polishers, cutlery grinders, including several occupations in which both dust and high temperature appear to be factors. Rates are also high among the group exposed to adverse weather conditions—dock laborers, drivers of horse-drawn vehicles, riveters, stevedores, etc.

It is important to note that tin and copper miners do not have an excess mortality from acute pneumonia.

TOTAL RESPIRATORY DISEASE (EXCLUSIVE OF TUBERCULOSIS AND INFLUENZA)

There is a certain confusion between mortality from bronchitis and pneumonia. In some cases deaths returned as pneumonia in the higher social classes would be returned as bronchitis in the lower. Therefore, it is desirable to consider also the total respiratory group. Following the custom of the International List, this group is exclusive of influenza and tuberculosis. The former could not affect the total appreciably, and in view of the specific relation of tuberculosis to silica dust exposure, it seems well not to confuse the general respiratory mortality with the inclusion of that cause.

TABLE 11.—*Standardized mortality from diseases of the respiratory system in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
13a	Tin and copper mine, underground workers, not superintending staff (III)	878.4
40a	Grinders in the cutlery trade (IV)	640.0
13	Tin and copper miners, not superintending staff (III)	603.5
20	Earthenware, china, etc., kiln and oven men (III)	407.4
55	Cotton strippers and grinders and card-room jobbers (IV)	396.4
18	Potters' mill workers; slip makers; potters (III)	396.4
40	Metal grinders (IV)	341.1
51	Cotton blow-room operatives, skilled (IV)	337.5
118	Stevedores (IV)	324.3
127	Costermongers, hawkers, and street sellers (V)	303.4
120	Other dock laborers (V)	294.6
30	Brass foundry furnace men and laborers (IV)	292.9
27a	Puddlers (III)	292.0
53	Cotton card and frame (not spinning frame) tenters (IV)	287.5
103	Shipyard laborers, etc. (V)	277.8
24	Other skilled glass workers (III)	274.2
29	Iron foundry furnace men and laborers (IV)	272.9
153	Barmen (IV)	264.2
41	Metal glazers, polishers, buffers, and moppers (IV)	261.5
122	Porters (V)	256.6
23a	Glass blowers and finishers, not machine hands (III)	254.8
164	General and undefined laborers (V)	241.8
112	Drivers of horse-drawn vehicles (IV)	240.4
101	Drafters and brush makers (III)	236.3
28	Metal molders (III)	231.1
104	Gas stokers (IV)	228.2
94	Masons, stone cutters, and dressers (III)	226.5
54	Wool and worsted card, comb or frame (not spinning frame) tenters (IV)	224.1
23	Skilled glasshouse workers (III)	221.2

TABLE 11.—*Standardized mortality from diseases of the respiratory system in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*—Continued

Occupation group No.	Occupation	Mortality rate
58	Cotton doublers, winders, warpers, beamers, etc. (III)	218.1
35	Brass finishers and turners (III)	217.8
64	Dye mixers and dyers (IV)	214.8
10	Coal mine, other workers below ground (IV)	201.9
27	Persons engaged in smelting, rolling, converting of iron and steel (IV)	200.6
11	Coal mine, workers above ground, not superintending staff (IV)	119.5
124a	Salesmen, etc., in businesses for sale of fish, meat, green groceries, milk (III)	188.8
152	Inn, hotel keepers, publicans (II)	187.1
80	French polishers (III)	185.5
43	Riveters and their laborers (III)	184.0
9	Coal mine, persons making and repairing roads (IV)	182.8
56	Cotton spinners and piecers (III)	176.7
117	Bargemen and boatmen (IV)	175.8
8	Coal mine, persons conveying material to the shaft (IV)	173.8
162	Packers (IV)	172.9
116	Grooms and horse keepers (IV)	168.6
7	Coal mine hewers and getters (III)	159.1
123a	Proprietors, etc., of businesses for sale of fish, meat, green groceries, milk (II)	157.3
	All occupied and retired males	138.8

Occupations with high rates may be divided into five groups:

(*a*) Dusty trades—tin and copper miners, grinders in cutlery trades, kiln and oven men, cotton strippers and grinders and card-room jobbers, potters, etc.

(*b*) Trades exposed to high temperatures (with or without high humidity)—brass foundry furnace men, puddlers, cotton workers, etc.

(*c*) Trades with general exposure to bad weather conditions—shipyard laborers, stevedores, other dock laborers, costermongers, drivers of horse-drawn vehicles, etc.

(*d*) Trades which have a tendency to collect groups of inferior physical types—costermongers, drivers of horse-drawn vehicles, etc.

(*e*) Trades in which there is an excessive amount of drinking—barmen, porters, etc.

The significance of respiratory conditions aside from tuberculosis in their relation to industrial health will promptly be recognized.

Under bronchitis was given a comparison as to cotton and wool workers. Similar figures are desirable for respiratory diseases as a whole, and are as follows:

	Cotton	Wool
Carders	287.5	224.1
Spinners	176.7	109.4
Doublers	218.1	109.0
Weavers	149.2	93.3
All occupied	138.8	

In regard to these rates, let us quote the following from the registrar general's report:

The spinning, doubling, and weaving of cotton are carried on at high temperatures (70° to 80°) in order to soften the waxy content of the fiber, and so render it more easily worked while carding-room processes do not involve this requirement. The carders' mortality does not differ greatly in the two industries, being higher from bronchitis for wool and from pneumonia for cotton. Thus it appears that for three textile occupations involving for cotton (but not for wool) workers exposure to artificial heat and moisture, respiratory disease mortality is above average for the cotton workers so exposed and well below it for the woolen workers not subject to these conditions, whereas for carders, who are exposed to much dust but little heat, there is excess in both industries.

INFLUENZA

There is added a table for influenza, although this disease is of minor importance from an occupational point of view.

TABLE 12.—*Standardized mortality from influenza in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
12	Iron ore mine, underground workers, not superintending staff (III)	69.4
64	Dye mixers and dyers (IV)	59.7
29	Iron foundry furnacemen and laborers (IV)	59.6
10	Coal mine, other workers below ground (IV)	58.6
11	Coal mine, workers above ground, not superintending staff (IV)	57.2
117	Bargemen and boatmen (IV)	55.9
9	Coal mine, persons making and repairing roads (IV)	55.6
152	Inn, hotel keepers, publicans (II)	51.5
28	Metal molders (III)	47.0
27	Persons engaged in smelting, rolling, converting of iron and steel (IV)	44.8
164	General and undefined laborers (V)	44.5
8	Coal mine, persons conveying material to the shaft (IV)	44.5
112	Drivers of horse-drawn vehicles (IV)	42.4
7	Coal mine, hewers and getters (III)	36.7
	All occupied and retired males	33.3

Only one occupation (iron ore miners, underground) reveals a death rate twice that of all occupied males. It is perhaps of moment that all of the coal mine groups show an excess. In fact, of the 14 occupations in the list 5 are coal. It should also be observed that iron foundry furnacemen and laborers, metal molders, and persons engaged in smelting, rolling, and converting of iron and steel have rates significantly above those for all occupied.

DISEASES OF HEART

A table for valvular heart disease and one for "other" (chiefly myocardial) heart disease are next given.

TABLE 13.—*Standardized mortality from valvular disease of the heart in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
55	Cotton strippers and grinders and card-room jobbers (IV)	119.7
153	Barmen (IV)	117.4
11	Coal mine, workers above ground, not superintending staff (IV)	95.0
164	General and undefined laborers (V)	86.9
56	Cotton spinners and piecers (III)	86.6
64	Dye mixers and dyers (IV)	84.9
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	84.3
60	Cotton weavers (III)	82.0
112	Drivers of horse-drawn vehicles (IV)	78.6
152	Inn, hotel keepers, publicans (II)	77.3
8	Coal mine, persons conveying material to the shaft (IV)	74.5
163	Stationary engine and crane drivers (III)	73.2
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	71.9
10	Coal mine, other workers below ground (IV)	71.7
160	Warehousemen (III)	70.5
98	Painters and decorators (III)	65.6
	All occupied and retired males	58.0

TABLE 14.—*Standardized mortality from other heart disease in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
13a	Tin and copper mine, underground workers, not superintending staff (III)	194.7
40a	Grinders in the cutlery trade (IV)	170.1
137	Barristers (I)	150.9
68	Hat formers, plankers, stiffeners (III)	139.1
20	Earthenware, china, etc., kiln and oven men (III)	127.4
75	Cellarmen (IV)	121.8
152	Inn, hotel keepers, publicans (II)	108.8
153	Barmen (IV)	107.6
40	Metal grinders (IV)	107.3
41	Metal glazers, polishers, buffers, and moppers (IV)	103.6
127	Costermongers, hawkers, and street sellers (V)	99.6
122	Porters (V)	99.4
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	98.4
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	96.3
156	Hairdressers, etc. (III)	80.4
112	Drivers of horse-drawn vehicles (IV)	79.3
123	Proprietors and managers of wholesale or retail dealing businesses (II)	78.8
123b	Proprietors, etc., of businesses for the sale of groceries and provisions (II)	76.9
164	General and undefined laborers (V)	76.5
67	Tailors, tailors' pressers, and machinists (III)	75.4
125	Commercial travelers (II)	74.3
	All occupied and retired males	60.0

In the case of valvular heart disease, two quite unlike occupations stand at the top (cotton strippers, etc., and barmen). Although this cause of disease apparently does not reflect occupational differences to the same extent as "other" heart diseases, it should be noted that cotton spinners and weavers (as well as strippers) have rates very much above those for all occupied. Another group with high rates is that of coal miner, an extremely strenuous occupation.

For myocardial disease the order of the occupations with the highest rates is quite different. In fact, very little association between these two causes of death can be found. Quite a number of occupa-

tions have extraordinarily high rates for "other" heart disease, the most interesting feature being the great variations in the nature of the occupations from tin miner to barrister to barmen.

There is a suggestion of an association between myocardial disease and silica risk, in regard to which the registrar general states:

The association * * * between heart disease and silica risk can not, unfortunately, be measured directly, as the deaths ascribed either to silicosis or to chronic interstitial pneumonia are far too few to make this possible. It is worth noting, however, that there is a significant correlation between mortality (164 occupations) from bronchitis and chronic nephritis, $r = +0.380 \pm 0.045$. Chronic nephritis has been seen to be associated with heart disease, and bronchitis certainly often results from silicosis. If the latter is a cause of chronic nephritis, it may conceivably be a cause also of similar degenerative changes in the heart muscle. But association of these degenerative diseases may of course be independent of silicosis. Little more than vague speculation is possible without some more effective appraisement of the incidence of silicosis on occupations than is at present supplied by the mortality returns.

CEREBRAL HEMORRHAGE

A number of occupations have strikingly high rates from cerebral hemorrhage. The data are given in the next table.

TABLE 15.—*Standardized mortality from cerebral hemorrhage, etc., in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
13a	Tin and copper mine, underground workers, not superintending staff (III)	156.5
53	Cotton card and frame (not spinning frame) tenters (IV)	125.9
13	Tin and copper miners, not superintending staff (III)	122.6
36	Coppersmiths (III)	108.6
153	Barmen (IV)	77.0
152	Inn, hotel keepers, publicans (II)	72.6
156	Hairdressers, etc. (III)	68.3
60	Cotton weavers (III)	67.4
98	Painters and decorators (III)	64.3
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	61.7
89	Employers, managers in the building, etc., trades, clerks of works (II)	59.4
42	Plumbers (III)	58.7
56	Cotton spinners and piecers (III)	58.5
11	Coal mine workers above ground, not superintending staff (IV)	57.6
9	Coal mine, persons making and repairing roads (IV)	56.1
112	Drivers of horse-drawn vehicles (IV)	54.1
8	Coal mine, persons conveying material to the shaft (IV)	52.9
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	52.5
164	General and undefined laborers (V)	51.8
32	Machine tool workers and metal spinners (IV)	49.9
33	Fitters, tool setters, millwrights, and similar occupations (III)	47.9
	All occupied and retired males	41.1

It seems difficult at the present time to explain such extraordinary rates, several of them more than twice as high as that of all occupied and retired males, occurring in widely varying occupations.

It might be mentioned that the registrar general has determined the correlation between mortality from cerebral hemorrhage and that from chronic nephritis to be $.66 \pm .03$, emphasizing a point long understood in clinical medicine.

DIGESTIVE DISEASES AND CHRONIC NEPHRITIS

For brevity the next three tables are treated together.

TABLE 16.—*Standardized mortality from diseases of the digestive system in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
137	Barristers (I)	261.0
152	Inn, hotel keepers, publicans (II)	187.9
74	Brewers of ale, stout, and porter (IV)	170.5
153	Barmen (IV)	125.6
148	Actors (III)	119.6
140	Dentists (I)	101.1
160a	Warehousemen, textiles and clothing (III)	100.5
139	Registered medical practitioners (I)	86.6
122	Porters (V)	77.7
125	Commercial travelers (II)	76.6
123b	Proprietors, etc., of businesses for the sale of groceries and provisions (II)	75.8
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	75.2
120	Other dock laborers (V)	72.4
123	Proprietors and managers of wholesale or retail dealing businesses (II)	70.1
112	Drivers of horse-drawn vehicles (IV)	67.4
46	Electrical engineers, fitters, and wiremen (III)	66.2
164	General and undefined laborers (V)	63.6
158	Clerks (not civil service or local authority); typists (II)	59.8
	All occupied and retired males	54.4

TABLE 17.—*Standardized mortality from peptic ulcer in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
137	Barristers (I)	157.9
153	Barmen (IV)	43.6
160a	Warehousemen, textiles and clothing (III)	37.6
152	Inn, hotel keepers, publicans (II)	26.4
112	Drivers of horse-drawn vehicles (IV)	22.4
46	Electrical engineers, fitters, and wiremen (III)	22.3
110	Railway porters and lampmen (IV)	22.0
164	General and undefined laborers (V)	19.2
	All occupied and retired males	14.5

TABLE 18.—*Standardized mortality from chronic nephritis in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
38	File cutters (III)	196.7
57	Wool and worsted spinners and piecers (III)	91.4
153	Barmen (IV)	81.2
152	Inn, hotel keepers, publicans (II)	71.5
156	Hairdressers, etc. (III)	60.9
42	Plumbers (III)	60.5
98	Painters and decorators (III)	60.1
123a	Proprietors, etc., of businesses for sale of fish, meat, green grocery, milk (II)	50.8
127	Costermongers, hawkers, and street sellers (V)	47.5
124a	Salesmen, etc., in businesses for sale of fish, meat, green grocery, milk (III)	47.3
56	Cotton spinners and piecers (III)	47.1
89	Employers, managers in the building, etc., trades; clerks of works (II)	45.5
123b	Proprietors, etc., of businesses for the sale of groceries and provisions (II)	44.8
29	Iron foundry furnacemen and laborers (IV)	44.1
112	Drivers of horse-drawn vehicles (IV)	41.4
123	Proprietors and managers of wholesale or retail dealing businesses (II)	40.6
164	General and undefined laborers (V)	40.0
	All occupied and retired males	31.6

It is difficult to separate the effect of specific occupational factors from the factor of intemperance in the case of these diseases. We find consistently high rates for publicans, brewers, barmen, porters, commercial travelers, etc., groups in which alcohol must be regarded as an important contributory factor and in which cirrhosis of the liver also shows a high mortality rate. Aside from alcoholic indulgence, dietary intemperance plays a part. Between the two the effect of any specific hazard is more or less obliterated. One is not sure, in examining the table for digestive diseases, whether these two points do not really explain every high rate. Few occupations show significantly high rates for ulcer of the stomach. The extraordinary rate for barristers, although significant as judged by the probable error, still contains a great deal of chance fluctuation, due to the small group. The probable error of the rate is 29.

In the case of chronic nephritis, the effect of alcoholism is pronounced, but other factors are at work, such as association with lead poisoning (plumbers, painters, and decorators). It might be stated that in all previous reports file cutters have exhibited definite mortality from lead poisoning, so that this association may be responsible for their position in this table.

No table has been prepared for diabetes, but it is of interest to note the high rates from this cause among glassworkers. Glass blowers, other skilled glasshouse workers, and other glass workers (i. e., not in the glasshouse) all have an unusual mortality from diabetes, a fact which appears to be very significant to the registrar general. He notices the fact that none of the deaths among glassworkers occurred at ages over 65, with 60 per cent at ages 55–64, which in itself may be significant of some occupational influence.

LEAD POISONING

No special table has been prepared for deaths from lead poisoning, because of the small number classified specifically under this heading (150 for the three years). These deaths were distributed as follows:

Potters	27
Plumbers	18
Occupations akin to plumbing	4
Painters and decorators	69
Other deaths probably due to paint	2
Workers in white and red lead	7
All other occupations	23

No new information as to lead hazard is contained in these figures. It should be observed that only one death was assigned to accumulator (battery) makers and pasters. However, the group is small and this occupation had not been pursued for very long when these returns were made (1921–1923). Even this one death gives a crude

rate of 73 while that for all occupied and retired males is little more than 1.

CANCER

The table for cancer follows:

TABLE 19.—*Standardized mortality from cancer (all sites) in occupations with rates above average, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	Mortality rate
154	Waiters (III)	235.3
75	Cellarmen (IV)	211.6
153	Barmen (IV)	210.3
56	Cotton spinners and piecers (III)	193.6
104	Gas stokers (IV)	187.7
122	Porters (V)	182.8
157	Chimney sweeps (III)	[1] 181.3
88	Bookbinders and pattern card makers (III)	176.9
149	Musicians (III)	176.8
40	Metal grinders (IV)	176.6
160a	Warehousemen, textiles and clothing (III)	175.9
35	Brass finishers and turners (III)	170.9
112	Drivers of horse-drawn vehicles (IV)	168.3
120	Other dock laborers (V)	167.2
164	General and undefined laborers (V)	162.1
115	Omnibus and tram conductors (IV)	155.4
152	Inn, hotel keepers, publicans (II)	149.8
124c	Salesmen, etc., in businesses for the sale of textiles and clothing (III)	148.5
25	Chemical workers (IV)	146.2
28	Metal molders (III)	145.5
125	Commercial travelers (II)	144.3
124a	Salesmen, etc., in businesses for sale of fish, meat, green groceries, milk (III)	143.3
162	Packers (IV)	141.2
27	Persons engaged in smelting, rolling, converting of iron and steel (IV)	135.8
31	Smiths and skilled forge workers (III)	131.2
	All occupied and retired males	117.5

[1] Difference is less than 3 times the probable error.

In view of present speculation as to the causes of cancer, its relation to occupation, is one of the deepest interest. The registrar general has appreciated this and gives to this disease a great deal of careful thought, and anyone working in this field should refer to the volume itself. Here it is possible only to point out what groups of workers have high rates from cancer.

1. Those exposed to soot and various coal-tar preparations (gas stokers, chimney sweeps).[11]

2. Those exposed to certain food and drink conditions (waiters, barmen, publicans). The registrar general suggests that cancer of the upper alimentary tract is largely influenced by food and drink. In connection with these occupations (and also cellarmen, porters, other dock laborers), it should be noted that Hope gives as one of the groups with high rates from cancer those having an excessive mortality from alcoholism.[12]

[11] The difference between the rate for chimney sweeps and that for all occupied males was not three times the probable error of the former, but was, nevertheless, included because of past experience and the fact that the rates in various ages are consistently higher for sweeps.

[12] Hope, Hanna and Stallybrass: Industrial Hygiene and Medicine, p. 414.

3. Those exposed to chemical fumes (chemical workers).

4. Those exposed to metallic dusts and fumes (metal grinders, brass finishers and turners, metal molders, persons engaged in smelting, rolling, converting of iron and steel, smiths, and skilled forge workers).

5. One specific occupational disease, cotton spinners' scrotal cancer.

No satisfactory analysis is possible without consideration of site, and this is not possible in this review.

V. Summary of Standardized Rates by Occupation

By way of summary of the preceding tables according to important diseases, the rates have been assembled in a single table, the causes being placed in successive columns. Thus is permitted a picture of a fundamentally important fact—the relation of different causes of death in the same occupation. The occupations are arranged according to the order of mortality for all causes. As before, there are given only the rates in which the difference between the rate and that for all occupied and retired males is three times the probable error of the particular rate.[13] Also, as an abbreviation of the table, there are shown only occupations for which the rate for all causes is 10 per cent greater than that for all occupied and retired males.

TABLE 20.—*Standardized mortality, by occupation and cause, males aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	All causes	Respiratory tuberculosis	Bronchitis	Pneumonia	Influenza	Valvular heart	Other heart	Cerebral hemorrhage	Digestive diseases	Peptic ulcer	Chronic nephritis	Cancer (all sites)
13a	Tin and copper, underground (III)	3,966	1,886	227	----	----	----	195	157	----	----	----	----
40a	Grinders, cutlery trade (IV)	3,015	1,179	331	190	----	----	170	----	----	----	----	----
13	Tin and copper (III)	2,990	1,324	176	----	----	----	----	123	----	----	----	----
40	Metal grinders (IV)	1,809	637	143	147	----	----	107	----	----	----	----	177
153	Barmen (IV)	1,789	403	91	149	----	117	108	77	126	44	81	210
38	File cutters (III)	1,694	365	----	----	----	----	----	----	----	----	197	----
20	Earthenware, china, etc. (III)	1,674	336	222	----	----	----	127	----	----	----	----	----
127	Costermongers, hawkers, etc. (V)	1,519	342	122	154	----	----	100	----	----	----	47	----
18	Potters' mill workers, etc. (III)	1,502	411	247	----	----	----	----	----	----	----	----	----
118	Stevedores (IV)	1,481	334	----	189	----	----	----	----	----	----	----	----
53	Cotton, card, and frame tenters (IV)	1,465	----	----	170	----	----	----	126	----	----	----	----
95	Slate masons and slate workers (III)	1,460	513	----	----	----	----	----	----	----	----	----	----
152	Inn, hotel keepers, publicans (II)	1,450	201	----	125	51	77	109	73	188	26	71	150
120	Other dock laborers (V)	1,402	285	114	156	----	----	----	----	72	----	----	167
30	Brass foundry (IV)	1,400	318	----	194	----	----	----	----	----	----	----	----
51	Cotton blow-room operatives (IV)	1,387	----	137	177	----	----	----	----	----	----	----	----
75	Cellarmen (IV)	1,382	236	----	----	----	----	122	----	----	----	----	212
122	Porters (V)	1,370	269	99	139	----	----	99	----	78	----	----	183
41	Metal glazers, polishers, etc. (IV)	1,320	318	89	----	----	----	104	----	----	----	----	----
164	General and undefined laborers (V)	1,316	247	88	131	45	87	77	52	64	19	40	162
160a	Warehousemen (III)	1,300	306	----	----	----	----	----	----	101	38	----	176
24	Other skilled glass workers (III)	1,296	270	113	134	----	----	----	----	----	----	----	----
19	Pottery dippers, glaziers, etc. (III)	1,293	----	----	----	----	----	----	----	----	----	----	----
55	Cotton strippers, grinders, etc. (IV)	1,277	----	253	----	----	120	----	----	----	----	----	----
68	Hat formers, plankers, etc. (III)	1,277	260	----	----	----	----	139	----	----	----	----	----
94	Masons, cutters and dressers (III)	1,272	304	91	----	----	----	----	----	----	----	----	----
112	Drivers of horse-drawn vehicles (IV)	1,261	197	93	124	42	79	79	54	67	22	41	168
54	Wool, card, or frame tenters (IV)	1,256	238	----	----	----	----	----	----	----	----	----	----
103	Shipyard laborers, etc. (V)	1,236	----	----	----	----	----	----	----	----	----	----	----
74	Brewers of ale, stout, porter (IV)	1,232	----	----	----	----	----	----	----	171	----	----	----
148	Actors (III)	1,222	229	----	----	----	----	----	----	120	----	----	----
154	Waiters (III)	1,210	242	----	116	----	----	----	----	----	----	----	235
101	Drafters and brush makers (III)	1,208	356	115	----	----	----	----	----	----	----	----	----
23a	Glass blowers, finishers (III)	1,202	----	146	----	----	----	----	----	----	----	----	----
64	Dye mixers and dyers (IV)	1,193	----	91	----	60	85	----	----	----	----	----	----

[13] In case of Class V occupations, the rate for that class instead of the rate for all occupied is used as the basis of calculation.

TABLE 20.—*Standardized mortality, by occupation and cause, males aged 20–65, 1921–1923, England and Wales*—Continued

Occupation group No.	Occupation	All causes	Respiratory tuberculosis	Bronchitis	Pneumonia	Influenza	Valvular heart	Other heart	Cerebral hemorrhage	Digestive diseases	Peptic ulcer	Chronic nephritis	Cancer (all sites)
35	Brass finishers and turners (III)	1,183	308	80	120								171
117	Bargemen and boatmen (IV)	1,180				56							
104	Gas stokers (IV)	1,179		96	123								188
37	Cutlers (III)	1,175	337										
124a	Salesmen, fish, meat, etc. (III)	1,171		80	96		84	96	62			47	143
27a	Puddlers (III)	1,144		122	159								
56	Cotton spinners and piecers (III)	1,142		65			87		59			47	194
23	Skilled glasshouse workers (III)	1,138	215	120									
22	Other persons in manufacture of bricks, etc. (V)	1,137		120									
58	Cotton doublers, winders, etc. (III)	1,131		89									
156	Hairdressers, etc. (III)	1,129	217					80	68			61	
119	Coal boat loaders and dischargers (V)	1,126											
80	French polishers (III)	1,125	246										
10	Coal mine, workers below ground (IV)	1,122		76	105	59	72						
50	Wool sorters (III)	1,121											
149	Musicians (III)	1,116	207										177
8	Coal mine, persons conveying material to the shaft (IV)	1,102		70		45	75		53				
121	Messengers, hall porters, etc. (V)	1,098											
52	Rag grinders, wool willowers, etc. (IV)	1,096											
9	Coal mine, persons making and repairing roads (IV)	1,090		64		56			56				
11	Coal mine, workers above ground (IV)	1,082		81	95	57	95		58				
123a	Proprietors, fish, meat, etc. (II)	1,075			95		72	98	53	75		51	
137	Barristers (I)	1,071						151		261	158		
66	Cutters of textile goods and clothing (III)	1,069	281										
76	Tobacco factory operatives (III)	1,052	300										
28	Metal molders (III)	1,040		78	133	47							146
157	Chimney sweeps (III)	1,027	240										
71	Skilled boot and shoe, not clickers, cutters (III)	1,025	272										
29	Iron foundry furnacemen, laborers (IV)	1,021		83	177	60						44	
48	Skilled lime and tanyard workers, etc. (III)	1,017	225										
125	Commercial travelers (II)	1,014						74		77			144
70	Boot and shoe clickers and cutters (III)	1,010	272										
57	Wool and worsted spinners and piecers (III)	1,009										91	
88	Bookbinders and pattern card makers (III)	1,005											177
162	Packers (IV)	1,004	199	63	96								141
142	Music teachers (II)	1,003											

What is perhaps most impressive is the number of occupations with excessive rates from several causes. The group of barmen, for instance, have rates which are significantly above the average for all occupied and retired males for every disease in this list except influenza. Although confusion in putting down the correct cause of death and difficulties as to which of two causes is primary must be regarded as a factor here, there still remains a real and important correlation as to many causes of death. In the case of myocardial (other) heart disease, cerebral hemorrhage, and chronic nephritis, a close association is to be found.

The importance of selection in determining the mortality rates by occupation is strikingly demonstrated in the case of drivers of horse-drawn vehicles—a large group with no specific hazard. Here every cause of death in the table shows a significant excess.

Another point of great interest is the fact that certain diseases, such as tuberculosis, bronchitis, pneumonia, and "other" heart diseases, contribute largely to the excessive rates in the occupations at the top of the table, whereas others, such as influenza, valvular heart, cancer, are more or less scattered through the table.

In the old occupational classification of the Census Bureau all pottery workers were grouped under the title "potters; earthenware, etc., manufacture." Now this group is subdivided into kiln and oven men and kiln setters and placers (Group 20); potters' mill workers, slip makers, and potters (Group 18); and pottery dippers, glazers, painters, decorators (Group 19). The first two have a very excessive mortality from all causes—1,674 and 1,502, respectively—while the third is 1,293. The kiln and oven men show a marked excess for respiratory tuberculosis, bronchitis, and "other" heart disease; the potters for tuberculosis and bronchitis. In the case of the dippers and glazers the rates for no particular cause are significantly high.

One may be surprised not to find medical practitioners in this list. Since this group falls in social class I and our criterion of significance was based on all occupied and retired males, it is clear that this group may have rates for certain diseases higher than the average of their own social class and still have been omitted from all preceding tables. The writer felt that there was no necessity for any particular study of class I occupations. As a matter of fact, medical practitioners form a group with specific industrial hazards due to close contact with disease. They have a standardized rate of 1,021 as compared with 812 for social class I. Such an excess would mean nothing in contrast to all occupied males, and it is one of the great advantages of the present volume on occupational mortality that this differentiation as to social class may be made.[14] The physician will be interested to observe how his mortality from different causes compares with that of other persons in the same social class. Accordingly, a table is included giving the ratio of the rate of medical practitioners to that of class I as a whole, by cause, with the standardized rates. Those significantly above the rates for class I are in bold face.

TABLE 21.—*Ratio of standardized rates for registered medical practitioners to corresponding rate for social class I, by cause*

Cause	Ratio	Standardized rate	Cause	Ratio	Standardized rate
Accident	**205**	**74.8**	Bronchitis	**117**	**13.6**
Pneumonia	**176**	**44.7**	Cirrhosis of liver	**114**	**16.3**
Suicide	**174**	**113.4**	Cerebral hemorrhage	**113**	**40.9**
All respiratory (except tuberculosis and influenza)	**160**	**140.9**	"Other heart"	**111**	**70.7**
Influenza	**153**	**42.5**	Peptic ulcer	**111**	**14.5**
Chronic nephritis	**138**	**43.3**	Circulatory	**101**	**130.4**
All causes	**126**	**934.0**	Cancer	**99**	**93.1**
Digestive	**125**	**86.6**	All heart	**99**	**96.2**
Diabetes	**125**	**17.4**	Respiratory tuberculosis	**95**	**69.2**
Syphilis, etc	**125**	**22.6**	Appendicitis	**93**	**12.8**
			Valvular heart	**77**	**25.4**

[14] It was possible only in a limited way on the basis of the 1910-1912 occupational data.

Aside from the high ratio for accidents, what stands out above all is the high mortality rate for pneumonia, influenza, and the "all respiratory" group as a whole in relation to the corresponding rates for class I. Contact with cases of these diseases may be partially responsible. The ratios emphasize the highly communicable nature of influenza and pneumonia. Bronchitis is much further down the list, and there is no excess at all in the case of respiratory tuberculosis.

The high rate for accident is a little puzzling, but is perhaps associated with the constant use of the automobile by the physician.

A careful examination of the table summarizing the significantly high rates by occupation, suggests that in many instances the high death rate from all causes is not to be explained by the few diseases showing a significantly high mortality. Sometimes, indeed, no cause stands out at all. This does not necessarily mean that other causes than those given in the table explain the high rate, but rather that there is some excess in these causes, but not sufficient to be significant according to the criterion used. This will be true especially of the smaller occupations.

To bring out such relations, and also because of the convenience in comparing figures proportional to the rates for all occupied and retired males, an additional table is given, with the ratios to the rate for all occupied and retired males for each major cause (the so-called "comparative mortality figures" of the British report). The ratios are of two classes:

(*a*) Those in boldface are used wherever the rate is significantly high, or in other words, in every case where a figure was used in the preceding table.

(*b*) All other ratios for the occupations used in the preceding table based on 10 or more deaths. The limitation as to number of deaths was necessary to avoid too much meaningless fluctuation of the ratios.

TABLE 22.—*Ratio of standardized rates for specific occupations to that for all occupied and retired males, by major cause, where rate is above average based on 10 deaths or more, males, aged 20–65, 1921–1923, England and Wales*

Occupation group No.	Occupation	All causes	Respiratory tuberculosis	Bronchitis	Pneumonia	Influenza	Valvular heart	"Other heart"	Cerebral hemorrhage	Digestive diseases	Chronic nephritis	Cancer (all sites)
13a	Tin and copper, underground (III)	**433**	**1,261**	**500**	----	----	----	**324**	**381**	----	----	189
40a	Grinders, cutlery trade (IV)	**329**	**788**	**728**	**244**	----	----	**283**	----	----	----	194
13	Tin and copper (III)	**327**	**885**	**389**	----	----	----	224	**298**	----	----	140
40	Metal grinders (IV)	**198**	**426**	**315**	189	162	106	179	151	109	102	150
153	Barmen (IV)	**195**	**269**	**200**	191	137	**202**	179	**187**	**231**	**257**	179
38	File cutters (III)	**185**	**244**	----	----	----	----	----	----	----	**623**	----
20	Earthenware, china, etc. (III)	**183**	**224**	**489**	166	----	----	**212**	----	----	----	156
127	Costermongers, hawkers, etc. (V)	**166**	**229**	**269**	**198**	109	146	**166**	102	127	150	121
18	Potters, mill workers, etc. (III)	**164**	**275**	**543**	124	120	150	102	112	138	173	85
118	Stevedores, (IV)	**162**	**223**	**205**	**243**	----	147	109	77	151	----	147
53	Cotton card and frame tenters (IV)	**160**	**106**	----	**218**	----	217	187	**307**	----	----	142
95	Slate masons and slate workers (III)	**160**	**343**	----	----	----	**199**	**264**	----	----	----	109

TABLE 22.—*Ratio of standardized rates for specific operations to that for all occupied and retired males, by major cause, where rate is above average based on 10 deaths or more, males, aged 20–65, 1921–1923, England and Wales*—Continued

Occupation group No.	Occupation	All causes	Respiratory tuberculosis	Bronchitis	Pneumonia	Influenza	Valvular heart	"Other heart"	Cerebral hemorrhage	Digestive diseases	Chronic nephritis	Cancer (all sites)
152	Inn, hotel keepers, publicans (II)	159	134	85	161	155	133	181	177	345	226	127
120	Other dock laborers (V)	153	190	251	201	116	136	132	123	133	117	142
30	Brass foundry (IV)	153	212	199	249	-----	-----	152	206	-----	-----	106
51	Cotton blow-room operatives (IV)	152	75	302	228	-----	-----	-----	-----	-----	-----	109
75	Cellarmen (IV)	151	158	188	95	186	123	203	-----	186	193	180
122	Porters (V)	150	180	217	179	131	142	165	110	143	99	156
41	Metal glazers, polishers, etc. (IV)	144	212	196	203	192	97	173	137	110	-----	-----
164	General and undefined laborers (V)	144	165	195	169	133	150	127	126	117	127	138
160a	Warehousemen (textiles and clothing) (III)	142	205	116	135	149	117	104	137	185	127	150
24	Other skilled glassworkers (III)	142	181	250	172	180	93	88	180	-----	163	140
19	Pottery dippers, glazers, etc. (III)	141	146	-----	-----	-----	-----	211	-----	-----	-----	152
55	Cotton strippers, grinders, etc. (IV)	140	80	558	159	212	206	125	-----	-----	-----	86
68	Hat formers, plankers, etc. (III)	140	173	-----	132	95	137	232	153	-----	-----	162
94	Masons, cutters and dressers (III)	139	203	199	107	119	125	123	131	111	119	114
112	Drivers of horse-drawn vehicles (IV)	138	132	204	160	127	135	132	132	124	131	143
54	Wool, card or frame tenters (IV)	137	159	218	140	-----	132	98	142	162	181	91
103	Shipyard laborers, etc. (V)	135	160	246	195	181	145	85	108	97	106	125
74	Brewers of ale, stout, porter (IV)	135	-----	-----	-----	-----	-----	-----	-----	313	-----	140
148	Actors (III)	134	153	-----	88	-----	107	116	118	220	175	128
154	Waiters (III)	132	169	97	149	-----	105	77	-----	129	-----	200
101	Drafters and brush makers (III)	132	238	254	135	-----	-----	-----	-----	-----	-----	96
23a	Glass blowers, finishers (III)	131	152	322	95	-----	-----	-----	-----	-----	-----	151
64	Dye mixers and dyers (IV)	130	122	200	134	179	146	138	110	141	140	110
35	Brass finishers and turners (III)	129	206	177	154	159	95	70	111	113	110	145
117	Bargemen and boatmen (IV)	129	113	134	121	168	140	128	137	71	118	124
104	Gas stokers (IV)	129	108	213	159	175	123	103	86	117	127	160
37	Cutlers (III)	128	225	-----	156	-----	-----	-----	-----	-----	-----	113
124a	Salesmen, fish, meat, etc. (III)	128	113	175	123	117	145	161	150	111	150	122
27a	Puddlers (III)	125	90	269	204	-----	-----	-----	139	-----	-----	160
56	Cotton spinners and piecers (III)	125	107	143	118	106	149	128	142	129	149	165
23	Skilled glasshouse workers (III)	124	144	265	99	117	125	89	133	71	-----	131
22	Other persons in manufacture of bricks, etc. (V)	124	107	264	115	135	125	122	121	127	110	109
58	Cotton doublers, winders, etc. (III)	124	87	196	145	133	147	155	131	102	116	125
156	Hairdressers, etc. (III)	123	145	103	111	42	101	134	166	131	193	106
119	Coal-boat loaders and dischargers (V)	123	102	198	196	159	121	131	98	-----	117	136
80	French polishers (III)	123	164	149	118	-----	92	119	118	116	128	126
10	Coal mine, workers below ground (IV)	123	92	167	134	176	124	102	111	106	88	97
50	Wool sorters (III)	123	107	-----	-----	-----	-----	-----	-----	-----	-----	73
149	Musicians (III)	122	139	120	127	-----	131	142	78	128	108	151
8	Coal mine, persons conveying matter to the shaft (IV)	120	77	155	101	133	128	110	129	116	75	81
121	Messengers, hall porters, etc. (V)	120	162	94	130	103	161	112	85	118	77	116
52	Rag grinders, wool willowers, etc. (IV)	120	109	157	-----	-----	-----	165	218	-----	224	123
9	Coal mine, persons making and repairing roads (IV)	119	89	142	115	167	117	95	137	103	77	107
11	Coal mine, workers above ground (IV)	118	98	178	121	172	164	109	140	92	98	88
123a	Proprietors, fish, meat, etc. (II)	117	92	97	122	119	124	164	128	138	161	107
137	Barristers (I)	117	-----	-----	97	-----	-----	251	-----	479	-----	122
66	Cutters of textile goods and clothing (III)	117	188	102	126	-----	129	103	142	101	147	103
76	Tobacco factory operatives (III)	115	200	-----	85	-----	148	-----	-----	147	-----	124
28	Metal molders (III)	114	107	172	171	141	95	102	125	100	107	124
157	Chimney sweeps (III)	112	161	137	107	-----	149	143	-----	86	-----	154
71	Skilled boot and shoe, not clickers, cutters (III)	112	182	106	99	77	121	107	117	110	86	96
29	Iron-foundry furnacemen, laborers (IV)	112	101	182	227	179	106	87	82	62	140	105
48	Skilled lime and tanyard workers, etc. (III)	111	151	97	133	104	108	90	71	134	85	121
125	Commercial travelers (II)	111	101	59	98	89	114	124	111	141	117	123
70	Boot and shoe clickers and cutters (III)	110	182	102	69	81	125	135	146	85	114	105
57	Wool and worsted spinners and piecers (III)	110	90	-----	101	-----	119	127	141	125	290	128
88	Bookbinders and pattern card makers (III)	110	121	102	94	-----	139	76	-----	127	-----	151
162	Packers (IV)	110	133	140	123	85	94	96	91	113	109	120
142	Music teachers (II)	110	93	-----	163	-----	137	87	153	-----	-----	97

By way of interpretation of this table and also to describe briefly occupations which appear frequently in the previous tables, the following summary by occupation is provided. The text of the registrar general's report is drawn upon freely in discussing each occupation.

Tin and copper miners.—Such miners are found exclusively in Cornwall. There is some transfer between these fields and the Transvaal, so that some of the high mortality may be the result of working outside of England. In addition, the tin and copper mines were in a depressed condition in 1921, so that it is probable that most of the able-bodied men had left the mines. As stated before, it is now possible to separate the group of underground workers (13a) from the others and reveal the severity of the hazard. The high rates are found particularly in the case of respiratory tuberculosis, bronchitis, other heart diseases, cerebral hemorrhage, and cancer.

Metal grinders.—Again here it has been possible to separate the group with the greatest hazard (cutlery grinders) from the others. The high mortality for tuberculosis, bronchitis, pneumonia, other heart disease, and cancer in the total group is primarily due to that among cutlery grinders who form one-fifth of the total.

Publicans, barmen, waiters.—Barmen and publicans (including inn and hotel keepers) form a group with excessive mortality from nearly every cause. The distinctive feature of this mortality is perhaps that from cirrhosis of the liver (which is not given in the table), because of its clear indication of the effect of alcoholic intemperance. Except for occupations with known specific hazards, the occupation of barmen stands at the top. Of the diseases in the list, influenza is the only one which is not significantly above the rate for all occupied. Publicans are not much lower, and in that case every disease is significantly above all occupied except bronchitis. This is of particular importance, since this group is in class II, where the rates are usually lower than for all occupied. Waiters have been included for convenience, but they exhibit a much lower rate of mortality, the excess being confined to respiratory tuberculosis, pneumonia, and cancer.

File cutters.—Although a very small occupational group, these workers have been kept separate because of a very high mortality. Rapid change is believed to be in progress in the processes of manufacture, which appears to be reducing the risk for the occupations. For all causes the ratio to all occupied was 185 for 1921–1923. The rate for chronic nephritis was the highest of any occupational group, the ratio being 623. Only one other cause showed a significantly high rate—respiratory tuberculosis—the deaths from other causes being too small for analysis separately.

Makers of bricks and pottery.—These occupations may be combined for convenience, but include some where the conditions are not unfavorable and some where specific hazards exist. Some discussion of the occupations has already been given (p. 1595). The kiln and oven men and the potters have the highest rates. In both of these occupations the ratios are higher for bronchitis (489 and 543, respectively) than for any other major causes, and respiratory tuberculosis ranks next higher. "Other" heart condition is significantly high for kiln and oven men. Pottery dippers and glazers have a high ratio from all causes of 141, which may be explained by the rates for respiratory tuberculosis, "other" heart, and cancer; although in no case can these rates be shown to be significantly greater than those for all occupied. "Other" persons in the manufacture of bricks, etc., have a mortality ratio for bronchitis of 264, no other ratio being definitely significant.

Costermongers.—Costermongers are itinerant vendors of goods, working on their own behalf, instead of for employers, like the canvassers. Their high mortality rates are no doubt to be explained partly by reason of excessive alcoholism (the rates for cirrhosis of the liver are excessive), partly by reason of the physical type going into the occupation, partly, possibly, by reason of the severe weather conditions that the group is exposed to. The rates are high for respiratory tuberculosis, bronchitis, pneumonia, "other" heart, and chronic nephritis. Bronchitis shows the highest ratio. From other causes there seems to be little excess (influenza gives a ratio of 109, cerebral hemorrhage of 102, cancer of 121, digestive of 127). Thus the group stands out from those showing a consistent excess from every important cause.

Dock laborers.—In this group stevedores and coal-boat loaders and dischargers have been tabulated separately. The latter have much lower mortality rates than the dock laborers as a whole (the ratio being 123, while that of stevedores is 162, and of "other" dock laborers, 153), and are too small a group for any particular study of individual causes of death. Bronchitis and pneumonia are highest. Stevedores also comprise a small group; but in spite of this fact we find significantly high rates for respiratory tuberculosis and pneumonia, with a rate for bronchitis which is more than twice that of all occupied (though not quite three times the probable error). "Other" dock laborers comprise a large enough group for more precise comparison. The death rates are significantly high for respiratory tuberculosis, bronchitis, pneumonia, digestive, and cancer. It should be added that in the case of stevedores comparison is made with all occupied, because the group does not fall in social class V, but in the case of coal loaders and "other" dock laborers the test of statistical significance is made with Class V. One can hardly avoid the im-

pression that the exposure of these men to inclement weather has something to do with the very marked excess of mortality from respiratory conditions.

Cotton workers.—Different occupations among cotton workers have already received some consideration in relation to bronchitis and respiratory diseases in general. The group deserves careful study with a detail that is not possible in this paper. Both dust and high temperature and humidity are occupational hazards, but there are suggestions in the data that selection of an inferior type physically and other factors may be of great importance in determining the death rates. The same factors appear to have major influence in the cotton industry in the United States. The disease which stands out most prominently is bronchitis, with a ratio of 558 for strippers and grinders; 302 for blow-room operatives; 196 for doublers, winders, etc.; 143 for spinners and piecers. It is noteworthy that there is no excess for respiratory tuberculosis in any of the specific occupations. Owing to the small numbers in the groups (except spinners and doublers), it is difficult to reach a conclusion as to other causes of death; but ratios are almost invariably above 100. Spinners show a general excess from nearly every cause, no one disease predominating; so in lesser degree with doublers. Weavers are not included in the table, as the rate for all causes was not 10 per cent in excess of the corresponding rate for all occupied.

Masons, stonecutters, and dressers.—The workers of one specific occupation may be considered first, slate masons and workers, who have a very high mortality rate, primarily from respiratory tuberculosis, for which the ratio is 343. The relation to silica dust is established for this occupation. The group is a small one, limited to one district of North Wales.

Although masons, stonecutters, and dressers have been grouped together, whether working in limestone or sandstone, it is clear that a differentiation between the two is necessary if the data are to have much meaning. It will be recalled that such a separation was made in the table on chronic interstitial pneumonia. For the whole group a significant excess is found for respiratory tuberculosis and pneumonia, the other rates being close to the normal. From all causes, sandstone masons show a ratio of 207 and limestone masons a ratio of 120.

Brass foundry.—Brass foundry furnace men and laborers are subject both to the heat risk of foundries in general and to the special risk associated with molten brass. The significantly high rates in this group are from respiratory tuberculosis and pneumonia; but those from bronchitis (199) and cerebral hemorrhage (206) are also suggestive. The ratio for all causes is 153.

Brass finishers and turners may be mentioned here, although they work in cold metal. Significantly high rates are found from respira-

tory tuberculosis, bronchitis, pneumonia, and cancer; but the ratio for all causes is much less (129) than that for the furnace men. Exposure to dust during processes of sand grinding and polishing may contribute to the mortality among finishers.

Porters.—Porters are classified in social class V, but have rates significantly above those for that class from respiratory tuberculosis, bronchitis, pneumonia, "other" heart, digestive, and cancer. The group is no doubt affected to a considerable extent by alcoholism, and shows excessive rates for cirrhosis of the liver.

Messengers, hall porters, etc., are chiefly boys under 20 years of age, and therefore the standardized figure for them is somewhat dubious. Nothing stands out as significant. The majority are classified in social class V, and thus the ratio for all causes (120) conforms to that of their social class.

Metal polishers.—As polishing may be looked upon as a modified form of grinding, so the mortality of polishers presents similar features to that of grinders in a somewhat lesser degree. The rates are significantly high for respiratory tuberculosis, bronchitis, and "other" heart. The pneumonia and influenza rates may also be of importance.

General and undefined laborers.—High mortality is natural to this group, for ill health, misfortune, and unreliability of character must all combine to recruit its ranks. The rates are significantly above social class V for every cause of death in the list, but because of the large numbers in the group only a small excess is needed to show a significant difference. The diseases, in the order of the ratios, are as follows: Bronchitis, pneumonia, respiratory tuberculosis, valvular heart, cancer, influenza, chronic nephritis, "other" heart, cerebral hemorrhage, digestive.

Warehousemen (textiles and clothing).—Warehousemen in general do not have much excess mortality, but those in textiles and clothing have an excess for all causes of 42 per cent, with significantly high rates from respiratory tuberculosis, digestive, and cancer.

Skilled glass workers.—The three groups in which glass workers are divided are meant to include all workers who can be assumed to be subject to the intense heat of the glasshouse—skilled glasshouse workers (Group 23); one special subdivision of these, glass blowers by the traditional method (Group 23a); and other skilled glassworkers, who work mainly in cold glass (engravers, cutters, bevelers, optical workers, etc.) (Group 24). The ratios which are significantly high for these three groups are as follows:

Group 24, respiratory tuberculosis (181), bronchitis (250), pneumonia (172).

Group 23, respiratory tuberculosis (144), bronchitis (265).

Group 23a, bronchitis (322).

The registrar general records as remarkable the high mortality from diabetes among glassworkers (a disease which has not been included in this review). All three of these groups are near the top, 23a and 23 being first and second, respectively. However, the only rate of the three which is significantly high as judged by the probable error is that for skilled glasshouse workers.[15]

Hat formers, plankers, stiffeners.—Two rates are significantly high (respiratory tuberculosis and "other" heart). For cancer, the ratio is 162, but the difference between the rate and that for all occupied is not three times the probable error. There were four deaths.

Drivers of horse-drawn vehicles.—These are almost all engaged in the transportation of goods. The "coachman" of former days has practically disappeared. The rates are significantly above all occupied for every cause considered in this paper, the highest ratio being that for bronchitis. What is of particular interest is that motor drivers do not show any general excess at all. It may be difficult to assign definite reasons for the consistently high rates among drivers of horse-drawn vehicles. Certain it is that no specific hazards exist, unless we regard inclement weather as such. It is hard to escape from the conclusion that a selective process, aided by the fact that the occupation is to be regarded as gradually being replaced by that of motor drivers, has been at work, leaving a group inferior physically.

Wool industry.—Wool, card or frame, tenters have a ratio for all causes of 137. The rate for respiratory tuberculosis is significantly high. That for bronchitis, although not significant according to the criterion used, gives a ratio of 218. Wool sorters and rag winders and wool willowers appear near the bottom of the table, and in neither is any individual ratio significantly high. Wool and worsted spinners and piecers, although with a low ratio for all causes, have a significant ratio of 290 for chronic nephritis.

Shipyard laborers.—This group comprises all the unskilled workers in shipbuilding who could not be assigned as unskilled workers in the metal-working, woodworking, or painting sections. The group falls in social class V, and the rates for no apparent cause are significantly above the corresponding rates for that class.

Actors.—Respiratory tuberculosis and digestive diseases have significantly high rates for this occupation. Cirrhosis of the liver (not given in the table) indicates the effect of alcoholism in this group.

To save space, this description of occupations will not be carried down to those with only slight excess above the rates for all occupied. Some hazards are no doubt present in a few of these occupations, and it is not meant to imply that there is not a great deal of information

[15] Group 23a has a mortality rate of 42.4 ± 11.3; Group 24, 28.7 ± 7.6. All occupied is 11.2.

of interest in this part of the table; but space forbids any detailed consideration.

VI. Mortality by Age from a Few Causes

For purposes of any extended analysis, perhaps the most valuable portion of the registrar general's report lies in the "abstracts" giving the deaths and the death rates by age, cause, and occupation. From such sources it is difficult to identify hazards in small occupational groups, as noted above; but the material is immensely valuable as reflecting the effect of industry on the health of the workers in a general sense, and the different ways in which this influence is felt in specific diseases. It is not possible here to more than touch upon some of the points of greatest interest. Because of the unique position occupied by respiratory tuberculosis, that cause of death has been selected for special study, but tabular data are also given for a number of other diseases.

TUBERCULOSIS

The extraordinary decline in mortality from tuberculosis in recent years might suggest that this disease had ceased to be of fundamental importance in industry, but, as the preceding tables have shown, this is not at all true. A series of graphs are given, in which the age curve of respiratory tuberculosis for a number of occupations is contrasted with that for all occupied and retired males. Quite obviously, only occupations of considerable size could be used, since in other cases the rates by age would fluctuate widely. Hence, the graphs can not be taken as a complete picture of occupations with excessive death rates from respiratory tuberculosis. For such a picture it is necessary to turn back to Table 7. In the case of occupations in class V, it has been found well to include the curve for that social class. The rates in class III and class IV were so nearly the same that it seemed preferable, generally, to use the curve for all occupied and retired males. At the end of the series of graphs is given also the curve for farmers. The occupations are arrayed according to the magnitude of the death rate. For the first graph a scale one-fourth that used in succeeding graphs was deemed necessary. The reader must bear in mind that many abrupt changes and irregular fluctuations in the curves are due to the small numbers. It will be found difficult to extract any meaning except from the general trends.

Where there is a specific hazard, there is a tendency for the rate to rise steadily with age, quite unlike the rate for occupied males generally. This unique form of curve is noted particularly for tin and copper underground miners; grinders in cutlery trade; slate masons and slate workers; potters' mill workers and potters; cutlers;

masons, stone cutters, and dressers; earthenware, china, etc., kiln and oven men, and kiln setters and placers; slate miners and quarriers. One is impressed here by the unique position held by dust, particularly dust with a high percentage of free silica.

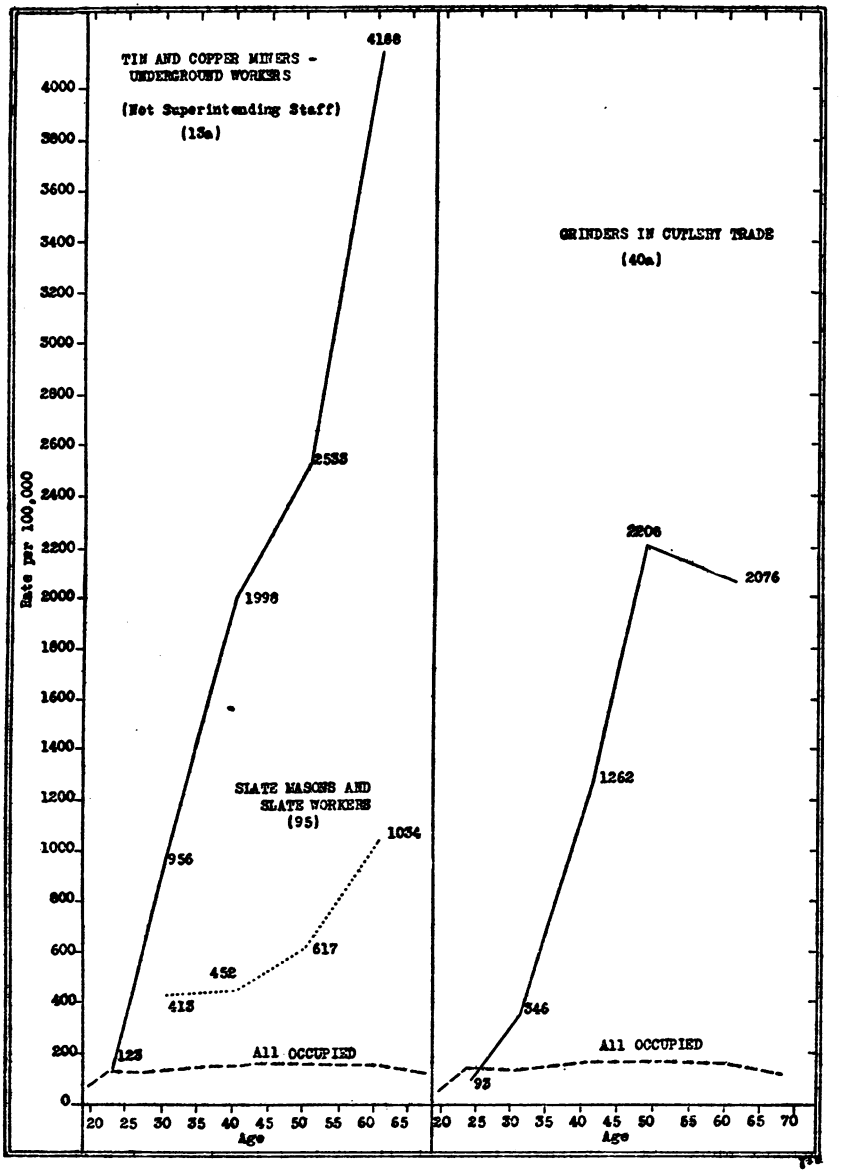

FIG. 1.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921–1923

But in many other occupations where dust is not a factor, abnormally high mortality rates from respiratory tuberculosis are found. The shape of the curve in these occupations has a tendency more or less to follow that of the curve for all occupied, but important

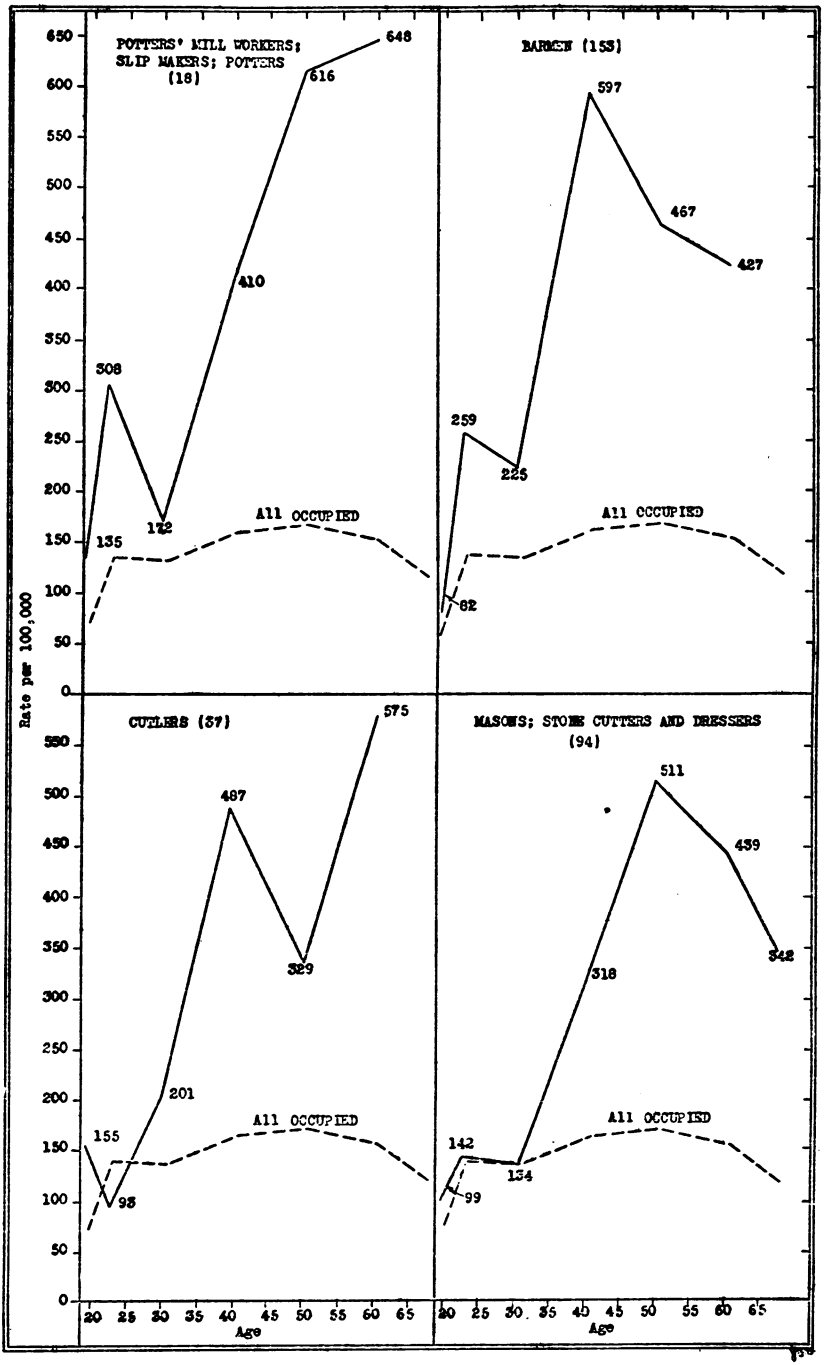

FIG. 2.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921-1923

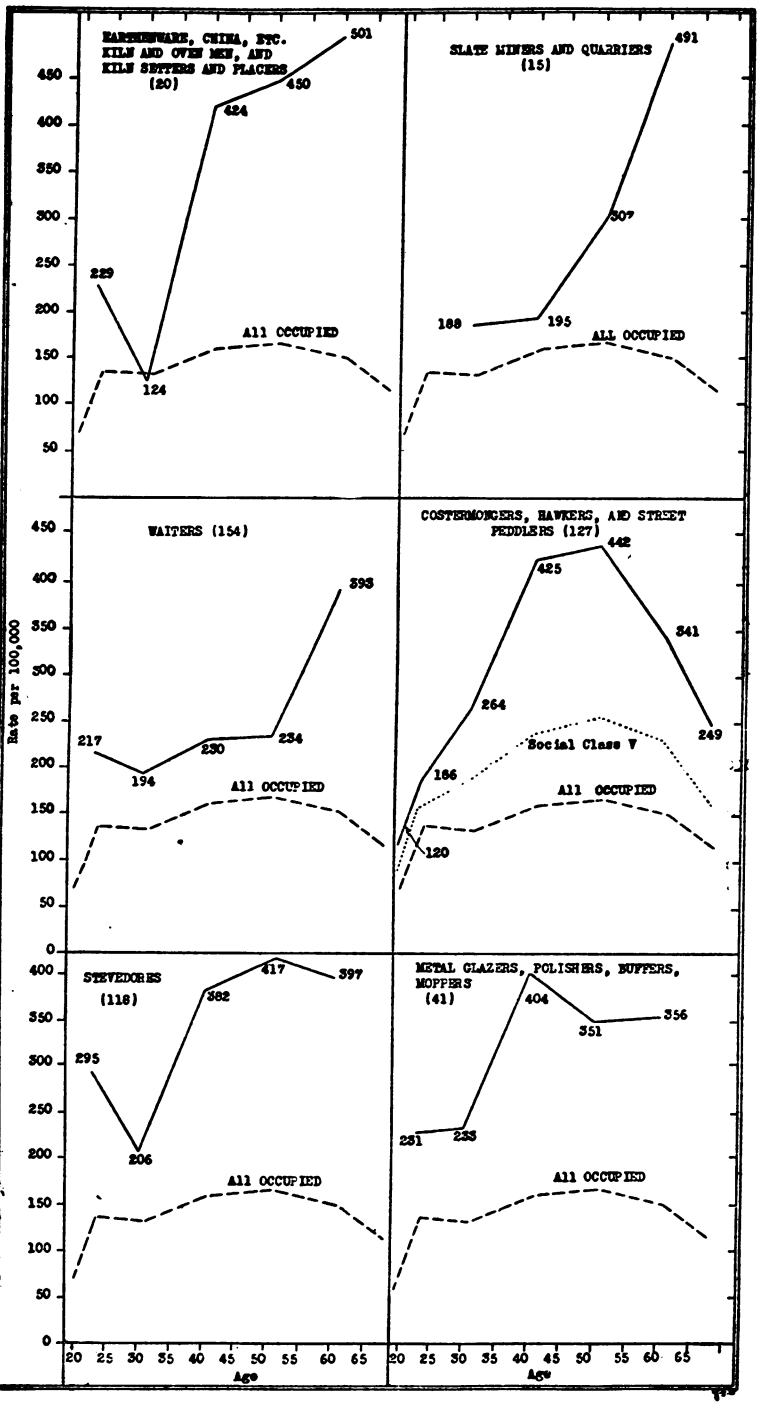

FIG. 3.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921–1923

differences are manifested. In some occupations the death rate appears to be higher than the average from the beginning of life on, suggesting a selective factor in the type of worker rather than the

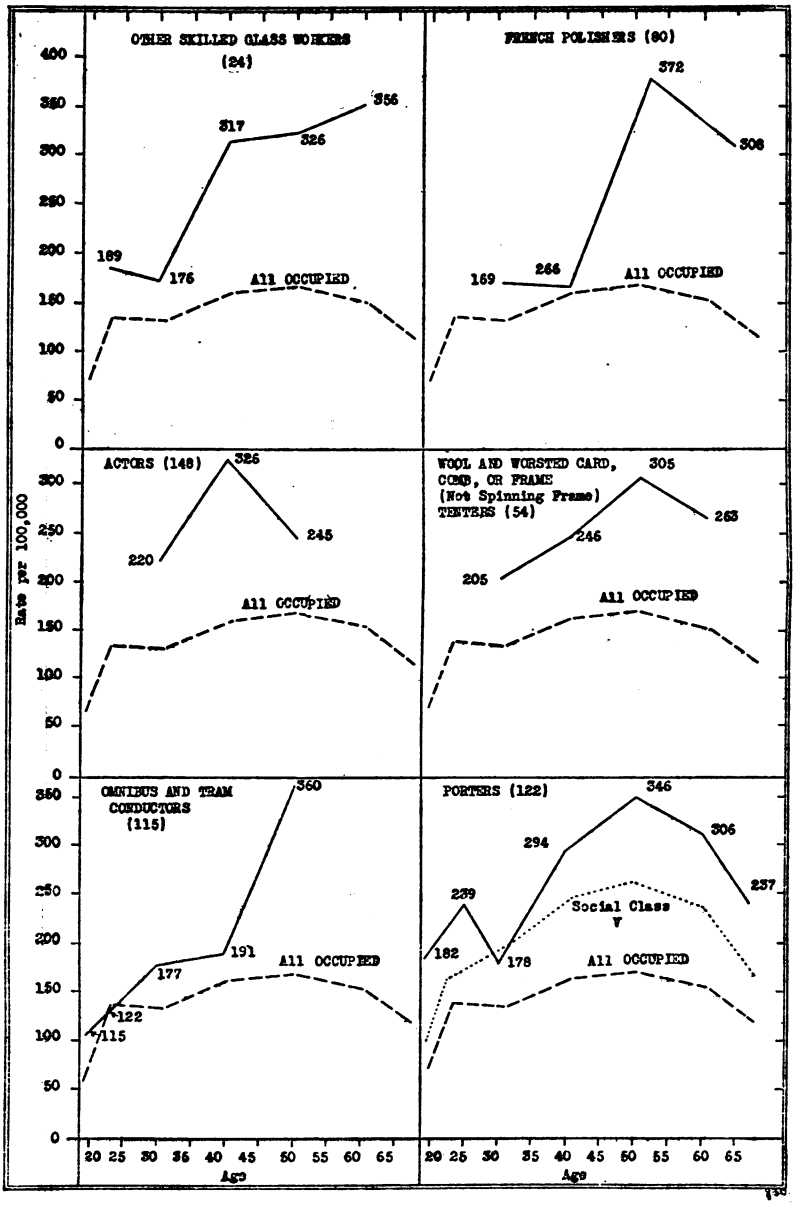

FIG. 4.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921–1923

effect of any hazard. In other cases the curve is no higher at the beginning of life, but reaches a peak later, and then gradually declines. One feels that in some occupations there are reflected such indirect

hazards as the strain of the industry or possibly exposure; in others that "the conditions of life implied by various occupations," as the registrar general puts it, appear to be of greatest importance. This

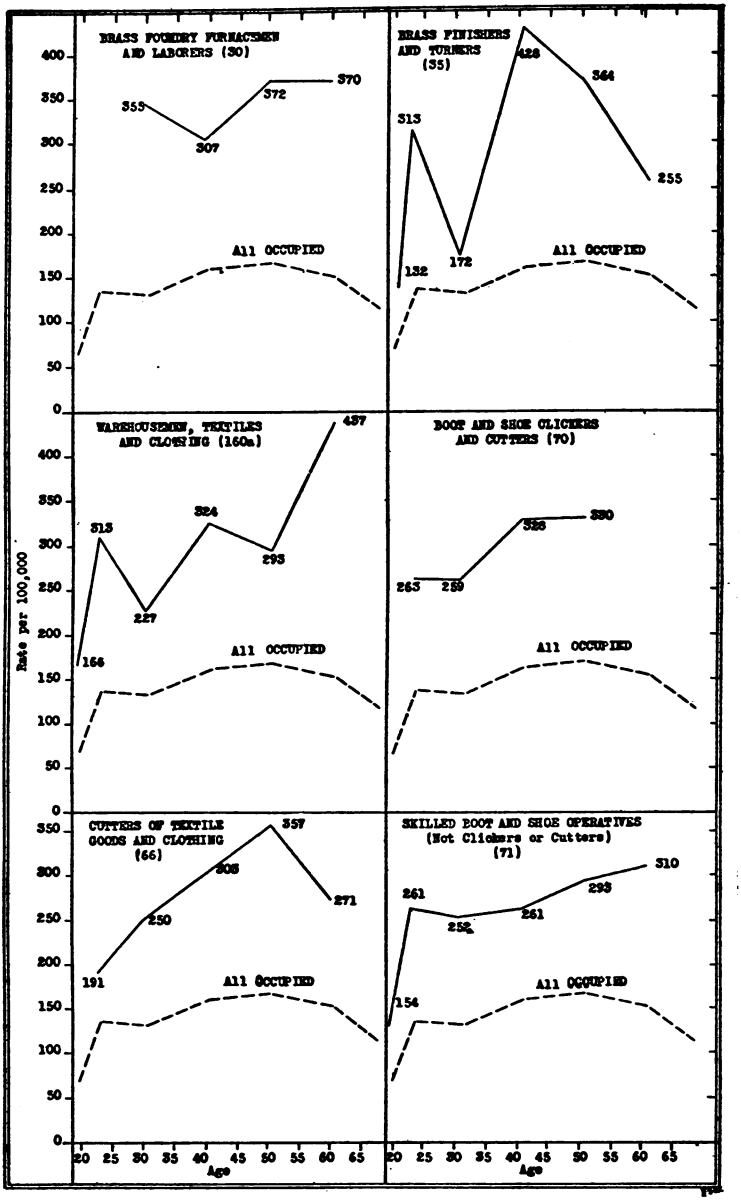

FIG. 5.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921-1923

series of graphs suggests the need for an adequate study as to the causes of the high tuberculosis mortality in industry, apart from specific hazards.

OTHER MAJOR CAUSES OF DEATH

Respiratory tuberculosis lends itself peculiarly well to a comparison by age. Other major causes of death have relatively little mortality

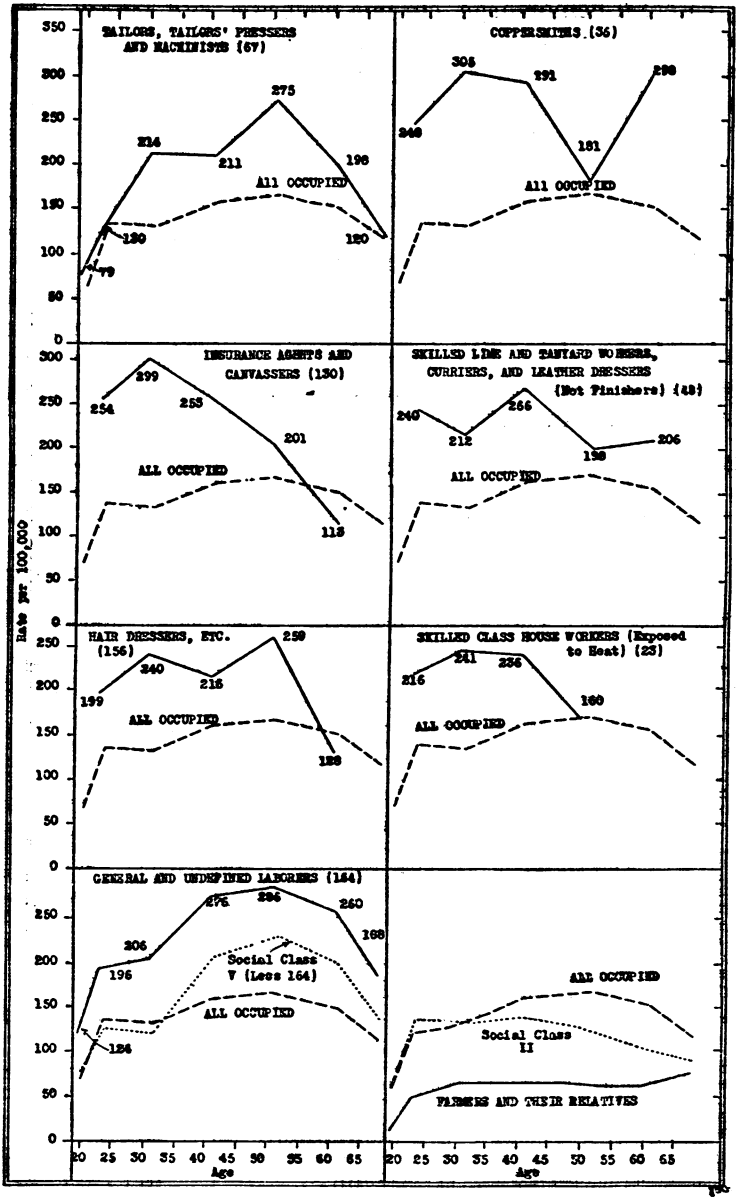

FIG. 6.—Mortality rates for respiratory tuberculosis for males in specified occupations and for all occupied and retired civilian males, by age, England and Wales, 1921–1923

in the younger ages. Accordingly, a graph would fail to bring out important differences at these ages, because such differences would be overshadowed by the height of the curve in advanced age. Tables

of the rates themselves, with ratios to the rate for all occupied in the same age group, seem to give a better idea of the influence of occupation. Such tables have been prepared for the following diseases: Bronchitis, pneumonia, valvular heart disease, other heart disease, cerebral hemorrhage, chronic nephritis, and cancer. Except in the case of pneumonia, satisfactory rates can be obtained only for three age groups, 35–44, 45–54, and 55–64. Rates for the lower ages are usually based on too small a number of deaths for satisfactory interpretation; rates for the ages beyond active industrial life, as in previous tables, do not seem to have any definite meaning with respect to occupational differences. Only occupations with significantly high rates and with large enough populations to permit fairly stable curves by age are included. The standardized rates and the rates for the three age groups are given at the top of the table, followed by corresponding ratios to the rate among all occupied and retired males. Blanks are left where the number of deaths is quite small. Such comment as seems necessary is given at the end of the whole group of tables.

TABLE 23.—*Mortality by age from bronchitis in occupations with excessive*[1] *rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	45	20	56	191
Social class I	12	5	17	47
Social class III	43	16	50	189
Social class V	80	41	109	313
13a. Tin and copper mines, underground workers (III)	227	-------	-------	1,173
55. Cotton strippers and grinders, card-room jobbers (IV)	253	-------	294	1,250
18. Potters' mill workers; slip makers, etc. (III)	247	-------	205	1,327
20. Earthenware, china, etc., kiln and oven men (III)	222	-------	309	1,001
40. Metal grinders (IV)	143	-------	224	607
23. Skilled glasshouse workers (III)	120	59	214	432
23a. Glass blowers and finishers (not machine hands) (III)	146	-------	243	575
13. Tin and copper mines (not superintending staff) (III)	176	-------	-------	877
127. Costermongers, hawkers, and street sellers (V)	122	54	175	488
22. Others in manufacture of bricks, tiles, pottery (V)	120	58	154	472
120. Other dock laborers (V)	114	52	160	448
112. Drivers of horse-drawn vehicles (IV)	93	42	125	363
164. General and undefined laborers (V)	88	47	121	337
122. Porters (V)	99	64	129	352
RATIO TO ALL OCCUPIED AND RETIRED MALES				
13a. Tin and copper mines, underground workers (III)	504	-------	-------	614
55. Cotton strippers and grinders, card-room jobbers (IV)	562	-------	525	654
18. Potters' mill workers; slip makers, etc. (III)	549	-------	366	695
20. Earthenware, china, etc., kiln and oven men (III)	493	-------	552	524
40. Metal grinders (IV)	318	-------	400	318
23. Skilled glasshouse workers (III)	267	295	382	226
23a. Glass blowers and finishers (not machine hands) (III)	324	-------	434	301
13. Tin and copper mines (not superintending staff) (III)	391	-------	-------	459
127. Costermongers, hawkers, and street sellers (V)	271	270	312	255
22. Others in manufacture of bricks, tiles, pottery (V)	267	290	275	247
120. Other dock laborers (V)	253	260	286	235
112. Drivers of horse-drawn vehicles (IV)	207	210	223	190
164. General and undefined laborers (V)	196	235	216	176
122. Porters (V)	220	320	230	184

[1] Where numbers are sufficient for specific rates.

TABLE 24.—*Mortality by age from pneumonia in occupations with excessive [1] rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group			
		25-34	35-44	45-54	55-64
RATE PER 100,000					
All occupied and retired males	78	40	72	103	170
Social class I	65	26	63	93	144
Social class III	70	37	63	91	153
Social class V	117	61	111	154	251
29. Iron foundry furnacemen and laborers (IV)	177	116	158	217	336
120. Other dock laborers (V)	156	71	155	199	345
127. Costermongers, hawkers, street sellers (V)	154	78	163	217	295
40. Metal grinders (IV)	147	54	101	266	320
122. Porters (V)	139	90	143	171	290
28. Metal molders (III)	133	67	134	155	321
164. General and undefined laborers (V)	131	65	120	173	297
152. Inn, hotel keepers, publicans (II)	125	69	157	166	227
112. Drivers of horse-drawn vehicles (IV)	124	71	121	173	242
27. Persons engaged in smelting, rolling, etc. (IV)	118	68	121	123	258
154. Waiters (III)	116	------	103	203	309
10. Coal mines, other workers below ground (IV)	105	51	80	156	212
44. Tinsmith and sheet metal workers (III)	104	44	80	178	217
116. Grooms and horse keepers (IV)	101	55	101	128	249
124a. Salesmen, etc., of fish, meat, etc. (III)	96	44	86	144	206
162. Packers (IV)	96	42	116	136	152
123a. Proprietors for sale of fish, meat, etc. (II)	95	64	97	115	197
11. Coal mines, above ground, not superintending staff (IV)	95	42	87	122	217
RATIO TO ALL OCCUPIED AND RETIRED MALES					
29. Iron foundry furnacemen and laborers (IV)	227	290	219	211	198
120. Other dock laborers (V)	200	178	215	193	203
127. Costermongers, hawkers, street sellers (V)	197	195	226	211	174
40. Metal grinders (IV)	188	135	140	258	188
122. Porters (V)	178	225	199	166	176
28. Metal molders (III)	171	168	186	150	189
164. General and undefined laborers (V)	168	163	167	168	175
152. Inn, hotel keepers, publicans (II)	160	173	218	161	139
112. Drivers of horse-drawn vehicles (IV)	159	178	168	168	142
27. Persons engaged in smelting, rolling, etc. (IV)	151	170	168	119	152
154. Waiters (III)	149	------	143	197	182
10. Coal mines, other workers below ground (IV)	135	128	111	151	125
44. Tinsmith and sheet metal workers (III)	133	110	111	173	128
116. Grooms and horse keepers (IV)	129	138	140	124	146
124a. Salesmen, etc., of fish, meat, etc. (III)	123	110	119	140	121
162. Packers (IV)	123	105	161	132	89
123a. Proprietors for sale of fish, meat, etc. (II)	122	160	135	112	116
11. Coal mines, above ground, not superintending staff (IV)	122	105	121	118	128

[1] Where numbers are sufficient for specific rates.

TABLE 25.—*Mortality by age from valvular disease of the heart in occupations with excessive [1] rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	58	36	72	188
Social class I	33	17	35	135
Social class III	56	34	69	184
Social class V	74	50	95	217
153. Barmen (IV)	117	62	110	512
11. Coal mines, above ground, not superintending (IV)	95	46	133	280
164. General and undefined laborers (V)	87	59	115	247
124a. Salesmen, fish, meat, greengrocery, etc. (III)	84	46	121	262
56. Cotton spinners and piecers (III)	87	35	83	287
64. Dye mixers and dyers (IV)	85	-------	81	299
60. Cotton weavers (III)	82	52	84	291
112. Drivers of horse-drawn vehicles (IV)	79	57	93	210
152. Inn, hotel keepers, publicans (II)	77	57	107	247
8. Coal mines, persons conveying material to the shaft (IV)	75	61	79	258
163. Stationary engine and crane drivers (III)	73	38	90	267
123a. Proprietors, etc., fish, meat, greengrocery, etc. (II)	72	45	93	222
10. Coal mines, other workers below ground (IV)	72	41	93	221
160. Warehousemen (III)	71	53	79	212
98. Painters and decorators (III)	66	47	88	186
RATIO TO ALL OCCUPIED AND RETIRED MALES				
153. Barmen (IV)	202	172	153	272
11. Coal mines, above ground, not superintending (IV)	164	128	185	149
164. General and undefined laborers (V)	150	164	160	131
124a. Salesmen, fish, meat, greengrocery, etc. (III)	145	128	168	139
56. Cotton spinners and piecers (III)	150	97	115	153
64. Dye mixers and dyers (IV)	147	-------	112	159
60. Cotton weavers (III)	141	144	117	155
112. Drivers of horse-drawn vehicles (IV)	136	158	129	112
152. Inn, hotel keepers, publicans (II)	133	158	149	131
8. Coal mines, persons conveying material to the shaft (IV)	129	169	110	137
163. Stationary engine and crane drivers (III)	126	106	125	142
123a. Proprietors, etc., fish, meat, greengrocery, etc. (II)	124	125	129	118
10. Coal mines, other workers below ground (IV)	124	114	129	118
160. Warehousemen (III)	122	147	110	113
98. Painters and decorators (III)	114	131	122	99

[1] Where numbers are sufficient for specific rates.

TABLE 26.—*Mortality by age from other heart disease in occupations with excessive [1] rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	60	30	70	222
Social class I	64	26	77	266
Social class III	54	27	58	210
Social class V	69	41	86	237
152. Inn, hotel keepers, publicans (II)	109	46	161	385
127. Costermongers, hawkers, and street sellers (V)	100	89	144	295
122. Porters (V)	99	54	109	314
123a. Proprietors, etc., fish, meat, greengrocery, etc. (II)	98	41	124	361
124a. Salesmen, fish, meat, greengrocery, milk (III)	96	48	79	420
156. Hairdressers, etc. (III)	80	33	93	326
112. Drivers of horse-drawn vehicles (IV)	79	46	91	279
123. Proprietors, wholesale and retail business (II)	79	37	95	289
67. Tailors, tailors' pressers, and machinists (III)	75	45	86	247
125. Commercial travelers (II)	74	33	73	304

[1] Where numbers are sufficient for specific rates.

TABLE 26.—*Mortality by age from other heart disease in occupations with excessive rates, including ratio to rate among all occupied and retired males*—Continued

	Standardized rate	Age group		
		35–44	45–54	55–64
RATIO TO ALL OCCUPIED AND RETIRED MALES				
152. Inn, hotel keepers, publicans (II)	182	153	230	178
127. Costermongers, hawkers, and street sellers (V)	167	297	206	133
122. Porters (V)	165	180	156	141
123a. Proprietors, etc., fish, meat, greengrocery, etc. (II)	163	137	177	163
124a. Salesmen, fish, meat, greengrocery, milk (III)	160	160	113	180
156. Hairdressers, etc. (III)	133	110	133	147
112. Drivers of horse-drawn vehicles (IV)	132	153	130	126
123. Proprietors, wholesale and retail business (II)	132	123	136	130
67. Tailors, tailors' pressers, and machinists (III)	125	150	123	111
125. Commercial travelers (II)	123	110	104	137

TABLE 27.—*Mortality by age from cerebral hemorrhage in occupations with excessive* [1] *rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	41	11	49	194
Social class I	36	7	45	172
Social class III	41	11	47	196
Social class V	44	15	54	201
152. Inn, hotel keepers, publicans (II)	73	28	125	281
98. Painters and decorators (III)	64	17	92	277
124a. Salesmen, etc., of fish, meat, etc. (III)	62	24	83	254
42. Plumbers (III)	59	12	81	272
60. Cotton weavers (III)	67	------	63	365
89. Employers, managers in building, etc., trades, etc. (II)	59	20	68	270
56. Cotton spinners and piecers (III)	59	17	55	287
156. Hairdressers, etc. (III)	68	------	57	361
RATIO TO ALL OCCUPIED AND RETIRED MALES				
152. Inn, hotel keppers, publicans (II)	178	255	255	145
98. Painters and decorators (III)	156	155	188	143
124a. Salesmen, etc., of fish, meat, etc. (III)	151	218	169	131
42. Plumbers (III)	144	109	165	140
60. Cotton weavers (III)	163	------	129	188
89. Employers, managers in building, etc., trades, etc. (II)	144	182	139	139
56. Cotton spinners and piecers (III)	144	155	112	148
156. Hairdressers, etc. (III)	166	------	116	186

[1] Where numbers are sufficient for specific rates.

TABLE 28.—*Mortality by age from chronic nephritis in occupations with excessive[1] rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	32	17	45	108
Social class I	31	18	47	115
Social class III	31	16	41	107
Social class V	34	21	49	106
98. Painters and decorators (III)	60	38	98	190
164. General and undefined laborers (V)	40	26	58	125
123. Proprietors and managers (II)	41	21	56	140
112. Drivers of horse-drawn vehicles (IV)	41	24	54	124
RATIO TO ALL OCCUPIED AND RETIRED MALES				
98. Painters and decorators (III)	188	224	218	176
164. General and undefined laborers (V)	125	153	129	116
123. Proprietors and managers (II)	128	124	124	130
112. Drivers of horse-drawn vehicles (IV)	128	141	120	115

[1] Where numbers are sufficient for specific rates.

TABLE 29.—*Mortality by age from cancer in occupations with excessive[1] rates, including ratio to rate among all occupied and retired males*

	Standardized rate	Age group		
		35–44	45–54	55–64
RATE PER 100,000				
All occupied and retired males	117	40	166	494
Social class I	94	24	146	386
Social class III	116	40	160	495
Social class V	144	51	211	596
154. Waiters (III)	235	46	390	956
56. Cotton spinners and piecers (III)	194	65	253	679
153. Barmen (IV)	210	53	343	826
104. Gas stokers (IV)	188	46	242	901
75. Cellarmen (IV)	212	------	317	771
40. Metal grinders (IV)	177	------	266	799
149. Musicians (III)	177	59	230	786
160a. Warehousemen, textiles and clothing (III)	176	------	321	690
88. Bookbinders and pattern card makers (III)	177	------	290	697
122. Porters (V)	183	82	282	696
157. Chimney sweeps (III)	[2]181	------	318	584
35. Brass finishers and turners (III)	171	94	331	510
112. Drivers of horse-drawn vehicles (IV)	168	57	255	682
120. Other dock laborers (V)	167	48	261	670
164. General and undefined laborers (V)	162	57	233	677
RATIO TO ALL OCCUPIED AND RETIRED MALES				
154. Waiters (III)	201	115	235	193
56. Cotton spinners and piecers (III)	166	163	152	178
153. Barmen (IV)	179	133	207	167
104. Gas stokers (IV)	161	115	146	182
75. Cellarmen (IV)	181	------	191	156
40. Metal grinders (IV)	151	------	160	162
149. Musicians (III)	151	125	139	159
160a. Warehousemen, textiles and clothing (III)	150	------	193	140
88. Bookbinders and pattern card makers (III)	151	------	175	141
122. Porters (V)	156	205	170	141
157. Chimney sweeps (III)	[2]155	------	191	118
35. Brass finishers and turners (III)	146	235	199	103
112. Drivers of horse-drawn vehicles (IV)	144	143	154	138
120. Other dock laborers (V)	143	120	157	136
164. General and undefined laborers (V)	138	143	140	137

[1] Where numbers are sufficient for specific rates.
[2] Difference less than 3 times the probable error.

Occupations with the highest mortality from bronchitis tend to show progressively higher rates as age advances, paralleling what was found in the case of tuberculosis. For instance, potters have a ratio of 366 for age group 45–54 and 695 for age group 55–64. In the case of cotton strippers the two rates are respectively 525 and 654. The other occupations shown in the table, however, do not generally manifest this tendency. The striking differences as to mortality by social class brought out previously is reemphasized at the top of the table.

In the case of pneumonia it appeared that the data for the age group 25–34 was also of value, because of the relatively higher mortality at this age for pneumonia than for the other causes of death included in these tables. Pneumonia is an acute disease, and one would not expect an excessive rise with age even in occupations predisposing to the disease. The ratios suggest that the excess mortality occurs more or less indifferently throughout the ages considered.

The same impression is given by the ratios of valvular and other heart disease, in spite of many irregularities for specific occupations, and the remaining causes of death for which ratios have been calculated. Careful study of these ratios will no doubt reveal some points of real interest in connection with the manner in which industrial hazards and industrial strain reveal themselves in different diseases.

Conclusion

No summary of the rather variegated findings of this paper seems required. Certain specific hazards have been thrown into relief by these figures, hazards which were in most cases understood to exist. In some instances new emphasis has been placed upon them; in others a different evaluation. From the point of view of specific, direct occupational hazard, it seems to the writer that the material is particularly valuable as an aid in checking up the meaning and extent of conditions which an industrial hygienist may encounter in his own work. If some adverse influence is suspected, the British figures may throw light on whether a suspected association between the condition and the occupation itself may be real.

Beyond this realm of direct deleterious influences (which really affect a relatively small group of the working population) we see the subtle and pervasive effect of many indirect conditions, occupational, living, even hereditary. "It will be found," states the registrar general, "that the effect of occupation upon male mortality is probably on the whole more indirect than direct—that mortality is influenced more by the conditions of life implied by various occupations than by the direct occupational risks entailed. The figures for

males do not permit of differentiation between the two types of influence, as both are at work in every case, so no definite proof can be adduced of this suggestion, which merely represents an impression created by study of the facts dealt with."

PUBLIC HEALTH ENGINEERING ABSTRACTS

Contact Infection of Milk Through Bottles. R. Meurer. Ztschr. f. Fleisch-u. Milch-hygiene, 1927, v. 37, 150–153; 169–172. From *Bulletin of Hygiene*, vol. 3, No. 1, January, 1928, pp. 21–22.

"Results of bacteriological examinations show progressive increase in the bacterial content of milk from the time of milking until finally bottled for delivery.

"Two samples tested showed an increase from 97 per cent to 442 per cent in the bacterial content. The large increase took place in the final stage of bottling.

"A completely sterile flask is difficult to obtain, so it is of great importance that preliminary stages in milking should be done with more care."

Sources of contamination: (1) "A large number of bacteria are to be found in water used for rinsing the vessels; (2) the brushes used for cleansing the vessels are potent sources of contamination and a larger increase in the bacterial content occurs in the milk if old brushes are used than with new brushes; (3) * * * 400,000 bacteria per c. c. were found in bottled milk, whereas directly after the cooling process the number was only 5,000 per c. c.; (4) * * * when samples of pasteurized milk were placed in sterile vessels and the ordinary bottles, the bacterial content of the milk in the sterile bottles remained constant, while that of the ordinary bottle varied greatly."

Reducing contamination: (1) "If the bottles are dried at 70° C. (158° F.) for thirty (30) minutes after they have been rinsed, the number of bacteria in the milk is greatly reduced; (2) in order to ensure a low bacterial content, bottles should be filled as soon as possible after sterilization of the milk; (3) * * * placing bottles in inverted position reduces contamination."

Chemical Sterilization in the Dairy Industry. M. J. Prucha. World's Butter Rev. 2, 12–7 (1928). Abstract by F. L. Seymour-Jones in *Chemical Abstracts*, vol. 22, No. 8, April 20, 1928, p. 1414.

"The Cl group of disinfectants is most satisfactory for dairy equipment. Cl in aqueous solution, Ca $(OCl)_2$, NaOCl dry and in solution, and chloramine-T were studied. All solutions were fairly stable up to 60 minutes at 26–71°. The addition of small amounts of milk caused reduction in available Cl, increasing with milk concentration. Adding NaOH increased stability except in the presence of milk, when decomposition was more rapid. Laboratory tests on *B. coli* showed sterilization was satisfactory with Cl and hypochlorites; with chloramine-T greater concentrations of available Cl were necessary. NaOCl gave excellent results in a four-month test in a bottled-milk plant. All utensils and equipment should be washed before sterilization. They are then rinsed with solutions of 50–100 p. p. m. available Cl or sprayed with solutions of 500 p. p. m."

Eliminating Tastes and Odors Caused by Algæ in Water. Chester Cohen. *The American City*, vol. 38, No. 4, April, 1928, pp. 129–130. (Abstract by J. B. Harrington.)

Algæ in Southern States, where climatic conditions are favorable to their growth, are partly responsible for discoloring the water, for imparting tastes and odors to the water, and for clogging filter beds and filling the pores of the filter material. Their presence is also quite common in swimming pools. Living

algæ produce oils which give the water a fishy, grassy, oily taste. When the food supply becomes exhausted and the algæ die, or when the algæ are killed by treatment, decomposition takes place, producing a strong medicinal taste when chlorine is used.

Algæ may be controlled by covering the reservoir or by treatment of the water with copper sulphate (bluestone) or chlorine. The dosage of either must be determined according to the type of algal growth. Water weeds in large reservoirs are usually destroyed by cutting the tops below the water line or by pulling up the weeds.

The Relation of Turbidity to Coagulant Dosage. Kenneth C. Armstrong. *The American City*, vol. 38, No. 2, February, 1928, pp. 100–102. (Abstract by J. B. Harrington.)

In this paper is described the relation of the turbidity to the coagulant dosage as observed at the Omaha, Nebr., filtration plant. From a series of tests, made by permitting river water to settle in a 5½-foot glass cylinder for various lengths of time and then siphoning off samples for turbidity tests, it was found that the coagulants required could be determined by the results of the three-hour settling tests.

During periods of high turbidity (10,000 p. p. m.) the application of coagulants at two points has been extremely helpful in delivering a satisfactory water to the filters. The effect of various turbidities on the coagulants required and the results of the settling tests are given in detail and shown on various charts of operation for June and July, 1926, and May, 1927.

The following conclusions are given: (1) The suspended material is chiefly responsible for variation in coagulant dosage; (2) coagulant dosage can be determined largely by the results of the 3-hour turbidity test; (3) two-point application of chemicals is helpful in treating very turbid water; (4) the 24-hour turbidity test gives a good indication of the concentration of finely divided material, some of which is of colloidal nature.

The Twort-D'Herelle Phenomenon. R. Bruynoghe. *The Journal of State Medicine*, vol. 35, No. 11, November, 1927, pp. 621–636. (Abstract by C. T. Butterfield.)

The author discusses the subject under the following headings: (1) Historical; (2) means of detecting bacteriophage; (3) the resistance of germs toward bacteriophage influence; (4) the properties of bacteriophages; (5) plurality of bacteriophages—(*a*) reciprocal resistance, (*b*) neutralization of bacteriophages, (*c*) properties of the bacteriophages; (6) the bacteriophage complexity.

The literature related to each type is reviewed briefly. The article is to be continued in subsequent numbers of the *Journal*.

McQueen vs. Owen Sound and Others. Anon. *Canadian Engineer*, vol. 54, No. 1, Jan. 3, 1928, pp. 111–113; No. 2, January 10, 1928, pp. 124–126. (Abstract by R. E. Thompson.)

In the case of McQueen *v.* the City of Owen Sound in 1926 the trial court found that "the plaintiff's illness [typhoid] was caused by the negligent supply to her by the defendants of contaminated water and awarded her damages" [$2,000].

The defendants appealed, and the conclusions of the appeal court are summed up as follows: "First, that there is no direct evidence that the water supplied the plaintiff by the defendants carried typhoid bacilli and that there is no indirect evidence to warrant the inference that it did; therefore it could not have caused her illness. On this ground alone her action fails. Secondly, I am of opinion that even if the water did contain typhoid bacilli the evidence does not warrant the inference that of all possible causes of the plaintiff's illness the most probable one was contaminated water. For this reason also her action fails, and

the judgment should be set aside and the action dismissed with costs below and of the appeal."

It is believed by the appeal court that not sufficient importance was attached to the possibility of contamination carried by flies from neighboring septic tanks, the overflow from which flowed in an open ditch in the vicinity of the plaintiff's residence. The case under consideration was one of a number which occurred in a restricted area. Of 800 pupils attending two schools in the district which was supplied with the same water as the plaintiff, only 3 contracted the disease, and these three pupils resided in the area in which infection from the septic tanks was possible. A previous outbreak in another section of the city may have been caused by fly or air borne infection from sewage sludge recently distributed over an area of land.

Clarification of the Catskill Water Supply of the City of New York by Coagulation and Sedimentation. Wm. W. Brush. *Journal of the New England Water Works Association*, vol. 42, No. 1, March, 1928, pp. 65–78. (Abstract by W. J. Scott.)

In December, 1926, a combination of very low storage-reservoir level with a flood-flow run-off from watersheds containing many steep clay banks raised the turbidity of the Catskill water supply of New York City to such an extent that alum and soda-ash treatment was carried out for nearly six months. The chemicals were applied to water above Kensico Reservoir, having at times a turbidity of over 100 p. p. m., and clarification took place in Kensico Reservoir, where the maximum turbidity of the effluent was 7 p. p. m. Low hydrogen ion figures were recorded until soda-ash application was begun. A noteworthy feature was the rapidity with which the clarification of the turbidity in the untreated water of Ashokan Reservoir took place in the last two weeks of May, 1927, whereas a very long sedimentation period was expected to be necessary for the finely divided clay. Temperature was not the only factor, as higher laboratory temperatures did not bring about this improvement. The treatment is of interest particularly because of the very large volume of water treated.

Coagulation Studies at the Washington Suburban Sanitary District. Robert B. Morse, Carl A. Hechmer, and S. T. Powell. *Industrial and Engineering Chemistry*, vol. 20, No. 1, January, 1928, pp. 56–59. (Abstract by Frank Raab.)

The Washington Suburban Sanitary District receives its water supply from a branch of the Anacostia River. The water is treated at two small rapid sand filter plants, one of which is located in Hyattsville, the other in Burnt Mills. The water has an alkalinity of from 18 to 22 p. p. m. The turbidity, which is subject to sudden changes, ranges from 5 to 5,000 p. p. m. after a rainfall. The water is treated with alum; during periods of high turbiduty soda ash is added to aid in the coagulation. The coagulant is added as the water enters the centrifugal pumps. Lime is added to the filter effluent to bring about a pH of about 8.0. This is necessary to have a pH of 7.0, or a little more, in the distribution system. During high turbidities, when larger doses of alum are required, alum floc passes through the filters, which gives the water in the clear-water reservoir a cloudy appearance.

It was found that small amounts of sodium aluminate used in combination with alum yielded good results. This hastened the alum reaction and secured a better floc, and resulted in a more effective removal of suspended matter and a clearer filter effluent. Less lime yielded the desired pH in the filtered water. Smaller amounts of chlorine produced satisfactory results; while in the end the sodium aluminate treatment proved, likewise, a little cheaper.

Latest Developments in Water Purification. George W. Fuller. Proceedings of Ninth Texas Water Works Short School, January, 1927, pp. 182–186. (Abstract by H. D. Cashmore.)

The newer developments in water purification have not been along the line of new processes but in the modification of the previous methods.

A brief discussion of each of the following developments is given with reference to the towns in which they were tried: (1) Superchlorination and dechlorination; (2) split chlorination and prechlorination; (3) double coagulation; (4) double filtration; (5) water softening; (6) effluent aeration; (7) mechanically cleaned settling basin; (8) new methods in coagulation of water; (9) boiler feed water; (10) new purification plants; (11) experimental studies on filter loading.

The Development of the Hydraulic Jump Mixing Flume for Water Purification. J. W. Ellms. Proceedings Ninth Texas Water Works Short School, January, 1927, pp. 180–182. (Abstract by H. D. Cashmore.)

The development of water purification processes pointed out the fact that thorough mixing of the chemicals with the water was a necessary procedure. The old baffled-mixing chambers and mechanical agitators were found to be faulty in many respects. The need for the proper mixing device was seen.

Experimental work was carried on at Cleveland, Ohio, by the city water department, under the direction of the author, who suggested the use of this procedure. Results of this work led to the following conclusions: (1) It is possible to design a flume in which the phenomenon can be produced; (2) costs of building the flume are about one-third that of the baffled mixing chamber; (3) the flume can be placed at the most suitable place; (4) the loss of head is low; (5) it is an extremely efficient mixing device.

The many installations now being used are ample evidence of the effectiveness of this method of mixing.

Power Gas from Sewage Sludge. Frank C. Vokes and Chas. B. Townsend. *The Surveyor*, vol. 72, No. 1873, December 16, 1927, p. 596. (Abstract by R. E. Thompson.)

Data are given on power production from sludge gas at the sewage works of the Birmingham, Tame, and Rea districts. About 400,000 tons of crude sludge, containing 8 per cent of dry solids, is digested each year. The sludge remains in the primary digestion tanks three months, is then pumped a distance of 4 miles to secondary digestion tanks for a period of two months, and is finally pumped onto drying beds. During digestion about 25 to 33 per cent of the solids is converted into a gas composed of 67 per cent methane, 30 per cent carbon dioxide, and 3 per cent nitrogen, having a calorific value of about 625 B. t. u. per cubic foot. Under the favorable conditions existing, the estimated production cost of current is 0.49d. per unit, effecting a net saving of over $1,000 per annum for the first unit. The estimated cost of gas production on the basis of 16,000,000 cubic feet per annum from this unit is 7½d. per 1,000 cubic feet. The estimated total available output of 10,000,000 horsepower-hours per annum is about 5 times the board's present requirements. Brief details of the reinforced concrete floating gas collector designed for the first unit are included.

Water Pollution Control—Milk Products Wastes. E. F. Eldridge, J. M. Hepler, and H. S. Murphy. Department of Health and Department of Conservation, Michigan, June, 1927. Pamphlet, 15 pages. (Abstract by E. W. Evans.)

This bulletin presents a compilation of several important findings on the treatment and purification of milk products wastes. Investigations conducted in Massachusetts, Wisconsin, New Jersey, New York, Ohio, Iowa, and by the United States Public Health Service are noted, with a brief discussion of the results found.

The experiments conducted at the Michigan State College in cooperation with the State health department are discussed in more detail. Preliminary laboratory experiments indicate that, in using the chemical precipitation method,

a good flow is secured and efficient settling occurs when sufficient quantities of ferrous sulphate and caustic soda are used. At least 0.6 p. p. m. of ferrous sulphate must be used or the precipitate will be red in color. Lime or caustic soda in quantities sufficient to produce a pH of 7.5 to 8.0 will give a good flow with good settling, but produces a large amount of sludge. Broad irrigation of milk products wastes is recommended as a temporary expedient where possible.

LaGrande, Oregon, Sewage Treatment Plant. L. R. Stockman. *Western Construction News*, vol. 3, No. 1, January 10, 1928, pp. 21–24. (Abstract by E. A. Reinke.)

This article describes a plant consisting of a 50 by 50 foot Dorr clarifier, twin dosing siphons, and sprinkling filter with 35,000 square feet area. A part of an old septic tank was made over into a separate sludge digester 20 by 80 feet in plan and 15 feet deep, giving slightly less than 1 cubic foot per capita on a population of 15,000. A 3,500-square foot sludge drying bed is provided. Sand for the bed is obtained from the grit chambers, the sewage carrying an abnormally high quantity. The underdrain system of the sprinkling filter contains 76,000 concrete slabs laid over V-troughs in the floor.

An interesting side light on the conditions around the plant was the occurrence of typhoid at one dairy (and among customers of the dairy) using sewage effluent from the old septic tank for irrigation and allowing the cows free access to it. The dairyman brought suit against the city for permanent damages, but was granted only temporary damages because the new plant overcame the possibility of permanent damages.

The Treatment of Sludge. A. P. I. Cotterell. *Journal of the Royal Sanitary Institute*, vol. 48, No. 9, March, 1928, pp. 489–493. (Abstract by W. L. Havens.)

This paper gives a brief description and evaluation of 15 methods for the treatment of sewage sludge. Sludge is defined as residue accruing from the use of grit chambers, screens, and tanks. The methods listed are: (1) Crude sewage applied to land or absorbent; (2) spreading sludge over land; (3) trenching; (4) lagooning; (5) drying on filters; (6) septicization; (7) digestion; (8) yeast fermentation; (9) activation by air; (10) filter pressing; (11) dumping at sea; (12) burning; (13) distillation—experimental only; (14) gas production; (15) use in fertilizers.

Digestion with an end process of drying on filter beds is indicated as a most promising field for successful treatment. Reference is made to the author's "vertical digestion tank" supplemented by two to four months' storage in a series of tanks with reference to gas production; citation is made of installations at Bombay and in Germany and of a commercial project proposed in Australia (Paramatta). This is an excellent paper in brief consideration of the subject.

Work for the Water and Sewage Purification Committee. H. H. King. Report of the King Institute of Preventive Medicine, Guindy, for the year ending March 31, 1927, pp. 10–11. (Abstract by H. D. Cashmore.)

This is a progress report of a portion of the work carried on by the committee on sewage and water purfication. Work in regard to the value of percolating nonsubmerged filters as compared with an ordinary submerged slow sand filter, as well as a comparison of open and closed septic tanks and Imhoff tanks, was carried on.

At the same filtering rate for water the percolating filter gave the best results. At increased head over that used in the submerged filter the same results were obtained except for oxygen absorbed, which was nearly equal. At increased rates for both filters about the same ratio of efficiency was maintained from both a chemical and bacteriological standpoint.

In comparing the work of the sewage tanks it was found that the closed septic tank was better than the open tanks. Insufficient sewage did not allow a comparison of the work for the Imhoff tanks.

The Digestion of Vegetable Wastes and Screenings in Sewage Treatment Plants. W. Rudolfs and H. Heukelekian. **Water Works**, vol. 67, No. 3, March, 1928, pp. 113–116. (Abstract by C. R. Cox.)

Comprehensive researches in the digestion of mixtures of garbage, screenings, fresh sewage solids, and digested sludge were made to ascertain whether garbage could be digested with the sludge at sewage disposal plants. Studies in the digestion of vegetable wastes from canneries will be made in the future. It was found that mixtures of vegetable wastes and fresh sewage solids digested very slowly; that the addition of ripe sludge greatly hastened digestion; and that lime dosing still further hastened digestion. The rate of digestion of vegetable wastes and screenings is slow, owing to the production of acids, which inhibit the growth of putrefactive organisms. The addition of lime neutralizes acidity, the addition of ripe sludge seeds the mixtures, and the addition of fresh sewage solids provides the nitrogenous wastes necessary for normal digestion. It was concluded that vegetable wastes and screenings may be digested in sewage tanks provided the sludge capacity is adequate and provided the ratio of sewage solids to vegetable wastes (nitrogen to carbon) is large. The allowable ratios in practice will be determined by further studies.

The Solution of Oxygen in Sewage. A. S. Parsons and H. Wilson. *The Surveyor*, vol. 72, No. 1869, November 18, 1927, pp. 490–494. (Abstract by C. K. Calvert.)

Experiments were conducted to shed light on the arguments and theories established by the proponents of mechanical aeration. It is claimed that, in the air diffusion method, the film of water about the bubbles may be saturated, but that it follows the bubble to the surface and does not mix with the liquor until the bubble bursts. If this is the case a deep aerator, offering less surface area in proportion to its volume, is less economical than a shallow one.

Two aerators were constructed each 18 inches in diameter. One of them had 6 feet 6 inches and the other 22 feet 6 inches operating depth. Ratio of diffuser area to area of cross section of chamber was 1:9.2. Air was admitted at the same rate to each aerator. Two kinds of liquor were used—(1) sewage and (2) sewage plus activated sludge. The concentration of oxygen increased more rapidly in the plain sewage than with activated sludge, since biologic action is more rapid in the presence of the sludge; but the concentration of oxygen increased in the deep tank as rapidly as or a little more so than in the shallow tank, when like liquors were used in them. The tanks were filled with a mixture of activated sludge and sewage, and air was applied equally as before. The rate of reduction of ammoniacal nitrogen and oxygen demand and the increase of nitric nitrogen were the same in the deep and shallow tanks. However, in aerating to the point of elimination of ammoniacal nitrogen (14 hours) about three times as much air was used in the shallow as in the deep chamber.

The authors conclude that the deep tank is more economical than the shallow one, but point out that in the former more trouble is experienced with sludge floating on account of entrained air. They suggest that the depth of tank should be given attention in its relation to the handling of specific sewages.

Laboratory experiments are reported showing that oxygen concentration is built up very much more rapidly in sewage the pH of which is modified either by the addition of acid or alkali. Sewage pH of 4, 6, 8, and 10, and distilled water at pH 7.6 were found to run near together. The original sewage Hp was 8.0.

DEATHS DURING WEEK ENDED JUNE 9, 1928

Summary of information received by telegraph from industrial insurance companies for the week ended June 9, 1928, and corresponding week of 1927. (From the Weekly Health Index, June 13, 1928, issued by the Bureau of the Census, Department of Commerce)

	Week ended June 9, 1928	Corresponding week, 1927
Policies in force	71, 349, 157	67, 889, 339
Number of death claims	14, 477	12, 910
Death claims per 1,000 policies in force, annual rate	10. 6	9. 9

Deaths from all causes in certain large cities of the United States during the week ended June 9, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927. (From the Weekly Health Index, June 13, 1928, issued by the Bureau of the Census, Department of Commerce)

City	Week ended June 9, 1928		Annual death rate per 1,000 corresponding week, 1927	Deaths under 1 year		Infant mortality rate week ended June 9, 1928[2]
	Total deaths	Death rate[1]		Week ended June 9, 1928	Corresponding week, 1927	
Total (68 cities)	7,458	13.0	12.0	768	706	63
Akron	35			4	1	43
Albany[3]	29	12.6	20.1	1	4	20
Atlanta	95	19.5	14.0	6	7	
White	50		10.1	4	2	
Colored	45	(4)	23.3	2	5	
Baltimore[3]	226	14.2	12.2	19	20	60
White	150		10.9	8	6	32
Colored	76	(4)	19.5	11	14	172
Birmingham	77	18.1	12.7	9	6	77
White	36		9.8	3	3	41
Colored	41	(4)	17.2	6	3	135
Boston	246	16.1	14.1	36	36	100
Bridgeport	25			0	1	0
Buffalo	165	15.5	12.3	28	16	120
Cambridge	34	14.1	9.7	3	2	53
Camden	34	13.1	12.5	3	6	48
Canton	25	11.2	6.0	1	3	24
Chicago[3]	706	11.7	11.4	63	47	54
Cincinnati	139	17.6	14.8	11	7	66
Cleveland	214	11.1	10.9	19	19	52
Columbus	66	11.6	13.4	6	5	56
Dallas	39	9.4	10.6	4	4	
White	29		8.5	2	4	
Colored	10	(4)	24.7	2	0	
Dayton	44	12.5	12.7	2	8	33
Denver	72	12.8	11.2	8	4	
Des Moines	32	11.0	11.9	1	3	17
Detroit	282	10.7	10.6	49	48	76
Duluth	23	10.3	6.4	2	2	47
El Paso	35	15.5	17.0	11	8	
Erie	30			2	4	41
Fall River[3]	26	10.1	13.0	5	2	86
Flint	29	10.2	6.2	7	1	89
Fort Worth	38	11.8	8.6	3	3	
White	33		8.0	2	3	
Colored	5	(4)	13.3	1	0	
Grand Rapids	31	9.9	11.9	2	6	30
Houston	72			7	5	
White	58			6	4	
Colored	14	(4)		1	1	
Jersey City	78	12.6	11.0	13	10	97
Kansas City, Kans	30	13.3	12.4	1	2	21
White	21		9.7	1	2	25
Colored	9	(4)	24.6	0	0	0
Kansas City, Mo	104	13.9	10.9	7	4	49
Knoxville	31	15.4	17.9	2	6	43
White	27		12.8	2	6	48
Colored	4	(4)	55.6	0	0	0

(See footnotes at end of table.)

Deaths from all causes in certain large cities of the United States during the week ended June 9, 1928, infant mortality, annual death rate, and comparison with corresponding week of 1927—Continued

City	Week ended June 9, 1928		Annual death rate per 1,000 corresponding week, 1927	Deaths under 1 year		Infant mortality rate week ended June 9, 1928[2]
	Total deaths	Death rate[1]		Week ended June 9, 1928	Corresponding week, 1927	
Los Angeles	238			17	28	49
Lowell	29	13.7	12.3	1	1	21
Lynn	26	12.9	10.4	2	4	50
Memphis	63	17.3	15.7	6	6	70
White	34		11.7	4	5	75
Colored	29	(4)	23.0	2	1	63
Milwaukee	133	12.8	9.8	23	8	103
Minneapolis	81	9.3	12.5	4	5	24
Nashville	48	18.1	17.8	1	4	16
White	26		14.2	1	4	21
Colored	22	(4)	26.8	0	0	0
New Bedford	34	14.9	10.9	4	5	87
New Haven	49	13.6	8.7	5	3	71
New Orleans	135	16.4	17.8	13	18	63
White	72		15.1	5	12	36
Colored	63	(4)	25.5	8	6	116
New York	1,536	13.3	11.8	170	157	69
Bronx Borough	200	11.0	9.3	18	21	54
Brooklyn Borough	510	11.6	10.1	69	56	69
Manhattan Borough	633	18.9	16.6	69	59	82
Queens Borough	152	9.3	8.5	12	16	48
Richmond Borough	41	14.2	14.9	2	5	36
Newark, N. J	107	11.8	11.2	7	16	36
Oakland	69	13.2	9.6	5	3	54
Oklahoma City	33			3	8	
Omaha	30	7.0	11.7	7	3	81
Paterson	34	12.3	10.9	5	2	87
Philadelphia	496	12.6	11.6	48	48	65
Pittsburgh	181	14.1	13.9	16	15	52
Portland, Oreg	103			5	5	54
Providence	65	11.9	9.8	8	7	70
Richmond	56	15.1	15.8	7	4	91
White	29		12.3	4	3	81
Colored	27	(4)	24.4	3	1	110
Rochester	77	12.3	12.7	7	11	57
St. Louis	238	14.7	12.1	23	8	77
St. Paul	58	12.0	11.9	2	1	19
Salt Lake City[3]	36	13.6	10.4	2	5	33
San Antonio	67	16.1	13.1	15	11	
San Diego	45	19.7	17.6	1	3	19
San Francisco	165	14.7	17.1	5	7	31
Schenectady	24	13.4	9.0	2	6	63
Seattle	59	8.1	7.9	1	3	10
Somerville	27	13.7	6.7	3	1	104
Spokane	32	15.3	15.8	3	1	77
Springfield, Mass	28	9.8	10.3	3	4	48
Syracuse	51	13.4	11.9	6	3	73
Tacoma	23	10.9	13.1	2	3	51
Toledo	69	11.5	10.9	6	4	58
Trenton	36	13.5	16.4	4	8	68
Utica	20	10.0	14.6	0	3	0
Washington, D. C	146	13.8	12.9	13	13	74
White	83		10.7	8	7	66
Colored	63	(4)	19.5	5	6	92
Waterbury	17			1	1	29
Wilmington, Del	25	10.2	12.0	3	1	79
Worcester	44	11.6	15.7	4	3	49
Yonkers	25	10.8	9.7	5	2	114
Youngstown	41	12.3	8.3	4	7	53

[1] Annual rate per 1,000 population.
[2] Deaths under 1 year per 1,000 births. Cities left bank are not in the registration area for births.
[3] Deaths for week ended Friday, June 8, 1928.
[4] In the cities for which deaths are shown by color, the colored population in 1920 constituted the following percentages of the total population: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Kansas City, Kans., 14; Knoxville, 15; Memphis, 38; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

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

CURRENT WEEKLY STATE REPORTS

These reports are preliminary and the figures are subject to change when later returns are received by the State health officers

Reports for Weeks Ended June 16, 1928, and June 18, 1927

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 16, 1928, and June 18, 1927

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927
New England States:								
Maine	5	2	6		63	112	0	0
New Hampshire	2				8		0	
Vermont					45	72	0	0
Massachusetts	71	86	16	2	687	344	1	1
Rhode Island	2	5		1	210	4	0	0
Connecticut	14	28	1		289	55	0	2
Middle Atlantic States:								
New York	399	393	[1] 19	[1] 9	3,062	809	41	4
New Jersey	152	121	38	5	1,314	48	4	1
Pennsylvania	162	144			2,494	584	9	2
East North Central States:								
Ohio	85		268		1,099		1	
Indiana	17	23	2	2	345	69	0	0
Illinois	126	114	28	20	216	373	7	11
Michigan	64	68	6		1,004	190	6	2
Wisconsin	14	31	107	32	48	540	0	12
West North Central States:								
Minnesota	32	21	1	3	63	68	2	2
Iowa	5	17			11	94	1	0
Missouri	18	27	1	1	275	124	3	0
North Dakota	1	4	2		4	26	0	0
South Dakota	1	3		1	5	23	1	0
Nebraska	7	11	16		18	41	0	0
Kansas	5	3	1	1	101	355	1	0
South Atlantic States:								
Delaware		1			16	2	0	0
Maryland [2]	27	50	7	6	241	24	0	0
District of Columbia	10	17		1	124	2	0	0
Virginia							1	
West Virginia	6	7	62	2	68	132	1	2
North Carolina	12	10			360	1,292	0	1
South Carolina	10	4	297	123	99	125	0	0
Georgia	3	6	27	20	50	44	0	1
Florida	6	9	27	26	118	33	0	0

[1] New York City only.

[2] Week ended Friday.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 16, 1928, and June 18, 1927—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927
East South Central States:								
Kentucky	7				138		0	
Tennessee	3	5	75	14	95	37	0	2
Alabama	9	24	87	20	161	189	1	0
Mississippi	3	6		11				
West South Central States:								
Arkansas	1	3	85	11	102	45	0	0
Louisiana	13	18	20	8	64	50	1	1
Oklahoma [2]	10	7	24	18	62	129	2	1
Texas	9	21	30	13	51	133	0	1
Mountain States:								
Montana	1			1	5	19	1	1
Idaho		5			1	15	1	1
Wyoming	5	1			9	64	0	0
Colorado	3	46	1		35	62	1	0
New Mexico	4				28	57	0	0
Arizona	4	3			205	17	1	0
Utah [3]	2	7	3			18	0	2
Pacific States:								
Washington	14	10			37	478	5	1
Oregon	6	7	6	8	35	139	1	4
California	79	93	22	10	49	571	3	7

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927
New England States:								
Maine	0	0	23	25	0	0	1	7
New Hampshire	0		13		0		0	
Vermont	0	0	6	5	0	0	0	1
Massachusetts	1	1	209	290	0	0	4	1
Rhode Island	0	0	12	15	0	0	0	0
Connecticut	1	1	27	56	0	0	0	1
Middle Atlantic States:								
New York	6	1	335	488	0	1	10	29
New Jersey	0	1	135	212	1	1	4	7
Pennsylvania	1	0	325	279	0	0	1	24
East North Central States:								
Ohio	1		113				9	
Indiana	0	0	39	75	59	76	2	2
Illinois	0	0	219	180	17	13	9	17
Michigan	0	1	261	197	29	24	6	8
Wisconsin	1	0	126	123	12	18	6	2
West North Central States:								
Minnesota	1	0	100	80	2	3	1	4
Iowa	0	0	46	25	44	29	0	1
Missouri	1	0	47	38	26	18	4	10
North Dakota	0	1	5	19	0	0	0	0
South Dakota	0	0	13	10	1	8	0	0
Nebraska	0	0	38	11	16	8	5	1
Kansas	0	0	54	45	47	14	1	7
South Atlantic States:								
Delaware	0	0	7	0	1	0	1	0
Maryland [3]	0	1	33	41	0	3	4	7
District of Columbia	0	0	27	12	0	12	1	2
Virginia	1							
West Virginia	0	0	7	23	9	29	4	8
North Carolina	0	0	23	15	46	19	12	26
South Carolina	3	0	6	4	3	8	43	77
Georgia	0	0	7	12	0	10	11	49
Florida	1	0	5	3	2	25	13	24

[2] Week ended Friday.

[3] Exclusive of Tulsa.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended June 16, 1928, and June 18, 1927—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927	Week ended June 16, 1928	Week ended June 18, 1927
East South Central States:								
Kentucky	0	----	34	----	23	----	3	----
Tennessee	0	1	13	16	35	9	20	66
Alabama	0	1	3	11	11	21	13	55
Mississippi	1	3	4	7	0	0	15	37
West South Central States:								
Arkansas	0	2	4	0	3	0	4	23
Louisiana	1	1	5	4	20	15	27	34
Oklahoma [3]	2	0	21	16	69	26	9	21
Texas	1	0	20	15	34	5	2	17
Mountain States:								
Montana	0	0	2	14	4	14	0	0
Idaho	0	0	2	8	1	2	2	1
Wyoming	0	0	17	11	2	3	6	0
Colorado	1	1	21	93	0	3	1	3
New Mexico	0	0	6	12	0	0	2	3
Arizona	0	2	3	2	1	0	4	0
Utah [2]	0	0	5	14	5	3	0	1
Pacific States:								
Washington	0	0	32	42	11	43	5	5
Oregon	1	0	6	15	29	15	4	8
California	4	14	128	136	18	13	12	3

[2] Week ended Friday. [3] Exclusive of Tulsa.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of monthly State reports is published weekly and covers only those States from which reports are received during the current week:

State	Meningococcus meningitis	Diphtheria	Influenza	Malaria	Measles	Pellagra	Poliomyelitis	Scarlet fever	Smallpox	Typhoid fever
May, 1928										
Arizona	4	30	9	----	151	1	2	11	37	10
Connecticut	8	98	231	----	1,472	----	0	385	11	4
Michigan	0	319	79	----	4,925	1	4	1,190	95	17
Nebraska	2	33	68	----	306	----	0	395	0	2
New Jersey	29	560	138	----	8,969	----	5	956	3	16
North Dakota	2	5	434	----	70	----	0	100	10	2
Tennessee	2	43	1,028	119	842	41	1	74	133	36
Vermont	0	----	----	----	228	----	0	47	1	3

May, 1928

Anthrax:
- New Jersey 1

Chicken pox:
- Arizona 28
- Connecticut 314
- Michigan 413
- Nebraska 168
- New Jersey 738
- North Dakota 35
- Tennessee 94
- Vermont 107

Conjunctivitis:
- Connecticut 6

Dysentery:
- Arizona (amoebic) 4
- Connecticut (amoebic) 1

Dysentery—Continued.
- New Jersey 2
- Tennessee 5

German measles:
- Connecticut 112
- New Jersey 1,303

Lethargic encephalitis:
- Connecticut 4
- Michigan 7
- North Dakota 2

Mumps:
- Arizona 75
- Connecticut 466
- Michigan 987
- Nebraska 108
- North Dakota 23

Mumps—Continued.	
Tennessee	283
Vermont	79
Ophthalmia neonatorum:	
New Jersey	1
Tennessee	5
Puerperal septicemia:	
Tennessee	1
Rabies in animals:	
Connecticut	2
Scabies:	
North Dakota	3
Septic sore throat:	
Connecticut	3
Michigan	24
Nebraska	5
Tennessee	5
Tetanus:	
Connecticut	1
Tennessee	5
Trachoma:	
Arizona	13
New Jersey	4
Tennessee	14
Vincent's angina:	
North Dakota	5
Whooping cough:	
Arizona	12
Connecticut	446
Michigan	622
Nebraska	45
New Jersey	654
North Dakota	41
Tennessee	96
Vermont	46

Number of Cases of Certain Communicable Diseases Reported for the Month of April, 1928, by State Health Officers

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid fever	Whooping cough
Maine	102	11	127	154	94	0	27	2	91
New Hampshire		11			62	0		3	
Vermont	121	4	252	193	40	0	12	16	
Massachusetts	655	338	6,456	998	1,129	0	606	11	823
Rhode Island	30	44	1,297	112	188	0	55	0	20
Connecticut	318	103	1,476	895	293	0	145	6	441
New York	1,719	1,387	12,426	2,068	3,045	13	1,722	46	1,720
New Jersey	568	439	6,470		1,083	54	448	15	548
Pennsylvania	1,647	686	8,907	3,531	1,938	13	734	35	1,109
Ohio	964	429	3,951	1,362	1,031	182	753	25	549
Indiana	271	81	1,670	445	399	515	209	7	122
Illinois	1,071	509	819	1,149	1,235	124	1,083	33	1,070
Michigan	552	232	6,376	1,550	1,094	141	517	23	574
Wisconsin	904	85	422	641	667	35	221	10	190
Minnesota	458	97	292		554	7	283	9	157
Iowa	117	26	109	247	274	190	66	9	25
Missouri	239	150	1,739	577	438	275	233	10	185
North Dakota	47	25	38	62	190	8	18	3	47
South Dakota	50	8	202	17	161	46	10	4	10
Nebraska	167	25	317	209	413	0	[1] 11	1	27
Kansas	438	29	554	747	730	347	104	8	283
Delaware [2]									
Maryland	352	125	3,630	149	314	2	236	32	207
District of Columbia	55	64	775		156	6	93	1	32
Virginia	628	80	3,348		161	33	[1] 133	29	560
West Virginia	203	66	708		135	217	116	28	45
North Carolina	517	116	8,032		97			10	494
South Carolina	228	74	2,600	55	34	41	186	40	417
Georgia	243	33	510	75	64	29	60	18	77
Florida	246	35	300	92	50	29	57	26	32
Kentucky [2]									
Tennessee	111	55	1,937	343	116	132	194	22	145
Alabama	225	54	1,670	142	37	28	507	20	126
Mississippi	852	55	7,406	1,393	48	35	271	50	1,599
Arkansas	62	14	1,310	141	64	48	[1] 25	11	65
Louisiana	30	98	883	10	34	83	[1] 155	47	36
Oklahoma [4]	65	67	1,621	146	204	482	45	26	99
Texas [2]									
Montana	71	23	30	7	87	105	18	2	42
Idaho	47	1	10	47	56	41	[1] 6	11	12
Wyoming	29	1	69	24	107	7		2	22
Colorado	298	52	502	500	390	34	109	2	87
New Mexico [3]									
Arizona	43	38	131	64	29	86	88	6	10
Utah [3]									
Nevada [3]									
Washington	401	41	662	368	190	195	181	17	61
Oregon	216	37	379	84	40	237	64	14	19
California	2,327	363	522	1,403	501	91	967	17	1,200

[1] Pulmonary.
[2] Reports not received at time of going to press.
[3] Reports received weekly.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Reports received annually.

Case Rates per 1,000 Population (Annual Basis) for the Month of April, 1928

State	Chicken pox	Diphtheria	Measles	Mumps	Scarlet fever	Smallpox	Tuberculosis	Typhoid fever	Whooping cough
Maine	1.57	0.17	1.95	2.36	1.44	.00	0.41	0.03	1.40
New Hampshire		.29			1.66	.00		.08	
Vermont	4.19	.14	9.76	6.68	1.33	.00	.42	.55	
Massachusetts	1.86	.96	18.30	2.84	3.21	.00	1.72	.03	2.34
Rhode Island	.51	.75	22.10	1.91	3.20	.00	.94	.00	.34
Connecticut	2.33	.75	10.80	6.55	2.14	.00	1.06	.04	3.23
New York	1.82	1.46	13.12	2.18	3.22	.01	1.82	.05	1.82
New Jersey	1.81	1.40	20.66		3.46	.17	1.43	.05	1.75
Pennsylvania	2.04	.85	11.03	4.37	2.40	.02	.91	.04	1.37
Ohio	1.72	.77	7.06	2.43	1.84	.33	1.35	.04	.98
Indiana	1.04	.31	6.41	1.71	1.53	1.98	.80	.03	.47
Illinois	1.77	.84	1.35	1.90	2.07	.20	1.79	.05	1.77
Michigan	1.47	.62	16.94	4.20	2.91	.37	1.37	.06	1.53
Wisconsin	3.73	.35	1.74	2.65	2.76	.14	.91	.04	.78
Minnesota	2.05	.43	1.31		2.48	.03	1.27	.04	.70
Iowa	.59	.13	.55	1.21	1.38	.95	.33	.05	.13
Missouri	.83	.52	6.02	2.00	1.52	.95	.81	.03	.64
North Dakota	.89	.49	.72	1.18	3.62	.15	.34	.06	.89
South Dakota	.87	.14	3.50	.29	2.79	.80	.17	.07	.17
Nebraska	1.45	.22	2.75	1.81	3.58	.00	[1].10	.01	.23
Kansas	2.91	.19	3.68	4.97	4.85	2.31	.09	.05	1.88
Delaware [2]									
Maryland	2.66	.94	27.41	1.12	2.37	.02	1.73	.24	1.56
District of Columbia	1.22	1.41	17.13		3.45	.13	2.06	.02	.71
Virginia	2.98	.38	15.86		.76	.16	[1].63	.14	2.37
West Virginia	1.44	.47	5.01		.96	1.54	.82	.20	.32
North Carolina	2.15	.48	33.35		.40			.04	2.05
South Carolina	1.49	.48	17.68	.36	.22	.27	1.22	.26	2.73
Georgia	.93	.13	1.94	.29	.24	.11	.26	.07	.29
Florida	2.13	.30	2.67	.80	.43	.25	.75	.22	.28
Kentucky [3]									
Tennessee	.54	.27	9.44	1.67	.57	.64	.95	.11	.71
Alabama	1.07	.26	7.92	.67	.18	.13	2.40	.09	.60
Mississippi	5.80	.37	50.46	9.49	.33	.24	1.85	.34	12.94
Arkansas	.39	.09	8.22	.88	.40	.30	[1].16	.07	.41
Louisiana	.19	.61	5.59	.06	.21	.52	[1].97	.29	.23
Oklahoma [4]	.37	.38	9.22	.83	1.16	2.74	.27	.15	.56
Texas [3]									
Montana	1.58	.51	.67	.16	1.93	2.33	.40	.04	.96
Idaho	1.05	.02	.22	1.05	1.25	.92	[1].13	.25	.27
Wyoming	1.43	.05	3.41	1.19	5.29	.35		.10	1.09
Colorado	3.34	.58	5.62	5.60	4.37	.38	1.22	.02	.97
New Mexico [3]									
Arizona	1.11	.98	3.37	1.65	.75	2.21	2.26	.15	.26
Utah [3]									
Nevada [3]									
Washington	3.03	.32	5.09	2.83	1.46	1.50	1.39	.13	.47
Oregon	2.95	.50	5.13	1.14	.54	3.21	.87	.19	.26
California	6.23	.97	1.40	3.76	1.34	.24	2.59	.05	3.21

[1] Pulmonary.
[2] Reports not received at time of going to press.
[3] Reports received weekly.
[4] Exclusive of Oklahoma City and Tulsa.
[5] Reports received annually.

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 100 cities reporting cases used in the following table are situated in all parts of the country and have an estimated aggregate population of more than 31,627,000. The estimated population of the 94 cities reporting deaths is more than 30,930,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended June 2, 1928, and June 4, 1927

	1928	1927	Estimated expectancy
Cases reported			
Diphtheria:			
43 States	1,196	1,648	----------
100 cities	738	938	805
Measles:			
42 States	15,996	10,628	----------
100 cities	7,358	2,663	----------
Poliomyelities, 43 States	32	28	----------
Scarlet fever:			
43 States	2,885	3,423	----------
100 cities	1,250	1,306	1,012
Smallpox:			
43 States	860	721	----------
100 cities	77	126	99
Typhoid fever:			
43 States	280	498	----------
100 cities	71	80	58
Deaths reported			
Influenza and pneumonia, 94 cities	975	583	----------
Smallpox, 94 cities	0	0	----------

City reports for week ended June 2, 1928

The "estimated expectancy" given for diphtheria, poliomyelitis, scarlet fever, smallpox, and typhoid fever is the result of an attempt to ascertain from previous occurrence the number of cases of the disease under consideration that may be expected to occur during a certain week in the absence of epidemics. It is based on reports to the Public Health Service during the past nine years. It is in most instances the median number of cases reported in the corresponding weeks of the preceding years. When the reports include several epidemics or when for other reasons the median is unsatisfactory, the epidemic periods are excluded and the estimated expectancy is the mean number of cases reported for the week during non-epidemic years.

If the reports have not been received for the full nine years, data are used for as many years as possible but no year earlier than 1919 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviations from the usual trend. For some of the diseases given in the table the available data were not sufficient to make it practicable to compute the estimated expectancy.

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
NEW ENGLAND									
Maine:									
Portland	76,400	11	0	0	0	0	9	7	2
New Hampshire:									
Concord	[1] 22,546	0	0	0	0	0	10	0	0
Manchester	84,000	0	1	0	0	1	4	0	3
Vermont:									
Barre	[1] 10,008	0	0	0	0	0	0	0	0
Massachusetts:									
Boston	787,000	23	44	22	9	2	87	4	35
Fall River	131,000	1	3	0	2	1	10	1	3
Springfield	145,000	5	2	2	2	2	1	13	1
Worcester	193,000	5	3	2	0	0	33	38	3
Rhode Island:									
Pawtucket	71,000	0	0	0	0	0	25	15	5
Providence	275,000	0	6	4	0	1	188	0	9
Connecticut:									
Bridgeport	([2])	2	5	5	1	0	15	0	3
Hartford	164,000	5	5	4	0	0	81	2	4
New Haven	182,000	12	2	4	5	1	32	11	10

[1] Estimated, July 1, 1925.

[2] No estimate made.

City reports for week ended June 2, 1928—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
MIDDLE ATLANTIC									
New York:									
Buffalo	544,000	10	8	11	-------	1	48	28	29
New York	5,924,000	169	247	242	53	25	2,583	38	221
Rochester	321,000	2	9	0	-------	1	117	35	5
Syracuse	185,000	16	4	0	-------	7	88	8	5
New Jersey:									
Camden	131,000	2	5	9	2	2	90	6	1
Newark	459,000	23	10	30	4	1	158	6	20
Trenton	134,000	2	3	0	0	0	16	2	4
Pennsylvania:									
Philadelphia	2,008,000	54	65	58	0	5	1,243	41	51
Pittsburgh	637,000	24	17	14	0	7	70	38	37
Reading	114,000	4	2	1	0	0	28	0	1
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	411,000	12	8	2	0	1	22	0	10
Cleveland	960,000	44	23	21	7	4	125	41	27
Columbus	285,000	2	3	3	3	4	95	2	1
Toledo	295,000	21	4	4	0	0	127	7	1
Indiana:									
Fort Wayne	99,900	1	2	2	0	0	3	0	1
Indianapolis	367,000	17	4	3	0	1	178	41	9
South Bend	81,700	3	1	0	0	0	1	0	0
Terre Haute	71,900	5	0	0	0	1	2	0	1
Illinois:									
Chicago	3,048,000	70	71	88	14	9	42	26	92
Springfield	64,700	7	0	0	2	2	0	1	0
Michigan:									
Detroit	[3] 1,242,044	25	43	35	4	7	307	11	25
Flint	136,000	9	3	0	0	1	221	6	5
Grand Rapids	156,000	2	2	1	0	0	12	2	4
Wisconsin:									
Kenosha	52,700	20	0	0	0	0	0	1	2
Milwaukee	517,000	57	13	6	2	2	2	12	19
Racine	69,400	2	1	0	0	0	0	1	1
Superior	[1] 39,671	0	0	0	0	0	0	0	1
WEST NORTH CENTRAL									
Minnesota:									
Duluth	113,000	5	0	0	0	0	0	3	1
Minneapolis	434,000	44	14	14	0	1	51	65	8
St. Paul	248,000	15	10	1	0	2	11	8	9
Iowa:									
Davenport	[1] 52,469	2	1	0	0	-------	0	0	-------
Des Moines	146,000	0	1	0	0	-------	0	0	-------
Sioux City	78,000	2	0	0	0	-------	0	16	-------
Waterloo	36,900	5	0	2	0	-------	1	7	-------
Missouri:									
Kansas City	375,000	16	4	1	0	3	60	24	8
St. Joseph	78,400	0	0	0	0	0	2	2	1
St. Louis	830,000	15	35	19	0	0	239	8	-------
North Dakota:									
Fargo	[1] 26,403	1	0	0	0	0	0	0	0
Grand Forks	[1] 14,811	0	0	0	0	-------	0	0	-------
South Dakota:									
Aberdeen	[1] 15,036	0	0	0	0	-------	0	0	-------
Sioux Falls	[1] 30,127	0	0	0	0	-------	0	0	-------
Nebraska:									
Lincoln	62,000	25	0	0	0	0	3	5	0
Omaha	216,000	15	2	4	0	0	1	0	2
Kansas:									
Topeka	56,500	15	0	1	1	1	9	1	0
Wichita	92,500	7	1	1	0	0	12	0	0
SOUTH ATLANTIC									
Delaware:									
Wilmington	124,000	0	1	1	0	0	22	3	3
Maryland:									
Baltimore	808,000	74	19	31	6	0	210	46	28
Cumberland	[1] 33,741	1	0	1	0	0	5	0	1
Frederick	[1] 12,035	0	0	0	0	0	15	0	0

[1] Estimated, July 1, 1925.

[3] Special census.

City reports for week ended June 2, 1928—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
SOUTH ATLANTIC—con.									
District of Columbia:									
Washington	528,000	20	9	14	1	1	215	0	6
Virginia:									
Lynchburg	[3] 38,493	11	0	0	0	0	27	3	0
Norfolk	174,000	4	0	0	0	0	0	0	7
Richmond	189,000	2	0	1	0	0	36	0	3
Roanoke	61,900	3	0	1	0	0	5	0	0
West Virginia:									
Charleston	50,700	1	0	0	0	1	1	0	3
Wheeling	[1] 56,208	14	0	0	0	0	6	2	1
North Carolina:									
Raleigh	[1] 30,371	0	0	0	0	0	18	0	0
Wilmington	37,700	6	0	0	0	1	0	0	0
Winston-Salem	71,800	4	0	1	0	0	3	4	2
South Carolina:									
Charleston	74,100	0	0	0	7	0	0	1	3
Columbia	41,800	6	1	0	0	0	2	15	4
Greenville	[1] 27,311	----	0	----	----	----	----	----	----
Georgia:									
Atlanta	[2]	6	1	2	18	0	14	6	12
Brunswick	[1] 16,809	2	0	0	0	0	1	8	0
Savannah	94,900	2	0	0	18	2	1	1	3
Florida:									
Miami	[3] 131,286	9	4	0	0	0	3	2	1
St. Petersburg	47,629	----	0	----	----	0	----	----	0
Tampa	102,000	2	0	1	0	0	0	0	2
EAST SOUTH CENTRAL									
Kentucky:									
Covington	58,500	1	0	1	0	0	0	0	3
Louisville	311,000	0	3	0	0	0	123	0	19
Tennessee:									
Memphis	177,000	7	1	5	0	0	9	5	5
Nashville	137,000	0	0	1	0	0	7	1	5
Alabama:									
Birmingham	211,000	3	0	1	23	5	66	3	7
Mobile	66,800	0	0	0	0	0	2	0	0
Montgomery	47,000	1	0	1	0	----	1	0	----
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	[1] 31,643	2	0	0	0	----	0	2	----
Little Rock	75,900	1	0	0	0	2	4	1	6
Louisiana:									
New Orleans	419,000	7	5	8	4	2	1	0	12
Shreveport	59,500	1	0	0	0	0	8	0	0
Oklahoma:									
Oklahoma City	[2]	2	1	0	4	0	3	2	1
Tulsa	133,000	5	0	0	0	----	2	1	----
Texas:									
Dallas	203,000	13	3	3	0	0	13	0	2
Fort Worth	159,000	3	1	5	0	0	2	0	2
Galveston	49,100	0	0	0	0	0	1	0	0
Houston	[1] 164,954	1	2	2	0	0	11	0	5
San Antonio	205,000	0	1	1	0	2	6	0	6
MOUNTAIN									
Montana:									
Billings	[1] 17,971	4	0	0	0	0	0	0	0
Great Falls	[1] 29,883	7	0	0	0	0	6	0	0
Helena	[1] 12,037	0	0	0	0	0	1	0	0
Missoula	[1] 12,668	0	0	0	0	0	0	0	0
Idaho:									
Boise	[1] 23,042	1	0	0	0	0	0	0	0
Colorado:									
Denver	285,000	36	9	6	----	4	96	45	10
Pueblo	43,900	3	1	0	0	0	8	0	0
New Mexico:									
Albuquerque	[1] 21,000	3	1	0	0	0	3	0	0
Utah:									
Salt Lake City	133,000	31	4	2	0	1	1	1	2
Nevada:									
Reno	[1] 12,665	0	0	0	0	0	0	0	0

[1] Estimated, July 1, 1925. [2] No estimate made. [3] Special census.

City reports for week ended June 2, 1928—Continued

Division, State, and city	Population, July 1, 1926, estimated	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
			Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
PACIFIC									
Washington:									
Seattle	(2)	43	4	5	0	--	18	8	--
Spokane	109,000	14	2	6	0	--	0	0	--
Tacoma	106,000	1	1	0	0	0	17	34	0
Oregon:									
Portland	[1] 282,383	23	5	5	0	0	16	1	7
California:									
Los Angeles	(2)	78	38	17	13	1	29	48	12
Sacramento	73,400	12	3	0	0	0	5	16	3
San Francisco	567,000	42	17	14	0	1	16	16	6

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
NEW ENGLAND											
Maine:											
Portland	2	3	0	0	0	0	1	0	0	0	18
New Hampshire:											
Concord	0	1	0	0	0	0	0	0	0	0	10
Manchester	1	1	0	0	0	0	0	0	0	0	19
Vermont:											
Barre	1	0	0	0	0	0	0	0	0	0	1
Massachusetts:											
Boston	56	55	0	0	0	16	2	1	0	33	241
Fall River	3	6	0	0	0	4	0	1	0	0	44
Springfield	6	5	0	0	0	2	0	0	0	2	28
Worcester	8	9	0	0	0	4	0	23	0	0	53
Rhode Island:											
Pawtucket	1	5	0	0	0	0	0	0	0	1	18
Providence	7	20	0	0	0	3	0	0	1	2	68
Connecticut:											
Bridgeport	9	2	0	0	0	4	0	0	0	2	36
Hartford	3	1	0	0	0	4	0	0	0	7	36
New Haven	5	1	0	0	0	1	1	0	0	17	61
MIDDLE ATLANTIC											
New York:											
Buffalo	16	44	0	0	0	15	0	0	0	10	178
New York	210	240	0	0	0	104	9	0	1	124	1,590
Rochester	12	5	0	0	0	0	0	1	0	3	70
Syracuse	7	7	0	0	0	2	0	0	0	14	57
New Jersey:											
Camden	5	2	0	0	0	2	0	0	0	3	26
Newark	21	23	0	0	0	13	1	0	0	30	144
Trenton	2	3	0	0	0	2	0	0	0	1	42
Pennsylvania:											
Philadelphia	79	60	0	0	0	50	4	1	0	64	519
Pittsburgh	28	24	0	0	0	4	1	0	0	14	179
Reading	2	3	0	0	0	1	0	1	0	7	25
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	13	36	2	0	0	13	1	1	1	4	129
Cleveland	30	17	1	0	0	17	0	1	0	27	203
Columbus	7	3	1	0	0	6	0	0	0	2	64
Toledo	10	3	1	0	0	6	0	0	0	8	56

[1] Estimated, July 1, 1925.

[2] No estimate made.

City reports for week ended June 2, 1928—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
EAST NORTH CENTRAL—continued											
Indiana:											
Fort Wayne	2	4	2	1	0	0	0	0	0	0	15
Indianapolis	8	17	11	4	0	4	0	0	0	4	77
South Bend	2	0	1	0	0	1	0	0	0	0	16
Terre Haute	2	0	0	1	0	0	0	0	0	0	17
Illinois:											
Chicago	101	73	2	4	0	46	3	0	0	64	705
Springfield	2	9	1	2	0	0	1	0	0	5	14
Michigan:											
Detroit	70	119	2	0	0	31	3	1	0	63	324
Flint	5	10	1	3	0	1	0	0	0	4	30
Grand Rapids	6	3	1	0	0	0	0	0	0	2	36
Wisconsin:											
Kenosha	2	0	1	0	0	1	0	0	0	13	12
Milwaukee	17	50	1	0	0	9	0	1	0	14	128
Racine	4	3	1	0	0	1	0	0	0	0	12
Superior	2	4	1	0	0	0	0	0	0	0	7
WEST NORTH CENTRAL											
Minnesota:											
Duluth	6	4	2	0	0	2	0	1	0	5	20
Minneapolis	31	22	7	0	0	3	1	0	0	23	81
St. Paul	19	11	2	0	0	2	0	0	0	38	67
Iowa:											
Davenport	0	2	1	2	----	----	0	0	----	0	----
Des Moines	5	5	2	18	----	----	0	0	----	0	24
Sioux City	1	2	2	0	----	----	0	0	----	1	----
Waterloo	1	3	0	0	----	----	0	0	----	3	----
Missouri:											
Kansas City	7	42	1	1	0	9	0	1	0	3	71
St. Joseph	1	6	0	1	0	1	1	0	0	4	19
St. Louis	27	20	3	1	0	17	2	0	0	23	220
North Dakota:											
Fargo	0	0	0	0	0	1	0	0	0	6	10
Grand Forks	1	0	0	0	----	----	0	0	----	0	----
South Dakota:											
Aberdeen	2	0	0	0	----	----	0	0	----	1	----
Sioux Falls	1	5	0	0	----	----	0	0	----	0	5
Nebraska:											
Lincoln	1	7	0	3	0	0	0	0	0	1	10
Omaha	4	2	5	6	0	2	0	0	0	1	32
Kansas:											
Topeka	1	6	1	1	0	0	0	0	0	1	29
Wichita	2	1	0	5	0	3	0	0	0	4	21
SOUTH ATLANTIC											
Delaware:											
Wilmington	4	5	0	0	0	1	0	0	0	0	40
Maryland:											
Baltimore	28	28	1	0	0	19	2	2	0	44	223
Cumberland	1	0	0	0	0	0	0	0	0	1	9
Frederick	0	0	0	0	0	0	0	0	0	0	4
District of Col.:											
Washington	17	45	1	0	0	13	1	2	1	7	127
Virginia:											
Lynchburg	1	0	0	0	0	0	0	0	0	10	8
Norfolk	1	5	1	2	0	1	0	0	0	0	----
Richmond	2	1	0	0	0	4	1	0	0	2	58
Roanoke	0	1	1	0	0	2	0	0	0	0	13
West Virginia:											
Charleston	0	1	0	0	0	2	1	0	1	0	22
Wheeling	2	0	0	0	0	0	0	0	0	0	17
North Carolina:											
Raleigh	0	0	0	0	0	1	0	0	0	2	10
Wilmington	0	0	0	0	0	0	0	0	0	0	9
Winston-Salem	0	4	2	0	0	2	1	1	0	0	19
South Carolina:											
Charleston	0	0	0	3	0	1	1	2	0	2	25
Columbia	0	0	0	0	0	3	1	0	0	7	42
Greenville	0	----	1	----	----	----	0	----	----	----	----

City reports for week ended June 2, 1928—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuberculosis, deaths reported	Typhoid fever			Whooping cough, cases reported	Deaths, all causes
	Cases, estimated expectancy	Cases reported	Cases, estimated expectancy	Cases reported	Deaths reported		Cases, estimated expectancy	Cases reported	Deaths reported		
SOUTH ATLANTIC—continued											
Georgia:											
Atlanta	3	14	7	2	0	4	2	0	1	6	
Brunswick	0	1	0	0	0	0	0	1	1	0	9
Savannah	0	0	1	0	0	4	1	1	0	0	40
Florida:											
Miami	0	0	0	0	0	0	1	1	0	0	15
St. Petersburg	0		0		0	0	0		0		9
Tampa	0	0	0	0	0	0	1	0	0	0	20
EAST SOUTH CENTRAL											
Kentucky:											
Covington	1	5	0	1	0	3	0	0	0	0	22
Louisville	6	45	1	0	0	10	1	0	0	0	125
Tennessee:											
Memphis	4	2	2	1	0	10	1	1	1	6	90
Nashville	2	0	1	2	0	9	1	2	0	1	67
Alabama:											
Birmingham	1	0	5	5	0	7	2	9	0	2	75
Mobile	0	4	1	0	0	1	0	1	0	0	20
Montgomery	0	1	0	0			0	0		0	
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith	0	0	0	0			0	3		7	
Little Rock	0	11	0	0	0	0	1	0	0	0	
Louisiana:											
New Orleans	3	4	1	0	0	19	2	2	0	3	165
Shreveport	0	0	1	3	0	1	0	0	1	0	27
Oklahoma:											
Oklahoma City	2	14	2	7	0	3	0	0	0	0	23
Tulsa	2	3	1	1			0	1		1	
Texas:											
Dallas	2	18	2	0	0	1	1	3	0	33	60
Fort Worth	1	10	2	6	0	4	1	0	0	5	31
Galveston	0	0	0	0	0	1	0	0	0	0	16
Houston	1	1	1	2	0	5	0	0	0	2	50
San Antonio	0	2	0	1	0	8	1	0	0	0	80
MOUNTAIN											
Montana:											
Billings	1	0	0	0	0	0	0	0	0	0	6
Great Falls	2	0	0	1	0	0	0	0	0	2	10
Helena	0	0	0	0	0	0	0	0	0	0	2
Missoula	0	0	0	0	0	0	0	0	0	0	5
Idaho:											
Boise	0	0	0	0	0	0	0	0	0	0	4
Colorado:											
Denver	10	4	1	0	0	9	1	0	0	20	85
Pueblo	1	1	0	1	0	0	0	0	0	0	2
New Mexico:											
Albuquerque	1	0	0	0	0	4	0	1	0	0	10
Utah:											
Salt Lake City	2	2	0	1	0	1	0	0	0	12	30
Nevada:											
Reno	0	1	0	3	0	0	0	0	0	0	5
PACIFIC											
Washington:											
Seattle	9	6	2	0			0	0		4	
Spokane	5	6	3	3			0	1		1	
Tacoma	2	4	3	3	0	1	1	0	0	1	13
Oregon:											
Portland	5	4	7	28	0	5	0	0	0	0	57
California:											
Los Angeles	23	12	7	10	0	21	2	3	2	45	
Sacramento	1	6	1	2	0	3	1	1	0	8	25
San Francisco	14	24	1	1	0	10	1	2	1	13	135

City reports for week ended June 2, 1928—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
NEW ENGLAND									
Massachusetts:									
Boston	2	1	0	0	0	0	0	0	0
Springfield	0	0	0	0	0	0	0	1	0
Worcester	0	0	0	1	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York	20	11	5	3	0	0	1	1	0
New Jersey:									
Newark	2	1	0	0	0	0	1	0	0
Trenton	1	1	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia	1	0	0	0	0	0	0	0	0
Pittsburgh	3	2	0	0	0	0	0	0	0
EAST NORTH CENTRAL									
Ohio:									
Cincinnati	1	0	0	0	0	0	0	0	0
Cleveland	1	0	0	0	0	0	0	0	0
Toledo	0	0	1	1	0	0	0	0	0
Indiana:									
Indianapolis	0	1	0	0	0	0	0	0	0
Illinois:									
Chicago	8	6	0	0	2	2	0	0	0
Michigan:									
Detroit	5	3	0	0	0	0	0	0	0
Flint	0	1	0	0	0	0	0	0	0
Wisconsin:									
Milwaukee	1	0	0	0	0	0	0	0	0
WEST NORTH CENTRAL									
Missouri:									
Kansas City	6	2	0	0	0	0	0	0	0
St. Louis	9	1	0	0	0	0	0	0	0
SOUTH ATLANTIC									
Maryland:									
Baltimore	0	0	0	0	0	0	0	3	1
West Virginia:									
Wheeling	1	0	0	0	0	0	0	0	0
South Carolina:									
Charleston	0	0	0	0	1	0	0	0	0
Georgia:									
Atlanta	0	1	0	0	3	0	0	0	0
Brunswick	0	0	0	0	0	1	0	0	0
Savannah	0	0	0	0	2	2	0	0	0
Florida:									
Miami	0	0	0	0	0	1	0	0	0
Tampa	0	1	0	0	0	0	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis	0	0	0	0	1	1	0	0	0
Alabama:									
Birmingham	0	0	0	0	1	0	0	0	0
Mobile	0	0	1	0	0	1	0	0	0
WEST SOUTH CENTRAL									
Arkansas:									
Fort Smith	0	0	0	0	2	0	0	0	0
Little Rock	0	0	0	0	1	1	0	0	0
Louisiana:									
New Orleans [1]	1	0	0	0	3	1	1	0	0
Texas:									
Dallas	0	0	0	0	3	3	0	0	0
Houston	1	1	0	0	0	1	0	0	0
San Antonio	0	0	0	0	0	2	0	0	0

[1] Rabies (in man), 1 case and 1 death at New Orleans, La.

City reports for week ended June 2, 1928—Continued

Division, State, and city	Meningococcus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infantile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimated expectancy	Cases	Deaths
MOUNTAIN									
Montana:									
Helena	1	0	0	0	0	0	0	0	0
PACIFIC									
California:									
Los Angeles	0	0	0	0	0	0	1	1	0
San Francisco	2	0	0	0	0	0	0	0	0

The following table gives the rates per 100,000 population for 101 cities for the five-week period ended June 2, 1928, compared with those for a like period ended June 4, 1927. The population figures used in computing the rates are approximate estimates as of July 1, 1928 and 1927, respectively, authoritative figures for many of the cities not being available. The 101 cities reporting cases had estimated aggregate populations of approximately 31,657,000 in 1928 and 31,050,000 in 1927. The 95 cities reporting deaths had nearly 30,961,000 estimated population in 1928 and nearly 30,370,000 in 1927. The number of cities included in each group and the estimated aggregate populations are shown in a separate table below.

Summary of weekly reports from cities, April 29 to June 2, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927 [1]

DIPHTHERIA CASE RATES

	Week ended—									
	May 5, 1928	May 7, 1927	May 12, 1928	May 14, 1927	May 19, 1928	May 21, 1927	May 26, 1928	May 28, 1927	June 2, 1928	June 4, 1927
101 cities	123	183	121	174	137	174	128	171	[2] 122	158
New England	133	130	113	105	110	153	64	160	99	160
Middle Atlantic	170	272	177	282	204	267	213	233	178	234
East North Central	107	159	109	132	114	160	102	145	105	123
West North Central	78	131	55	135	95	105	72	91	84	81
South Atlantic	88	119	82	115	103	110	109	144	[2] 94	126
East South Central	40	76	35	81	20	35	35	96	45	61
West South Central	80	141	92	112	64	50	28	83	56	66
Mountain	80	152	71	99	97	108	71	143	71	179
Pacific	125	110	102	94	120	104	92	196	107	127

[1] The figures given in this table are rates per 100,000 population, annual basis, and not the number of cases reported. Populations used are estimated as of July 1, 1928 and 1927, respectively.
[2] Greenville, S. C., not included.

Summary of weekly reports from cities, April 29 to June 2, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927—Continued

MEASLES CASE RATES

	Week ended—									
	May 5, 1928	May 7, 1927	May 12, 1928	May 14, 1927	May 19, 1928	May 21, 1927	May 26, 1928	May 28, 1927	June 2, 1928	June 4, 1927
101 cities	1,423	696	1,376	602	1,346	620	1,305	548	[1] 1,216	447
New England	1,322	270	1,120	346	1,159	416	1,290	435	1,129	314
Middle Atlantic	2,266	212	2,254	297	2,274	323	2,185	365	2,164	282
East North Central	794	564	788	450	680	492	773	372	661	324
West North Central	888	1,522	937	932	1,116	952	939	653	752	459
South Atlantic	2,109	1,577	1,704	1,546	1,436	1,537	1,219	1,358	[1] 1,029	1,001
East South Central	1,132	517	1,082	345	1,237	355	1,077	319	1,037	380
West South Central	392	877	336	567	268	620	260	459	176	496
Mountain	752	1,632	1,141	1,300	1,150	906	831	1,049	991	619
Pacific	266	1,601	327	1,259	263	1,215	304	1,060	217	1,094

SCARLET FEVER CASE RATES

101 cities	258	360	253	340	253	309	234	294	[1] 207	219
New England	345	393	347	439	292	432	306	365	248	288
Middle Atlantic	303	540	285	474	279	415	267	363	200	255
East North Central	254	283	265	289	272	267	254	301	228	212
West North Central	218	271	242	319	279	289	207	245	232	236
South Atlantic	175	128	167	148	195	101	163	121	[1] 186	78
East South Central	304	183	155	152	190	132	219	137	284	101
West South Central	148	58	184	21	216	33	204	25	144	21
Mountain	274	1,004	115	726	133	986	18	897	71	780
Pacific	153	212	204	201	143	167	130	209	148	185

SMALLPOX CASE RATES

101 cities	14	22	18	21	24	26	17	29	[1] 13	21
New England	0	0	0	0	0	0	9	0	0	0
Middle Atlantic	0	0	0	0	0	0	0	0	0	0
East North Central	15	28	20	20	22	37	16	49	10	33
West North Central	31	34	43	26	64	48	27	42	29	24
South Atlantic	14	36	21	38	32	36	26	40	[1] 12	32
East South Central	15	56	45	56	30	76	60	61	45	91
West South Central	36	33	8	58	60	17	24	29	24	17
Mountain	106	36	159	9	159	45	133	27	53	36
Pacific	31	73	36	91	54	71	38	84	49	60

TYPHOID FEVER CASE RATES

101 cities	6	10	8	8	6	10	8	9	[1] 12	13
New England	2	2	5	5	7	5	11	9	57	9
Middle Atlantic	4	10	2	5	4	6	6	6	1	5
East North Central	3	7	3	3	2	5	5	7	3	7
West North Central	2	2	8	2	2	6	4	4	4	12
South Atlantic	18	18	19	9	7	13	7	18	[1] 15	29
East South Central	0	15	20	66	20	56	10	80	65	61
West South Central	28	37	16	25	4	45	12	25	32	37
Mountain	0	18	18	9	0	9	0	18	0	9
Pacific	15	3	31	10	23	10	36	8	18	26

[1] Greenville, S. C., not included.

Summary of weekly reports from cities, April 29 to June 2, 1928—Annual rates per 100,000 population compared with rates for the corresponding period of 1927—Continued

INFLUENZA DEATH RATES

	Week ended—									
	May 5, 1928	May 7, 1927	May 12, 1928	May 14, 1927	May 19, 1928	May 21, 1927	May 26, 1928	May 28, 1927	June 2, 1928	June 4, 1927
95 cities	32	13	33	13	29	12	25	9	[1] 20	7
New England	21	5	16	14	41	14	18	9	16	2
Middle Atlantic	28	15	31	14	28	10	21	8	24	9
East North Central	36	7	43	10	36	12	33	4	21	4
West North Central	53	8	43	4	18	8	12	12	14	6
South Atlantic	21	16	9	25	16	11	11	13	[1] 9	16
East South Central	84	43	73	32	63	43	89	27	26	5
West South Central	25	13	37	13	16	25	33	25	25	17
Mountain	35	9	27	9	27	9	53	9	44	0
Pacific	7	21	17	7	10	0	7	3	7	3

PNEUMONIA DEATH RATES

95 cities	206	131	210	123	189	110	176	100	[1] 145	93
New England	189	140	257	144	207	100	253	144	172	116
Middle Atlantic	264	166	267	151	218	119	211	116	182	107
East North Central	211	121	232	97	222	104	175	85	130	79
West North Central	128	68	120	70	88	58	84	87	59	58
South Atlantic	184	114	89	128	146	148	119	85	[1] 138	112
East South Central	214	149	193	128	240	112	230	64	204	53
West South Central	90	115	164	140	123	106	144	89	127	81
Mountain	159	99	133	54	97	63	124	36	106	72
Pacific	74	79	98	114	105	121	91	100	71	96

[1] Greenville, S. C., not included.

Number of cities included in summary of weekly reports, and aggregate population of cities in each group, approximated as of July 1, 1928 and 1927, respectively

Group of cities	Number of cities reporting cases	Number of cities reporting deaths	Aggregate population of cities reporting cases		Aggregate population of cities reporting deaths	
			1928	1927	1928	1927
Total	101	95	31,657,000	31,050,300	30,960,700	30,369,500
New England	12	12	2,274,400	2,242,700	2,274,400	2,242,700
Middle Atlantic	10	10	10,732,400	10,594,700	10,732,400	10,594,700
East North Central	16	16	7,991,400	7,820,700	7,991,400	7,820,700
West North Central	12	10	2,683,500	2,634,500	2,566,400	2,518,500
South Atlantic	21	21	2,981,900	2,890,700	2,981,900	2,890,700
East South Central	7	6	1,048,300	1,028,300	1,000,100	980,700
West South Central	8	7	1,307,600	1,260,700	1,274,100	1,227,800
Mountain	9	9	591,100	581,602	591,100	581,600
Pacific	6	4	2,046,400	1,996,400	1,548,900	1,512,100

FOREIGN AND INSULAR

PLAGUE ON VESSEL

Steamship "Tymeric"—At Barbados, from New Orleans, for Cape Town, Union of South Africa.—On May 21, 1928, the steamship *Tymeric* from New Orleans arrived at Barbados, British West Indies, with a case of suspect plague on board. The case was reported positive May 29, 1928. The *Tymeric* left New Orleans May 11, 1928, arrived May 21 at Barbados, and sailed same date for Cape Town, Algoa Bay, East London, Port Natal, and Lourenço Marquez.

THE FAR EAST

Report for the week ended May 26, 1928.—The following report for the week ended May 26, 1928, was transmitted by the Eastern Bureau of the Health Section of the Secretariat of the League of Nations, located at Singapore, to the headquarters at Geneva:

Plague, cholera, or smallpox was reported present in the following ports:

PLAGUE

Aden Protectorate.—Aden.
Egypt.—Alexandria, Suez.
India.—Bassein, Bombay, Rangoon.

CHOLERA

India.—Bassein, Calcutta, Madras.
Siam.—Bangkok.
French Indo-China.—Haiphong, Saigon.

SMALLPOX

Egypt.—Alexandria.
Iraq.—Basra.
India.—Bombay, Calcutta, Madras, Moulmein, Negapatam, Rangoon, Vizagapatam.
French India.—Pondicherry.
China.—Shanghai, Hong Kong.
Japan.—Kobe, Osaka, Yokohama.
Kwantung.—Dairen.

Returns for the week ended May 26 were not received from Colombo, Ceylon; Samarinda, Makassar, Belawan-Deli, Padang, nor Tarakan, Dutch East Indies.

ARABIA

Aden—Plague—May 22, 1928—Summary.—On May 22, 1928, a case of plague was reported in the village of Maala, between Crater and Steamer Point, Aden, Arabia. To May 23, 1928, 1,493 cases of plague were reported in Aden, with 1,106 deaths.

CANADA

Provinces—Communicable diseases—Week ended May 26, 1928.—The Canadian Ministry of Health reports cases of certain communicable diseases from seven Provinces of Canada for the week ended May 26, 1928, as follows:

Disease	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	Total
Cerebrospinal fever				1	2			3
Influenza	26			17				43
Poliomyelitis					1			1
Smallpox		1		6	3	3	18	31
Typhoid fever	1		10	7		1		19

Quebec Province—Communicable diseases—Week ended June 2, 1928.—The Bureau of Health of the Province of Quebec reports cases of certain communicable diseases for the week ended June 2, 1928, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Scarlet fever	73
Chicken pox	18	Smallpox	19
Diphtheria	44	Tuberculosis	48
German measles	25	Typhoid fever	10
Influenza	5	Whooping cough	5
Measles	135		

CZECHOSLOVAKIA

Communicable diseases—April, 1928.—During the month of April, 1928, communicable diseases were reported in Czechoslovakia as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax	3	----	Paratyphoid fever	9	----
Cerebrospinal meningitis	16	4	Puerperal fever	48	19
Diphtheria	740	53	Scarlet fever	1,287	23
Dysentery	10	3	Trachoma	262	----
Malaria	54	----	Typhoid fever	365	34

JAPAN

Tokyo, city and district—Dysentery—March 25–April 21, 1928.—During the four weeks March 25 to April 21, 1928, dysentery was reported in Tokyo city and district (Prefecture) as follows: Tokyo city—cases, 95; deaths, 35; Prefecture—cases, 138; deaths, 71. Population—city, 1,995,567; prefecture—2,489,577.

LATVIA

Birth and infant mortality rates, 1925, 1926.—In 1925, 41,314 births were recorded in Latvia, and in 1926, 41,073 births, giving birth rates of 22.4 in 1925 and 21.8 in 1926.

The infant mortality was 107 per thousand births in 1925, and 88 per thousand in 1926.

The population of Latvia, according to the census of 1925, was 1,844,805.

LIBERIA

Monrovia—Quarantine service instituted.—Information has been received under recent date showing the appointment of a sanitary officer to have charge of quarantine service for Liberia, and the establishment of a quarantine station on Bushrod Island, vicinity of Monrovia.

MALTA

Communicable diseases—April, 1928.—During the month of April, 1928, communicable diseases were reported in the Island of Malta as follows:

Disease	Cases	Disease	Cases
Bronchopneumonia	11	Puerperal fever	3
Chicken pox	36	Scarlet fever	4
Diphtheria	2	Trachoma	21
Erysipelas	3	Tuberculosis	27
Influenza	29	Typhoid fever	11
Malaria [1]	1	Undulant (Malta) fever	62
Pneumonia	6	Whooping cough	8
Poliomyelitis	1		

[1] Contracted abroad.

Population, civil, estimated: 228,575.

Moriality.—During April, 1928, 342 deaths were recorded in Malta, of which 14 were caused by tuberculosis.

SENEGAL

Dakar—Conference for Study of Disease Control in West Africa.—During the week ended April 28, 1928, medical representatives from several of the West African colonies, met at Dakar, Senegal, for the purpose of studing the clinical characteristics of West African yellow fever and other diseases, their epidemiology and methods for their prevention and control.

The conference was called by the Governor General of the West African Colonies. The following-named countries were represented at the Conference: French Togoland, Gambia, Gold Coast, Nigeria, and Sierra Leone. The Rockefeller Foundation was represented.

It was resolved that a liaison be formed among the West African colonies; that this liaison operate through a central bureau established for the purpose of collecting and assimilating knowledge relative to the occurrence of infectious diseases in the colonies, or, provisionally, by interchange of visits by members of the medical staff of the several colonies; also, that should any colony report the presence of yellow fever or other infectious disease, the medical departments of all the other countries be privileged to send medical representatives to the infected districts to study the disease and its control.

UNION OF SOUTH AFRICA

Cape Province—Natal—Orange Free State—Typhus fever—April 15–28, 1928.—During the two weeks ended April 28, 1928, typhus fever was reported in the Union of South Africa as follows: Fresh outbreaks in ten districts of the Cape Province, in one district of Natal, and in two districts of the Orange Free State. Two sporadic cases occurred in Europeans.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From medical officers of the Public Health Service, American consuls, health section of the League of Nations, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases; D, deaths; P, present]

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928			April, 1928				May, 1928			
								17	24	31	7	14	21	28	5	12	19	26
China:																		
Amoy	C	16																
Canton	C	14	12	1					1	1								
	D	14	11	1					1	1								
Foochow	C	P																
Hong Kong	C	P																
Shanghai (settlement and concession)—																		
Foreigners only	C	3																
Including natives	D	7																
Swatow	C	P	P															
	D	P	P															
Tientsin	C	2	P	1														
Dutch East Indies: Java—Batavia	C		28	3														
	D		18	3														
India	C	20,160	23,047	25,139	15,377	12,391	13,236	4,546	5,384	5,856	5,529	7,746						
	D	10,371	12,863	15,026	8,863	6,750	7,282	2,605	2,931	3,182	3,159	4,920						
Bassein	D					1	2		4	25	22	20	6	6	9	9	16	8
Bombay	C		2			1	1	1	1	1								
	D		2				1	1		1	1							
Calcutta	C	101	199	428	176	203	341	164	190	148	162	163	131	152				
	D	64	138	281	125	112	241	94	122	114	112	111	97	105	115	126	102	92
Madras	C	14	13	1	1	2	14		7	1	2	5	5	5	7	7		
	D	8	7	2	1	4	18		2	1	1	4	5	4	5	3		5
Madras Presidency	C	2,050	3,073	3,702	1,864	4,681	2,961	510	455	243	275							
	D	1,055	1,736	2,104	984	2,660	1,618	280	244	131	157							
Negapatam	C					4	4											
	D					6	4					1			1			
Rangoon	C	6	2	8	4	6	29	4	7	8	3	5	10					
	D	5	5	6	3	2	18	2	3	6	5	2	7	6	1			
Tuticorin	C	1		8							10	43	45	19	3			
	D	1	37	14				1			8	26	32	10	3			

India (French):																		
Chandernagor	C		6	10	14	6	5	2	1		4							
	D		6	10	9	1	5	1	1		4							
Karikal	C		1	1	8	32	6					1						
	D		1	1	4	19	5					1						
Pondicherry	C		1	25	11	12	33				1	2	3	2	1			
	D		1	21	12	10	19				1	2	3	2	1			
Indo-China (see also table below):																		
Saigon	C	1			3	4	16	27	13	21	35	50	28	23	15	10		4
	D				1	1	8	19	8	12	20	37	17	12	10	7		2
Iraq [1]																		
Kwangchow-wan (see table below)																		
Siam	C	18	110	88	110	200	295	53	88	70	80	120	85					
	D	11	76	64	80	139	214	39	67	54	58	84	61					
Bangkok	C	5	4	3	21	101	60	8	12	16	24		30	24	20	17	14	11
	D	3	2	2	11	66	36	5	5	12	11		13	14	8	6	9	7
Straits Settlements: Singapore	C		7	5	23	3		1	1					1				
	D		5	4	12	1		1	1					1				
On vessel:																		
S. S. Hawaii Maru at Singapore from Saigon, French Indo-China	C										11							
S. S. Tabaristan: At Basra, Iraq	C	1																

[1] From July 19 to Dec. 26, 1927, 1,479 cases of cholera were reported in Iraq, with 1,063 deaths, as follows: Amarah Liwa, 261 cases, 205 deaths; Baghdad Liwa, 80 cases, 60 deaths; Basra Liwa, 421 cases, 330 deaths; Diwaniah Liwa, 122 cases, 72 deaths; Diyalah Liwa, 1 case, 1 death; Duliam Liwa, 100 cases, 69 deaths; Hillah Liwa, 105 cases, 71 deaths; Kerbalah Liwa, 79 cases, 60 deaths; Kut Liwa, 66 cases, 44 deaths; Muntafiq Liwa, 244 cases, 151 deaths.

Place		July-September, 1927	October, 1927	November, 1927	December, 1927	January, 1928	February, 1928			March, 1928			April, 1928			May, 1928
							1-10	11-20	21-29	1-10	11-20	21-31	1-10	11-20	21-30	1-10
Indo-China (French) (see also table above):																
Annam	C	3,179	226	126	18	267	23	36	14	18	18	23	17	11	18	4
Cambodia	C	251	180	85	72	54	38	22	51	33	22	92	43	102	51	34
Cochin-China	C	469	178	100	113	295	178	113	153	206	217	245	277	316	240	140
Laos	C	246	67	10												
Tonkin	C	1,297	1		2	1							1	4	1	9
Kwangchow-Wan	C	16														

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE

[C indicates cases; D, deaths; P, present]

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928			April, 1928				May, 1928				June, 1928	
								17	24	31	7	14	21	28	5	12	19	26	2	9
Algeria (see also table below):																				
Algiers	C														1					
Oran	C		2													1				2
Arabia: Aden	C				19	178	343	189	148	151	163	108	59	53	13	5	1	1		
	D				7	104	206	134	135	134	126	97	48	16	16	7	1	1		
Plague-infected rats						P	P													
Argentina:																				
Avellaneda	C																		1	
	D																		1	
Bahia Blanca district	C			3																
Buenos Aires [1]	C					2										(1)	6			
	D																3			
Cordoba Province	C	P	P	10	2							5								
Entre Rios	C																			2
Firmat	C			1																
Loreto	C																		3	
Quilino	C			3																
Rosario	C			4	5	4	1													
Santa Fe	C																			7
Santiago del Estero	C						1													9
Suardi	C																		2	
Ucacha	C			1																
Azores: St. Michaels Island	C	3	3	3	2	8	3	1	1		1		2	1						
	D	1		1	1	4	1	1			1		1	1						
Brazil:																				
Bahia	C				4	5	8			P	2	1								
	D				4	4	5													
Porto Alegre	C						2													
Rio de Janeiro	C					4	3	2	1											
	D					1	2	2	1											
Plague-infected rats						1														
British East Africa (see also table below):																				
Tanganyiki	C	P	P	P	P	2	3													
	D					2	3					5								
Uganda	C	99	99	67	79	23	13													
	D	88	96	61	64	18	10													

Canary Islands:																				
Arrecife	C																1			
	D																1			
Las Palmas	C	9		3	3	1	1	2		2										
	D			1	1	1	1													
Teneriffe	C						10													
	D						4													
Ceylon: Colombo	C	1		6	7	3	11	3		4					1	1	2			
	D			6	6	2	6	3		2					1	1	1			
Plague-infected rats			3		2	5	6													
China:																				
Hong Kong	C														2					
Tungliao	D	95																		
Dutch East Indies:																				
Balik-Papan	C				1															
	D				1															
Celebes—Makassar	C		6	2	6	5	1													
	D		6	2	5	5	1													
Java	D	779	829	1,017	754	737	454													
Batavia and West Java	C	130	132	154	128	137	103	19	18	17	26	13	10	14						
	D	129	132	152	128	135	103	19	18	17	26	13	10	14						
Cheribon	C			1																
	D			1																
Plague-infected rats																				
East Java and Madura	C	17	10	8	7	7		1	1	2		1	2							
	D	17	10	8	7	7		1	1	2		1	2							
Kedoe Residency	C											P								
Pasberoean Residency	C			P																
Surabaya Residency	C			P						1					1					
	D									1					1					
Surakarta Residency	C		P	P																
Ecuador: Guayaquil (see table below).																				
Egypt:																				
Alexandria	C			12	5	2	1											1		
	D			7	2	2	1											2		
Beni-Souef	C													4	8	4	14	34	17	
	D													1	2	4	6	8	5	
Cairo	C				2															
	D				2															
Maghagha District	C												1							
	D												1							
Menufia	C																	6	5	
	D																		2	
Minieh Province	C												32	9	7	13	15	36	12	
	D												5	4		5	2	9	1	
Suez	C				1	4	13		4	7	3		3	2			1	2		
	D				1	2	9		2	3	4		2	2			1			
Plague-infected rats									2											
Tanta	C																1			
	D																1			

[1] 6 cases of plague reported in Buenos Aires, Argentina, before May 14, 1928.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928			April, 1928				May, 1928				June, 1928	
								17	24	31	7	14	21	28	5	12	19	26	2	9
Greece:																				
Athens and Piræus	C	1			3															
	D	1			1															
Mitylene	C	1	3	3																
Patras	C	1	1																	
	D	1	1																	
Hawaii Territory: Hawaii	D						1													
India	C	3,246	3,600	5,518	7,097	12,652	23,174	7,517	6,077	6,634	5,851	6,690								
	D	1,792	2,065	3,269	4,925	8,521	16,998	6,031	4,724	5,372	4,780	5,911								
Bassein	D	8	4	4	17	8	12	5	5	7	5	4	5	1	3	2	1			
Bombay	C	4			3	14	33	4	16	28	21	17								
	D	3			3	9	33	4	11	25	21	15	14	19	21	17	14			
Calcutta	C				2															
	D					1					2									
Madras Presidency	C	583	470	791	550	452	271	25	19	13	5	14	6							
	D	298	282	359	206	256	212	18	16	9	5	7	5							
Rangoon	C	11	11	15	17	35	48	5	11	3	11	5	2							
	D	11	11	15	16	30	43	4	9	5	8	5	1	3	5	3	3			
Indo-China (see also table below):																				
Saigon	C		1																	
Iraq:																				
Baghdad	C					4	2	2	2	1		1	4	4	2	4	3	4	2	
	D					2	2	2	2	1		1		4	1		1	1	1	
Plague-infected rats														4		3				
Dulaim Liwa	C					1						1								
Kwangchow-Wan (see table below)																				
Madagascar (see table below)																				
Mauritius (see table below)																				
Nigeria (see also table below):																				
Lagos	C		17	13	10	10	8	2		2	3	2	6	7	2	4	8	6		
	D		17	13	8	11	8	2		2	2	2	7	7	2	4	8	6		
Peru (see table below)																				

Senegal (see table below):																					
Baol	C	95	P	P																	
	D	40																			
Cayor	C	176	48																		
	D	88	28																		
Dakar	C	1																			
Louga	C	8																			
Thies and vicinity	C	1	1								8										
	D										4										
Siam	C	13	1	3	16	20	42	7	8	13	5	6	11	5							
	D	9		2	11	12	36	6	9	10	5	4		5							
Bangkok	C	2			1	2	1			1			3	1							
	D		1		1	2	1			1			2								
Straits Settlements: Singapore	C		1			1	3		1												
	D		1			1	2		1												
Syria (see table below)																					
Tunisia [1]																					
Turkey: Constantinople	C	1		2																	
	D	1		1																	
Union of South Africa:																					
Cape Province	C		2	2		1															
	D		2	1		1															
Orange Free State	C		1	8		5	5	3	2												
	D		1	6		4	1	3	2												
Union of Soviet Socialist Republics:																					
Chita district	C	1																			
	D	1																			
Northern Caucasus	C	1																			
Venezuela: State of Miranda—Tacata and Cua	C						P														
On vessel:																					
S. S. Cadwallen, at La Plata, from Rosario, Argentina	C				1																
S. S. Aghios Gerasimos, at Vigo, Spain	C		3																		
S. S. Tymeric, at Barbados from New Orleans	C																		1		

[1] 8 cases of plague with 6 deaths were reported in Bengardane region, Tunisia, Mar. 17 to 27, 1928.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

PLAGUE—Continued

[C indicates cases; D, deaths; P, present]

Place		July-September, 1927	October-December, 1927	January, 1928	February, 1928	March, 1928	April, 1928	May, 1928
Algeria (see also table above):								
Algiers	C	------	2	------	------	------	------	1
Angola	C	------	3	------	------	------	------	------
British East Africa (see also table above):								
Kenya	C	95	62	26	24	19	17	------
	D	------	------	------	------	------	5	------
Ecuador: Guayaquil	C	15	18	4	6	10	------	------
	D	------	5	4	3	1	------	------
Plague-infected rats		34	31	23	31	21	------	------
Indo-China (French) (see also table above)	C	14	10	7	------	5	9	10
Kwangchow-Wan	C	------	------	------	------	18	17	------
Madagascar	C	314	692	427	342	171	------	------
	D	286	605	388	317	159	------	------
Ambositra Province	C	7	25	105	67	30	------	------
	D	7	17	96	66	29	------	------
Antsirabe Province	C	39	109	117	108	56	------	------
	D	38	108	117	108	54	------	------
Madagascar—Continued.								
Itasy Province	C	36	104	33	19	3	------	------
	D	41	94	29	17	3	------	------
Moramanga Province	C	12	95	19	25	12	------	------
	D	12	83	19	24	12	------	------
Tananarive Province	C	211	408	155	123	70	------	------
	D	189	354	129	102	61	------	------
Mauritius	C	1	------	------	------	------	------	------
Nigeria (see also table above)	C	32	63	16	16	------	------	------
	D	29	61	16	16	------	------	------
Peru	C	34	34	------	41	52	------	------
	D	19	11	------	14	9	------	------
Callao	D	3	3	------	------	------	------	------
Lima	C	------	7	6	------	------	------	------
	D	------	3	------	------	------	------	------
Senegal (see also table above)	C	------	------	5	17	8	81	14
	D	------	------	------	13	4	40	5
Syria: Beirut	C	------	2	------	------	------	------	------

PLAGUE RATS ON VESSELS

S. S. *Modemi* at Goteborg, Sweden, from Bahia and Buenos Aires, via Cape Verde Islands, December 22, 1927.
S. S. *Gydavore* at Landskrona, Sweden, from Rosario, via Canary Islands, January 22, 1928.
S. S. *Dryden* at Liverpool, from La Plata River ports, January 20, 1928.

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928 17	24	31	April, 1928 7	14	21	28	May, 1928 5	12	19	26	June 2, 1928
Algeria (see also table below)	C	683	661	170	129	71	72	3				12							
Algiers	C			3	9	15	10		2	2	1		2		2	1	1		
Oran	C	11	20	39	29	11	5		2	10		3	1	2	11	4	1		
Angola (see table below).																			
Arabia: Aden	C		1	3	1		1												
Brazil (see also table below):																			
Rio de Janeiro	C		1					1											
	D		1					1											
British East Africa (see also table below):																			
Kenya—Mombasa	C								1		1								
Tanganyiki	D	P	P	P	8	5													
British South Africa:																			
Northern Rhodesia	C	164	185	252	236	233	297		54	8	5	26	7	4					
	D	11	64	62	31	23	42		9			1	1	1					
Southern Rhodesia	C		3	2	1	3	7	4	1	2		21	3						
	D						1					10							
Canada:																			
Alberta	C	23	10	10	11	27	10	7	20	7	13	4	2	3	3	13	10	5	
Calgary	C							1											
Edmonton	C	1	1	8	5	3	13	1	11	1	7	2			1	12	10		
British Columbia—Vancouver	C			4	8	26	10	2	5	6	4	11	6	1	6	4	2		
Manitoba	C	7	19	7	11	1									7				
Winnipeg	C	2	2	2	2	2													
New Brunswick	C				1		1										1		
Nova Scotia:																			
Halifax	C	1																	
Ontario	C	96	264	347	212	243	147	19	35	20	9	6	18	18	8	15	12		
Hamilton	C			2															
Kingston	C		1		1	1						2		1					
Ottawa	C	67	134	63	60	68	22	6	8	10	2		3	1		4	2		
Toronto	C	10	34	39	28	20	14	2	3	3	1	2	4	4	1	2	7		
Windsor	C	9																	
Quebec	C	8	25	16	44	26	54	22	40	35	15	21	25	4	33	13	31	15	
Montreal	C		1		8	8	9	6	3				6	2	1			1	2
Quebec	C			4	10	16	13	3	2	4	1	3	7	5	8	7	17	9	14
Riviere du Loup	C		3																
Sherbrooke	C									3									

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928 17	24	31	April, 1928 7	14	21	28	May, 1928 5	12	19	26	June 2, 1928
Canada—Continued.																			
Saskatchewan	C	31	34	58	52	97	22	14	7		12	2	23	15	12	12	13		
Moose Jaw	C	3		1	4	11	13	2	5			3					1		
Regina	C	5	1	1						1	2	3	2		3	1			
Saskatoon	C			2	4	15	2												
Ceylon: Colombo	C		1	2		4	6				1								
	D			1		1			1										
China:																			
Amoy	C						1	1	2	1	2	3	2	1	3	1			
Antung	C				1								1		2				
Canton	C						2	3	2		2	1				1		1	
Chefoo	C	P		P				P											
	D						1												
Foochow	C	P	P	P	P	P	P				P	P	P	P	P				
Hong Kong	C				1	2	7	5	7	10	10	4	4	9	8	8	10	3	
	D				1	2	4		2	5	12	7	2	10	7	11	5	4	
Manchuria—																			
Changchun	C			1		4						2		1	1	3			
Dairen	C	1	2	1	5	15	13	1	3	5	6	7	3	6		12	10	13	
	D	1				8	7		3	5									
Fushun	C		1																
Harbin	C			2	1	5	7	2	3		2	2	3	2					
Mukden	C	2	1			4	21			1			3	1					
Pensihu	C	1																	
Shanghai—																			
Foreigners only	C					5	6	1	1	3	2		1	1	1	2			
Including natives	D					11	19	2	1	3	3	3	1	3	2	1	7	5	
Tientsin	C	13	8	9	8	48	20	4	3	3	3	9	1	3	4				
Chosen (see table below)																			
Curacao (alastrim)	C					2	3												
Dominican Republic: Santo Domingo	C							2							1				
Dutch East Indies:																			
Borneo—																			
Pontianak	C						1												
Samarinda district	C		P																
Java—																			
Batavia and West Java	C	4	25			4	2	4			1	1							
	D		15																

East Java and Madura	C	8	9	9	5	2	9					1						
	D	1					1											
Sumatra—Medan	C			3	9	23	14	6			1	2		2				
	D			2	3	11	2	4			1	2		1				
	D	1		1							33	6						
Ecuador (see table below)																		
Egypt	C			4	4	1	2				52	11		1		1		
	D	1		1							33	6		1				1
Cairo	C			2		1												
France (see table below)																		
Gold Coast (see table below)																		
Great Britain:																		
England and Wales	C	473	902	1,041	1,175	1,530	1,473	359	342	322	318	321	326	376	321	319	336	
Birmingham	C	1				44	3	1				1						
Bradford	C		11	19	32	24	12	9		5	5	3	2	7	2	2	7	2
Bristol	C	6	4	8		3	4		2	8	2	1	10	1	5	4	1	
Cardiff	C		1		1					5				1	2		1	
Castleford	C						4	2	10	7	11	27	11	20	11	11	6	
Leeds	C	7	5	16	11	3	9	3	5	3	3	2	2	1	1			
Liverpool	C				1		1											
London	C					4	14	10	5	1	1	7	5	3	27	5	10	
Manchester	C	3	6	25	5	25	8	4	3	3	4	2	4	2		1	1	
Newcastle on Tyne	C	6	9	55	22	27	12	3	4		2			4		1	6	
Nottingham	C				13	27	11	5	1	6	1	4	4	6	3	5	10	
Sheffield	C	10	6	9	14	8	6				1		10	2	2	2		
Stoke on Trent	C				4	1	15	11			1	4	10	5	13	9	8	
Greece (see table below)																		
India	C	3,153	4,052	6,731	10,676	17,777	18,850	6,004	6,169	8,101	7,760	8,789						
	D	715	927	1,650	2,429	3,709	3,826	1,212	1,207	1,500	1,621	1,988						
Bassein	C					1									1			
Bombay	C	10	4	9	14	61	149	49	58	62	49	56	57	54	33	46	37	26
	D	2	3	2		24	73	24	33	36	27	32	34	27	25	25	22	18
Calcutta	C	5	5	25	36	58	71	20	29	45	40	49	51	31	40	41	29	31
	D	6	2	11	27	34	50	15	21	33	35	32	42	21	35	30	26	23
Karachi	C						1	1							2			
	D						1								1			
Madras	C	8	7	11	21	74	100	30	27	45	81	49	36	60	24	17	22	11
	D		2	3	6	8	19	5	3	6	15	16	8	7	7	5	5	
Negapatam	C				5	8	3					1		5	1	3	4	1
	D				3	3						1		2			1	
Rangoon	C	17	6	14	136	275	377	96	82	92	50	62	45	37	23	15	2	6
	D	3	1	4	31	64	104	28	17	34	23	24	17	12	16	4	2	2
Tuticorin	C															3		
Vizagapatam	C				3	10	2			3			2			2		1
	D					8												1
India (French):																		
Chandernagor	C										5							
	D										1							
Karikal	C	2	P															
	D	2																
Pondicherry	C	38	42	41	65	47	9		6	5	7	12		15	9	16		7
	D	38	42	41	50	47	9		6	5	7	12		15	9	16		6

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928 17	24	31	April, 1928 7	14	21	28	May, 1928 5	12	19	26	June 2, 1928
Indo-China (see also table below):																			
Saigon	C			1	3		3												
Iraq:																			
Baghdad	C	7	5	25	23	19	7	3	1		1	1	3		1	6		3	
	D	4	4	14	12	11	4	3	1			1	1		1	1		2	
Basra	C	2	3	4	2	1	7	4	1				1	1	2		1	2	
	D	2	1	3	1			1	1				1	1			1	2	
Italy:																			
Leghorn	C						1	1											
Palermo	C									3	2	1	3	3	3	2			
Rome and vicinity	C					3													
Jamaica (outside Kingston) (alastrim)	C	9	7	3	2	5	10	3	2	1	7		1	2	1			1	
Kingston (alastrim)	C	2																	
Japan:																			
Kobe	C																6	3	
Nagoya	C													1	5	2			
Tokyo	C					4	4	1	3	1	10	8							
	D					1	2				1	1							
Tokyo Prefecture	C								17	5	2	1							
	D										1	1	1						
Yokohama	C													1	1	1		1	
Latvia (see table below).																			
Mauretania	C						P												
Mexico (see also table below):																			
Acapulco	C		1																
	D		1																
Chihuahua	D				1														
Jalisco (State)	C						P	P	P	P	P	P	P	P					
Guadalajara	D			2			1				2	2	1	4	5	7	4		2
Manzanillo	D				1			1											
Mazatlan	D																2		
Mexico City and surrounding territory	C			4		2	2							1		1			
Saltillo	D															1	1		
Tampico	C						1												
Torreon	D	2																	

Morocco (see table below):																			
Nigeria (see also table below):																			
Lagos	C										1								
Southern Provinces	C						7		40	26	27								
	D								28	1	6								
Palestine: Jerusalem	C			1		1													
	D					1													
Persia (see table below).																			
Poland	C			1	6	3	1	1				5	2	2					
	D											1							
Portugal (see also table below):																			
Lisbon	C	8	4	10	12	12	20			2	3		3	2	1				
	D			1			1												
Oporto	C													1					
Senegal (see also table below):																			
Dakar	C						34	17			12	5	11			12			
	D							12			8		8			4			
Siam	C	6	1	9	23	35	12		2	14	12	1							
	D			1	2	4	3			4		1							
Bangkok	C		1	1	3														
	D				1														
Spain (see also table below):																			
Malaga	D		1	1															
Seville	C				1														
Valencia	C	1			2		1		1	1									
Straits Settlements: Singapore	C		1			1	1	1				1							
Sudan (Anglo-Egyptian)	C				4	85	109	10	28	250	54	29	18	78	35	39	7		
	D				4	48	27	7	8	75	10	6	8	4	14	4	1		
Sudan (French) (see table below).																			
Switzerland	C				2														
Syria (see table below).																			
Tunisia: Tunis	C				4	3	14	1		1	2		4		2				
Union of South Africa:																			
Cape Province	C	P				P													
Natal	C					P	P	P	P	P									
Orange Free State	C		P	P	P	P				P									
Transvaal	C	P	7																
Union of Soviet Socialist Republics (see table below).																			
Upper Volta	C						5		2			P		4	5				
Venezuela:																			
Maracaibo	D	1				1	1												
On vessel:																			
S. S. Arendskerk at Singapore, from Amoy, China	C									P									
S. S. Kashgar at Kobe, from Shanghai	C														P				
S. S. Rohna at Penang from Negapatam	C																	P	
S. S. Tjileboet at Hong Kong, from Shanghai	C														P				
S. S. Yarmouth at Kingston, Jamaica, from Habana, Cuba	C										1								

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

SMALLPOX—Continued

[C indicates cases; D, deaths; P, present]

Place		July-September, 1927	October, 1927	November, 1927	December, 1927	January, 1928	February, 1928			March, 1928			April, 1928			May, 1928	
							1-10	11-20	21-29	1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20
Algeria (see also table above)	C	1,217	682														
Oran	C	51	11														
Indo-China (French) (see also table above)	C	68	25	38	34	58	50	31	90	57	71	69		35		36	
Senegal (see also table above)	C													51			
	D													7			
Sudan (French)	C					4		5	1	P	5			4		30	P
	D															6	
Syria:																	
Aleppo	C				1	1											
Beirut	C				2	15	11	26		12	7	4	3	5	1	2	3
	D											2	1				
Damascus	C		22	13	12	13					1						

Place		July-September, 1927	October-December, 1927	January, 1928	February, 1928	March, 1928	April, 1928
Angola	C	51	151	10	36		
	D		2				
Congo	C	5	77		36		
Cuanza-Norte	C	1					
Cuanza-Sul	C		9	10			
Loanda	C	1					
Zaire	C	3	5				
Brazil (see also table above):							
Porto Alegre	C	11	5		1		
British East Africa (see also table above):							
Zanzibar	C		2				
	D		1				
Chosen	C	21	4	4	21	23	
	D	6	1	2	8	6	
Seoul	C					1	
Ecuador: Guayaquil	C	4	6	2	9	24	19
	D						
France	C	37	25	11	10	13	6

Place		July-September, 1927	October-December, 1927	January, 1928	February, 1928	March, 1928	April, 1928
Gold Coast	C	7	4		1	3	
Greece	C	10	9	6	11	19	
	D				2	2	
Latvia	C		2		1		
Mexico (see also table above)	D	221	346	256			
Morocco	C	180	622	55	47	30	19
Nigeria (see also table above)	C	820	316	275	217		
	D	173	81	39	45		
Persia	D		2	7			
Portugal (see also table above)	C			143	115		
	D			22	8		
Spain (see also table above):							
Madrid	D		1				
U. S. S. R.:							
Railways, etc	C	26	33	18	20		
Other territories in Europe	C	366	1,256		998		
Transcaucasus, Siberia, and Central Asia	C	80	81				
Ukraine	C	27	48	6	11		

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER

[C indicates cases; D, deaths; P, present]

Place		July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928			April, 1928				May, 1928				June 2, 1928
										17	24	31	7	14	21	28	5	12	19	26	
Algeria (see also table below):																					
Algeria	C							1	3	1	1	2	5	1	3			1	1		
	D								1						2						
Oran	C						4	2	10	1		2	1	1	6	2	2	1			
	D														1						
Austria: Vienna	C							1													
Bulgaria (see also table below):																					
Sofia	C			17	6	1	6	1		3		3	14				1	1			
	D				1																
Chile:																					
Antofagasta	D			1																	
Talcahuano	D		1								1										
Valparaiso	C		1		1	2	1		1												
	D	2	1		2																
China: (see also table below):																					
Manchuria—																					
Dairen	C													7		3					
Harbin	C	2			1										1	1					
Tientsin	C		2																		
Chosen (see table below)																					
Czechoslovakia (see table below)																					
Egypt	C	2		12	4	14	8	9	17		1	1		2	1						
	D	3		5		8	4	2	8		1										
Cairo	C					3							2	3			1				
	D					3							1	3			1				
Port Said	C			1		1															
Behera Province	C												29	23			2	7	5		
	D													4				3	1		
Gharbieh Province	C												23	5		5		1			
	D													3		2					
Keneh Province	C												5	29		9					
	D													1		6					
Menoufieh	C															5	23	5			
	D															1	2				

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

TYPHUS FEVER—Continued

[C indicates cases; D, deaths; P, present]

Place		July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Jan. 15–Feb. 11, 1928	Feb. 12–Mar. 10, 1928	Week ended— March, 1928			April, 1928				May, 1928				June 2, 1928
										17	24	31	7	14	21	28	5	12	19	26	
Greece (see table below)																					
Ireland (Irish Free State)	C							1						1							4
Cork County	C					3	1														
Donegal County, Letterkenny	C			4																	
Japan (see table below)																					
Latvia (see table below)																					
Lithuania (see table below)																					
Mexico (see also table below):																					
Guadalajara	D					1															
Mexico City, including municipalities in Federal District	C	17	19	18	28	17	15	5	8	6	6			4		4					
	D				2	1	5		4		3					1					
Monterey	D								1												
Morocco (see table below)	C						32	1,051	316	172	167	219	190	186	167	136	102	62	63		
Palestine	C	11	1	5	3	9	8	5	10	5			2	3		1	2	2	1	1	
Peru (see table below)																					
Poland	C	50	35	19	64	93	195	346	265	90	90	125	77	93		71	80				
	D	6	2	4	11	10	16	19	26	5	6	7	7	8		2	2				
Portugal (see table below): Oporto	C	1			1			1													
Rumania	C	36	16	17	22	35	68	39	68	29	34	33	45	36	38	30	38				
	D	1		2			3	9	5	2	2	3	4		6	5	1				
Syria (see also table below): Aleppo	C		2				2														
Tunisia	C	14		3	1	1	6	4	1	13		5			2	16	1	3			
Union of South Africa:																					
Cape Province	C	P	P	P	P	P	1	1	P		P	P	P	P	P	P					
Natal	C	P	P	P	P	2	3	1	2	P	P	P		P	P	P					
Orange Free State	C			P		P		P			P	P	P	P	P	P					
Transvaal	C	1		5	P	P					P	P									
Union of Soviet Socialist Republics (see table below)																					
Yugoslavia (see table below)																					
On vessel: S. S. Gaika at Durban, Natal, from Mauritius	C								1												

Place		1927				January, 1928			February, 1928			March, 1928			April, 1928			May 1-10 1928
		July-September	October	November	December	1-10	11-20	21-31	1-10	11-20	21-29	1-10	11-20	21-31	1-10	11-20	21-30	
Algeria (see also table above)	C	110	12															
	D	13	1															
Algiers	C	10	2															
Bulgaria (see also table above)	C	43	2		2	7	6		8	12	6							26
	D	3	1		1		1		1	2	2							
Morocco (see also table above)	C	231	11	26	86													

Place		July-September, 1927	October-December, 1927	January, 1928	February, 1928	March, 1928	April, 1928
China (see also table above):							
Shanghai	D		1				
Chosen	C	90	80	183	400	313	
	D	8	6	19	44	25	
Chemulpo	C	3		1		1	
Gensan	C	2		1			
	D			1			
Seoul	C	5	2			10	
	D	1	1			1	
Czechoslovakia	C	12	7			25	
Greece: Athens	C	3	1	2	2		13
	D						2
Japan	C	1	1				
Latvia	C	6			1	26	
Lithuania	C	69	54	86	137		
	D	14	3	10	12		

Place		July-September, 1927	October-December, 1927	January, 1928	February, 1928	March, 1928	April, 1928
Mexico (see also table above)	D	64	98	46			
Peru:							
Arequipa	D	3	3	2			1
La Oroya	C			P	P	P	
Lima	C	8					
Turkey	C				17		
	D				1		
Union of Soviet Socialist Republics:							
Railways, etc	C	77	102	41	107		
Transcaucasus, Siberia, and Central Asia	C	208	190	7			
Ukraine	C	295	631	533	459		
Other territories in Europe	C	1,839	1,924		1,853		
Yugoslavia	C	20	2	7	24	3	10
	D	5		3			1

CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER—Continued

YELLOW FEVER

[C, indicates cases; D, deaths; P, present]

Place		July 3–30, 1927	July 31–Aug. 27, 1927	Aug. 28–Sept. 24, 1927	Sept. 25–Oct. 22, 1927	Oct. 23–Nov. 19, 1927	Nov. 20–Dec. 17, 1927	Dec. 18, 1927–Jan. 14, 1928	Week ended— January, 1928		February, 1928				Mar. 3, 1928
									21	28	4	11	18	25	
Belgian Congo:															
Boma	C							3							
	D							2							
Matadi	C							29	1	5	8			1	
	D							16	2	5	6				
Brazil:															
Bahia [1]															
Estancia															
Rio de Janeiro [1]	C														1
Dahomey:															
Grand Popo	C						1								
	D						1								
Porto Novo	C	1													
	D	1													
Gold Coast (see also table below):															
Ashanti—															
Obuasi	C		1												
	D		1												
Ivory Coast	C	1						1							
	D	1						1							
Liberia: Monrovia	C			1											
Nigeria	C			2											
	D			2											
Senegal	C	3	10	21	31	38									
	D	3	9	21	31	28									
Dakar	C	1			12	14	7	2							
	D				7	10	7	2							
Togoland	C		1												
	D		1												

Place		July	August	September	October	November	December	January	February	March	April	May
Gold Coast (see also table above)	C	15	2	6	1							
	D	4	2	4	1							1

[1] Two deaths from yellow fever and two suspected cases were reported at Rio de Janeiro, Brazil, June 4, 1928. The disease was said to have been imported from the north. Three cases of yellow fever were reported at Bahia, Brazil, June 20, 1928.