Statistical Studies of Heart Disease

IV. Mortality from heart disease (all forms) related to geographic section and size of city

By MARY GOVER *

This is the fourth in a series of studies dealing with the statistics of heart disease morbidity and mortality. The studies are prepared jointly by the Division of Public Health Methods, Public Health Service, and the National Office of Vital Statistics with the cooperation of the Division of States Relations.

Any possible relationship of heart disease mortality with geographic section and population size can be appraised only in a general manner from vital statistics data. Resident age-adjusted rates of mortality from heart disease specific for sex, color, and size-of-city in each geographic section are obtainable from vital statistics tabulations and give an over-all picture of variation with respect to section and urbanization. Other variables such as income and occupation may influence heart disease mortality, but are not usually obtainable from routine tabulations of death certificates.

Source of the Data

The source of the data for this study is the annual report of deaths made by the National Office of Vital Statistics, supplemented by an unpublished tabulation of resident deaths from heart disease in 1940, specific for age, sex, race, urbanization, and geographic section of the United States. Mortality rates based on these data have been adjusted for age for purposes of geographic comparison—those for States by the indirect and those for geographic section by the direct method (*2*, pp. 270–276). Because of some degree of overlapping of diagnosis, mortality from intracranial lesions of vascular origin and from nephritis are included in this study in nearly the same detail as mortality from heart disease.

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The broad divisions of heart disease identified by the International List of Causes of Death are (1) congenital diseases of the heart, (2) acute rheumatic heart disease, (3) cardiovascular syphilis, and (4) a large classification group, including acute endocarditis, chronic conditions of the valves and endocardium, diseases of the coronary arteries, chronic myocarditis and other degenerative forms of heart disease. The present statistical study considers only a total of the last named group designated as heart disease (all forms) and tabulated in 1940 under International List numbers 90–95.

Approximately half of all death certificates are certified by physicians as due to multiple causes. When this is the case, selection of the primary cause of death is usually made in accordance with the Manual of Joint Causes of Death.[1] Heart disease, nephritis, and intracranial lesions of vascular origin are interrelated causes, and are therefore frequently reported jointly. According to the Joint-Cause Manual, nephritis is usually preferred over heart disease and heart disease over artery conditions. The 1940 tabulation of associated causes of death gives heart disease as contributory to nephritis in 42 percent of deaths due to nephritis and in 1 percent of deaths due to intracranial lesions of vascular origin. Among deaths due to heart disease 8 percent are primary over intracranial lesions of vascular origin and 2 percent over nephritis.

Coding procedure is uniform for the entire country. There are known to be geographic differences, however, in the relative frequency in the reporting of multiple causes of death by physicians among the several geographic sections (*1*), related probably to the urban character of a district and to proximity to large centers of medical practice. This geographic variability in the frequency of reporting of multiple causes results in geographic differences in the relative number of death certificates referred to the Joint-Cause Manual in a selection of the primary (tabulated) cause of death. The almost perfect agreement between tabulated frequency of primary and associated cause of death and Manual preference (*5*) indicates that in the selection of primary cause of death reliance has been placed upon this arbitrary standard almost exclusively.

Recent Trend

Age-adjusted mortality from heart disease in the death registration area has increased from a rate of 253 in 1930 to 292 per 100,000 in 1940, an annual increase of 1.5 percent (*4*). Similar trends by geographic section are shown in figure 1 and table 1. Percentage change in mortality in the several sections has been determined for the period

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[1] For a detailed account of allocation to primary and contributory cause of death together with tabulated fre quencies and a consideration of changes in coding procedure, 1900 to the present, see earlier studies in this series (*4, 5*).
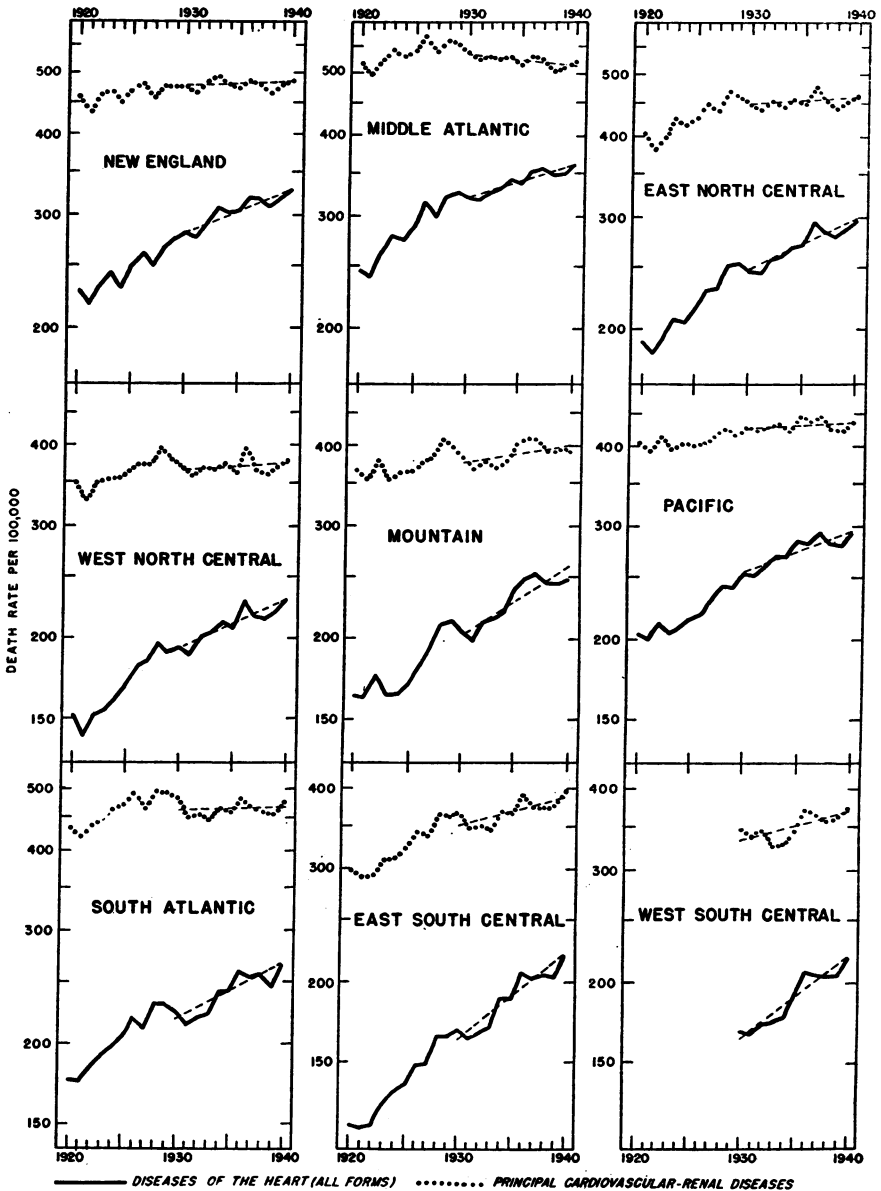
Figure 1. Rate of change in mortality from diseases of the heart (all forms) and from a total of the major cardiovascular-renal diseases in each of the nine geographic sections of the United States, 1920–1940.

1930 through 1940 by fitting straight lines to the logarithms of the rates; the slopes of the fitted lines with their probable error are shown in table 3. For comparative purposes, mortality from a total of the principal cardiovascular-renal diseases, including heart disease, is also given in figure 1 and in tables 2 and 3.

Table 1. *Trend of mortality from diseases of the heart (all forms) in 9 geographic sections; age-adjusted death rate per 100,000 population* [1]

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic (white)	East South Central (white)	West South Central (white)	Mountain	Pacific
1920	227.1	246.1	191.3	152.3	176.1	119.2	---------	162.6	202.8
1921	217.5	241.3	183.0	140.6	174.7	117.6	---------	162.0	200.4
1922	231.7	262.0	194.3	151.9	182.7	118.8	---------	175.3	211.7
1923	242.5	278.0	207.4	154.3	191.4	129.3	---------	163.0	205.5
1924	229.6	273.8	205.1	161.1	196.9	134.9	---------	163.9	211.3
1925	251.2	288.5	215.7	168.0	204.6	137.7	---------	171.3	215.1
1926	261.1	313.4	230.5	181.3	218.6	148.5	---------	182.4	219.4
1927	251.1	297.9	231.6	183.9	212.6	149.3	---------	195.1	231.6
1928	266.3	320.9	251.4	196.5	230.5	164.5	---------	209.7	241.9
1929	273.8	323.9	252.7	190.5	229.7	165.4	---------	213.0	240.7
1930	278.7	318.7	246.3	192.6	224.2	167.7	168.0	204.0	252.6
1931	274.7	316.0	243.9	188.8	213.6	163.3	165.9	197.8	251.9
1932	288.5	323.5	256.9	200.8	219.5	167.2	171.4	212.4	259.1
1933	304.5	329.4	260.4	203.6	221.7	170.7	173.0	214.1	268.7
1934	301.5	340.3	268.7	211.9	241.4	187.8	176.0	220.1	268.8
1935	302.9	334.5	271.4	206.5	241.5	188.5	188.7	239.5	284.8
1936	317.6	351.3	294.5	228.5	259.1	206.7	207.5	248.4	282.0
1937	316.1	354.1	284.3	216.6	254.7	202.9	205.4	253.3	292.7
1938	308.1	346.1	279.5	215.4	256.2	204.6	204.3	245.0	282.0
1939	316.1	348.2	287.1	219.5	246.0	203.1	205.3	244.4	279.6
1940	327.1	360.3	295.9	230.1	266.4	219.8	218.6	246.9	292.7

[1] Deaths are by place of occurrence and are for white persons wherever available.

Annual rates for each section were adjusted to the age distribution of the total population, enumerated 1940, according to the following method: mortality rates for heart disease and the principal cardiovascular-renal diseases were adjusted for age by the usual direct method for the census years, 1920, 1930, and 1940. Ratios of adjusted to crude rates were computed for the 10-year intervals: annual ratios were obtained by interpolation between the ratios for 1920 and 1930, and those for 1930 and 1940. Age-adjusted rates for successive years as tabulated, are the product of these annual ratios multiplied by annual crude rates, as of July 1.

The entrance of individual States at irregular intervals into the area comprising the Death Registration States made some adjustment of the above method necessary. Briefly, mortality rates for 1920 through 1929 are for the constant area of 1920, those for 1930 through 1940 are for the area of 1930. The States included in each section and decade are as follows: *New England:* All States, 1920–1940; *Middle Atlantic:* All States, 1920–1940; *East North Central:* All States, 1920–1940; *West North Central:* Minnesota, Missouri, Nebraska, and Kansas, 1920–1940; Iowa, North Dakota, and South Dakota, 1930–1940; *South Atlantic:* (White, except for Delaware and West Virginia) Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, and Florida, 1920–1940; West Virginia and Georgia, 1930–1940; *East South Central:* (White) Kentucky, Tennessee, and Mississippi, 1920–1940; Alabama, 1930–1940; *West South Central:* (White) Arkansas, Louisiana, and Oklahoma, 1930–1940; Texas, 1933–1940; *Mountain:* Montana, Colorado, and Utah, 1920–1940; Wyoming, Idaho, New Mexico Arizona, and Nevada, 1930–1940; *Pacific:* All States, 1920–1940.

Table 2. *Trend of mortality from a total of the principal cardiovascular-renal diseases* [1] *in 9 geographic sections; age-adjusted death rate per 100,000 population* [2]

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic (white)	East South Central (white)	West South Central (white)	Mountain	Pacific
1920	455.3	516.6	405.3	348.0	433.2	297.8	---------	366.2	404.8
1921	429.5	495.1	382.8	328.6	420.7	290.7	---------	354.0	393.0
1922	459.0	520.4	400.4	349.1	435.7	293.4	---------	378.4	411.7
1923	467.5	541.8	424.7	353.0	447.1	309.1	---------	354.9	396.3
1924	447.9	530.2	416.7	355.4	462.0	312.3	---------	361.8	401.9
1925	467.9	540.9	427.6	362.8	471.7	324.0	---------	365.4	399.7
1926	478.1	569.9	448.9	374.1	489.6	341.5	---------	374.6	401.9
1927	455.9	536.7	439.1	373.5	465.2	338.1	---------	383.9	413.1
1928	474.0	560.6	469.9	395.0	491.8	363.5	---------	407.7	424.2
1929	473.3	552.4	462.7	379.3	490.2	361.5	---------	397.0	415.1
1930	472.9	536.9	449.2	369.0	481.8	366.0	347.5	381.5	426.4
1931	464.4	524.4	440.3	358.3	450.8	346.3	337.6	368.1	421.6
1932	479.2	529.1	452.9	369.0	454.5	348.7	342.8	377.3	427.4
1933	488.9	525.5	446.0	366.5	444.9	345.0	324.7	368.5	429.0
1934	478.5	529.5	455.8	375.9	465.5	367.9	329.1	379.5	423.4
1935	471.4	514.5	450.6	361.8	458.0	365.5	343.9	402.5	442.9
1936	483.4	530.3	480.7	393.6	484.3	390.1	371.0	409.4	435.9
1937	476.6	523.1	453.8	366.2	466.2	374.9	361.8	404.4	441.6
1938	462.1	504.4	442.6	362.1	458.6	372.5	356.1	392.1	426.0
1939	475.4	510.3	452.6	370.6	455.5	375.2	361.9	391.7	423.5
1940	482.0	519.3	461.6	379.2	475.3	395.7	374.0	388.8	434.6

[1] See appendix table, footnote 2.
[2] See table 1, footnote 1.

Regional rates of mortality in time sequence (fig. 1) show considerable variability. It is obvious, however, that recorded heart disease mortality has increased, 1920–40, in all geographic sections; the rate of increase from 1930 to 1940 is greatest in the three Southern and the Mountain sections. Mortality from a total of the principal cardiovascular-renal diseases, or the sum of mortality from diseases of the heart (all forms), intracranial lesions of vascular origin, and nephritis (all forms) has, on the contrary, been practically stationary since 1930, except for a slight but significant increase in the rates in the East South and West South Central sections and a minor decrease in the Middle Atlantic region.

Table 3. *Average annual percentage change in mortality from diseases of the heart (all forms) and from a total of the principal cardiovascular-renal diseases, from 1930 to 1940*

Geographic section	Heart disease (all forms)[1]	Principal cardiovascular-renal diseases[1]
	Average annual percentage change from 1930 to 1940[2]	
New England	+1.55±.16	+ .04±.11
Middle Atlantic	+1.26±.11	− .39±.09
East North Central	+1.92±.17	+ .24±.15
West North Central	+1.74±.20	+ .24±.17
South Atlantic	+2.06±.24	+ .12±.18
East South Central	+3.02±.23	+1.04±.20
West South Central	+2.95±.22	+1.00±.23
Mountain	+2.47±.26	+ .66±.20
Pacific	+1.49±.17	+ .17±.11

[1] See appendix table, footnote 2.
[2] The average annual percentage change and probable error was computed as follows:

$y = a + bx$ where y is the logarithm of the rate
$B = $ (antilog of b) -1 where B is the average annual percentage change in the rate

$$\sigma_b = \sqrt{\frac{\bar{\sigma}}{\Sigma(x-\bar{x})^2}}$$

where $\bar{\sigma}$ = square root of the sum of the squares of the differences between observed and calculated values of y divided by $n-2$ (i. e., 9), and where $\Sigma(x-\bar{x})^2$ = sum of squares of deviations of x from the mean of x.

$$P.E_B = 0.67449 \frac{(1+B)\sigma_b}{0.4342945}$$

Mortality in States

Mortality in separate States specific for sex and population-size is found in the appendix table and the rates are shown in map form in figure 2. Three main facts are seen (1) men have a higher rate of mortality than women in every size-of-city group, (2) both urban and rural mortality from heart disease is slightly higher in North than South and in Eastern than Central sections, (3) recorded urban mortality is higher than rural among both men and women. Owing to the general agreement in mortality from heart disease over large sections of the country, as seen in figure 2, summary rates in 5 sections have been used (figs. 3 and 4) for a regional and an urban-rural comparison.

DISEASES OF THE HEART (ALL FORMS)
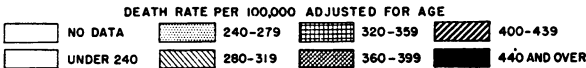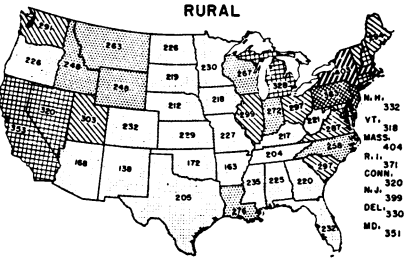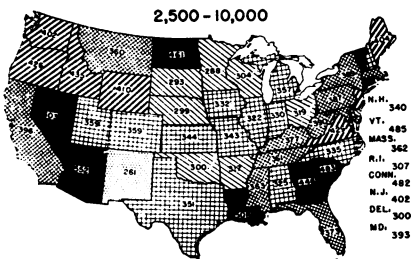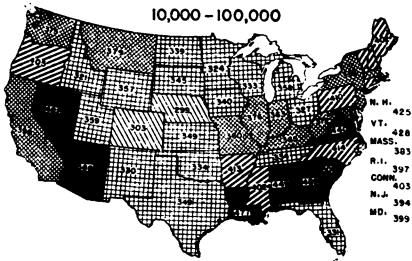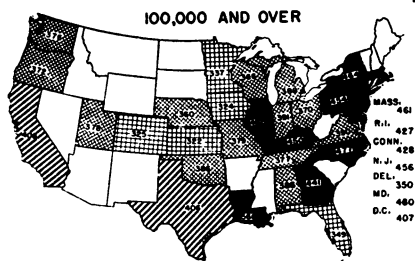
Figure 2. Distribution of mortality from diseases of the heart (all forms) by States—
white resident, age-adjusted mortality, specific for sex and urban-rural areas of
States, 1940.

Geographic Section

A North-South comparison of heart disease mortality is most advantageously made in the Eastern section (fig. 3). Among males in large cities and rural areas and among females in all populatio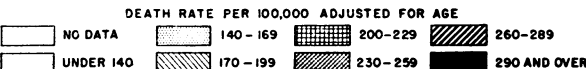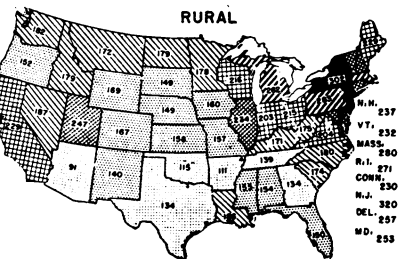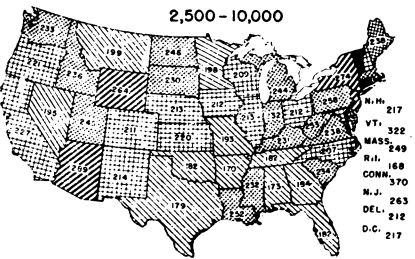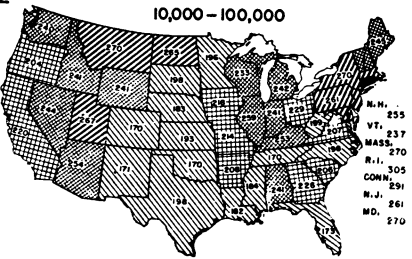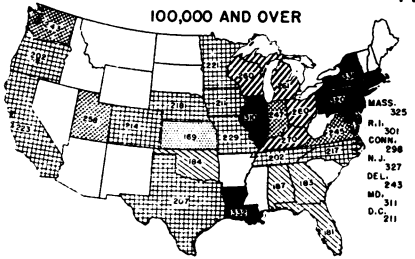n-size groups, heart disease mortality is somewhat higher in the North than in the South. The only variation from the general statement of higher mortality in North than South is the high rates among males in smaller cities and towns of the South. The reason for this increased mortality is obscure from these data. Although the differences between heart disease mortality rates in North and South are not excessive and show some irregularity, they nevertheless amount to a difference (North minus South) of approximately 35 percent in rural areas and of 8 and 30 percent, respectively, for males and females of large cities.

An East-Central comparison shows somewhat wider and more consistent differences, the higher rates being in the East (fig. 3). In rural areas of the North, heart disease mortality is approximately 45 percent higher in the East than in the Central section. The only exception to the statement of higher mortality in the East is the unusually high rate among males in large cities of the Central South. This rate, however, is based on a relatively small population; only four States including seven large cities comprise that area. Mortality from heart disease in the Pacific section falls, on the average, between that in the East and Central divisions.

A North-South comparison of the remaining two causes of death grouped as cardiovascular-renal diseases (fig. 3) is as follows: Mortality from intracranial lesions of vascular origin shows no marked geographic differences but is, on the whole, higher in the South than the North and slightly higher in the East than Central sections. Mortality from nephritis is definitely higher in the South than in the North in all population-size groups and tends also to be higher in the East than Central sections. Recorded mortality from both intracranial lesions of vascular origin and nephritis is small compared with that from heart disease; on the whole the above-named causes are opposite to heart disease in respect to a North-South and in the same direction in respect to an East-Central comparison.

It has been pointed out that practically all death certificates certifying both heart disease and intracranial lesions of vascular origin are allocated as heart disease deaths and that they form 8 percent of all recorded mortality from heart disease; death certificates certifying both heart disease and nephritis, however, are almost entirely allocated to nephritis and form 42 percent of the nephritis death rate. These percentages are for the country as a whole and are not available by geographic section. Even if 40 percent of the recorded nephritis death rate or a total of the rate involving primary nephritis and secondary heart disease mortality is added to the heart disease death rate in the

Table 4. *White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of geographic sections, 1940; age-adjusted death rate per 100,000* [1]

Geographic section	Both sexes				Male				Female			
	100,000 and over	10,000–100,000	2,500–10,000	Rural	100,000 and over	10,000–100,000	2,500–10,000	Rural	100,000 and over	10,000–100,000	2,500–10,000	Rural
Diseases of the heart (all forms) [2]												
United States [3]	346.8	303.7	289.6	237.9	419.3	377.9	363.5	274.1	279.5	237.2	221.3	196.5
New England	375.5	324.2	315.5	283.6	445.0	389.6	388.7	332.6	315.4	266.0	248.1	232.9
Middle Atlantic	389.7	326.5	321.5	337.6	452.1	396.6	387.9	380.9	330.2	264.0	260.7	290.4
East North Central	343.8	292.8	266.9	255.5	408.5	351.7	327.0	289.8	280.6	238.3	211.6	214.9
West North Central	281.2	267.4	280.3	190.4	352.2	340.6	323.9	220.0	216.6	202.1	201.3	155.5
South Atlantic	318.3	294.0	297.7	223.2	405.2	398.1	394.9	262.3	243.7	205.1	212.2	181.1
East South Central	301.1	298.8	274.5	186.8	393.8	383.7	357.7	216.3	223.6	226.0	203.7	154.6
West South Central	326.3	273.2	266.3	167.6	427.9	358.5	351.6	197.1	237.1	194.0	185.7	132.8
Mountain	278.6	294.4	310.7	205.7	339.6	366.0	391.6	232.3	223.0	222.4	223.2	168.2
Pacific	303.3	298.6	311.1	265.0	394.0	394.6	401.9	311.9	220.8	214.6	222.5	203.2
Intracranial lesions of vascular origin [3]												
United States [3]	77.6	91.6	94.7	85.7	78.0	95.3	100.6	87.1	76.3	88.5	89.7	84.0
New England	93.3	87.9	87.0	84.7	89.0	88.8	91.0	84.6	96.4	86.8	83.3	84.8
Middle Atlantic	68.1	85.4	82.4	90.3	66.9	83.1	78.4	88.5	69.0	87.3	85.7	92.2
East North Central	81.0	94.0	92.8	91.6	81.3	95.9	96.6	91.9	80.8	92.4	89.5	91.3
West North Central	79.6	93.0	97.5	77.6	82.8	96.7	103.5	79.4	76.8	89.8	92.1	75.4
South Atlantic	84.6	104.3	117.8	100.7	93.7	121.2	135.3	107.5	77.1	90.2	102.8	93.3
East South Central	93.4	113.4	103.8	88.4	99.5	130.6	120.1	92.9	87.9	100.0	90.4	83.3
West South Central	91.3	94.7	100.2	71.4	105.3	109.2	113.3	72.7	79.8	81.7	88.0	69.8
Mountain	72.0	89.9	100.9	64.6	70.4	96.6	110.2	61.5	73.1	86.2	90.7	68.9
Pacific	74.4	84.3	96.2	74.8	77.1	86.6	102.6	74.0	71.9	82.6	90.4	75.8

Nephritis (all forms) [2]

United States [3]	70.9	77.5	83.2	72.2	76.5	88.8	95.3	77.5	65.9	68.1	72.7	66.4
New England	66.9	67.2	70.7	60.8	72.3	72.4	80.3	63.9	62.6	63.1	62.5	57.7
Middle Atlantic	65.9	81.6	88.6	85.0	67.8	88.7	90.3	86.4	64.2	76.8	87.1	83.6
East North Central	75.6	72.8	74.4	71.6	78.6	80.9	84.1	75.4	73.0	65.7	66.0	67.4
West North Central	65.6	73.9	69.3	68.0	74.0	89.5	80.7	62.7	88.9	60.4	58.7	52.5
South Atlantic	102.6	109.2	119.6	102.2	117.5	134.3	149.8	113.3	90.7	88.7	93.6	90.4
East South Central	74.7	100.0	96.1	80.9	92.6	116.6	121.9	91.3	70.3	86.5	75.0	69.7
West South Central	82.9	82.3	93.9	65.9	98.1	100.4	112.6	73.6	69.6	66.0	76.6	56.7
Mountain	69.9	81.8	85.7	54.7	70.3	96.5	95.8	55.4	63.8	67.3	74.9	53.8
Pacific	60.8	66.7	80.5	55.4	69.1	78.6	92.7	58.5		56.7	69.0	51.4

Cardiovascular-renal diseases [2]

United States [3]	495.3	472.8	467.5	395.8	574.6	562.0	559.4	438.7	421.7	393.8	383.7	346.9
New England	537.4	481.8	476.4	437.2	612.6	554.2	559.4	485.3	477.2	423.5	406.2	389.6
Middle Atlantic	523.8	493.4	493.0	516.4	596.2	573.0	558.8	558.8	460.5	426.9	437.3	471.8
East North Central	500.0	460.5	437.3	427.0	576.2	529.1	507.3	462.7	431.0	400.9	376.5	386.2
West North Central	427.4	437.2	432.9	332.5	510.7	526.9	511.0	367.7	355.3	359.6	361.2	291.1
South Atlantic	506.5	509.6	537.6	426.0	625.8	664.6	686.5	483.2	412.1	383.3	410.3	365.6
East South Central	471.0	514.0	475.7	357.0	596.3	637.8	602.1	401.6	371.7	414.0	372.2	308.4
West South Central	500.9	451.1	461.2	305.1	640.4	575.5	578.4	344.6	385.4	339.8	352.2	288.5
Mountain	421.7	466.7	498.8	324.4	479.9	558.0	597.7	349.6	370.5	376.3	392.0	289.3
Pacific	439.8	452.7	489.3	396.1	544.8	560.8	596.9	446.3	350.3	362.4	386.9	330.5

[1] Age-adjusted rates for diseases of the heart (all forms) and for intracranial lesions of vascular origin were obtained by the direct method of adjustment (2, pp. 274–276). Age-adjusted rates for nephritis and for the total of cardiovascular-renal diseases were obtained by the indirect method of adjustment (2, pp. 270–274). Rates are adjusted to the age distribution of the total population as enumerated in 1940.

[2] See appendix table, footnote 2.

[3] From Vital Statistics, Special Reports, vol. 23, No. 1, 1945.

PRINCIPAL CARDIOVASCULAR-RENAL DISEASES

Size of City	Geographic Section	MALE Heart disease	Intra-cranial lesions	Neph-ritis	FEMALE Heart disease	Intra-cranial lesions	Neph-ritis
100,000 and over	East North	435	75	72	311	77	67
	East South	402	95	110	238	80	82
	Central North	350	81	73	217	76	60
	Central South	428	105	98	237	80	70
	Pacific	394	77	69	221	72	54
10,000-100,000	East North	378	90	82	255	89	69
	East South	394	124	129	211	93	88
	Central North	348	96	91	208	89	62
	Central South	359	109	100	194	82	66
	Pacific	395	87	79	215	83	57
2,500-10,000	East North	360	89	86	237	87	75
	East South	381	129	139	209	98	86
	Central North	342	105	84	207	92	62
	Central South	352	113	113	186	88	77
	Pacific	402	103	93	223	90	69
Rural	East North	326	90	78	244	91	72
	East South	243	101	104	170	89	82
	Central North	223	76	61	158	75	53
	Central South	197	73	74	133	70	57
	Pacific	312	74	58	203	76	51

Death rate per 100,000 (0, 200, 400, 600)

Legend: ■ Diseases of the Heart (all forms) ▨ Intracranial Lesions of Vascular Origin ▦ Nephritis (all forms)

Figure 3. Regional comparison of mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted mortality, specific for sex, population-size, and geographic section, 1940.

several geographic sections (as can be done from the rates given in fig. 3), both the North-South and East-Central relationships observed for recorded heart disease mortality still persist; namely, somewhat higher rates in North than South and in East than Central sections.

With this general presentation of heart disease mortality in mind, the question next arises whether rates for cities of the same size may

vary not only with respect to section of the country, but also according to other obviously related characteristics such as industrialization or income.

Some measure of industrialization in cities can be obtained from tabulations made by the Bureau of the Census of the number of persons employed in specific industries. The percentage of males 14 years and over employed in mining and manufacturing can be used as a rough index of industrialization and is shown in the following table for cities of three population-size groups, in five geographic sections:

Geographic section	Cities of 2,500–10,000 population	Cities of 10,000–100,000 population	Cities of 100,000 and over population
	Percent	Percent	Percent
East North	24. 3	29. 7	23. 9
East South	20. 8	19. 9	18. 3
Central North	11. 6	14. 7	17. 4
Central South	13. 3	13. 3	14. 6
Pacific	15. 7	16. 9	14. 2

From Census of Population, 1940.

According to this rather crude index the extent of industrialization is greatest in the East North region; in both Eastern and Central sections it is usually slightly higher in the North; in both North and South it is markedly higher in the East. The index for the Pacific tends to fall between that for the East and Central sections. It appears, therefore, that the degree of industrialization among cities of the same size varies with section of the country and that the broad regional distribution of industrialization is in general similar to that of mortality from heart disease. It may be true, therefore, that industrialization, as measured by the percentage employed in manufacture and obviously related variables such as income and medical and hospital facilities, is correlated with heart disease mortality when population-size is held constant. This association because of an interrelationship with latitude may account for the slight observed association of mortality from all forms of heart disease with latitude as shown in variation with geographic section.

Heart disease is the only one of the three old-age causes of death dealt with here that shows the same broad regional distribution observed for industrialization.

Population-size

Recorded mortality from diseases of the heart decreases in general with a descending order of population-size (fig. 4); the difference between cities and rural areas is clearly marked, but among cities of varying size the differences are of a slight amount only and are not entirely consistent throughout.

In the Eastern section of the country rural mortality is lower than an average of urban, the percentage difference of urban minus rural mortality being greater in the South. The question arises as to how

PRINCIPAL CARDIOVASCULAR-RENAL DISEASES

MALE / FEMALE

Geographic Section	Size of City	Male Heart disease	Male Intra-cranial lesions	Male Neph-Oritis	Female Heart disease	Female Intra-cranial lesions	Female Neph-Oritis
East North	100,000 and over	435	75	72	311	77	67
East North	10,000-100,000	378	90	82	255	89	69
East North	2,500-10,000	360	89	86	237	87	75
East North	Rural	326	90	78	244	91	72
East South	100,000 and over	402	95	110	238	80	82
East South	10,000-100,000	394	124	129	211	93	88
East South	2,500-10,000	381	129	139	209	98	86
East South	Rural	243	101	104	170	89	82
Central North	100,000 and over	350	81	73	217	76	60
Central North	10,000-100,000	348	96	91	208	89	62
Central North	2,500-10,000	342	105	84	207	92	62
Central North	Rural	223	76	61	158	75	53
Central South	100,000 and over	428	105	98	237	80	70
Central South	10,000-100,000	359	109	100	194	82	66
Central South	2,500-10,000	352	113	113	186	88	77
Central South	Rural	197	73	74	133	70	57
Pacific	100,000 and over	394	77	69	221	72	54
Pacific	10,000-100,000	395	87	79	215	83	57
Pacific	2,500-10,000	402	103	93	223	90	69
Pacific	Rural	312	74	58	203	76	51

Death rate per 100,000 — 200, 400, 600

Diseases of the Heart (all forms) ■   Intracranial Lesions of Vascular Origin ▨   Nephritis (all forms) ▦
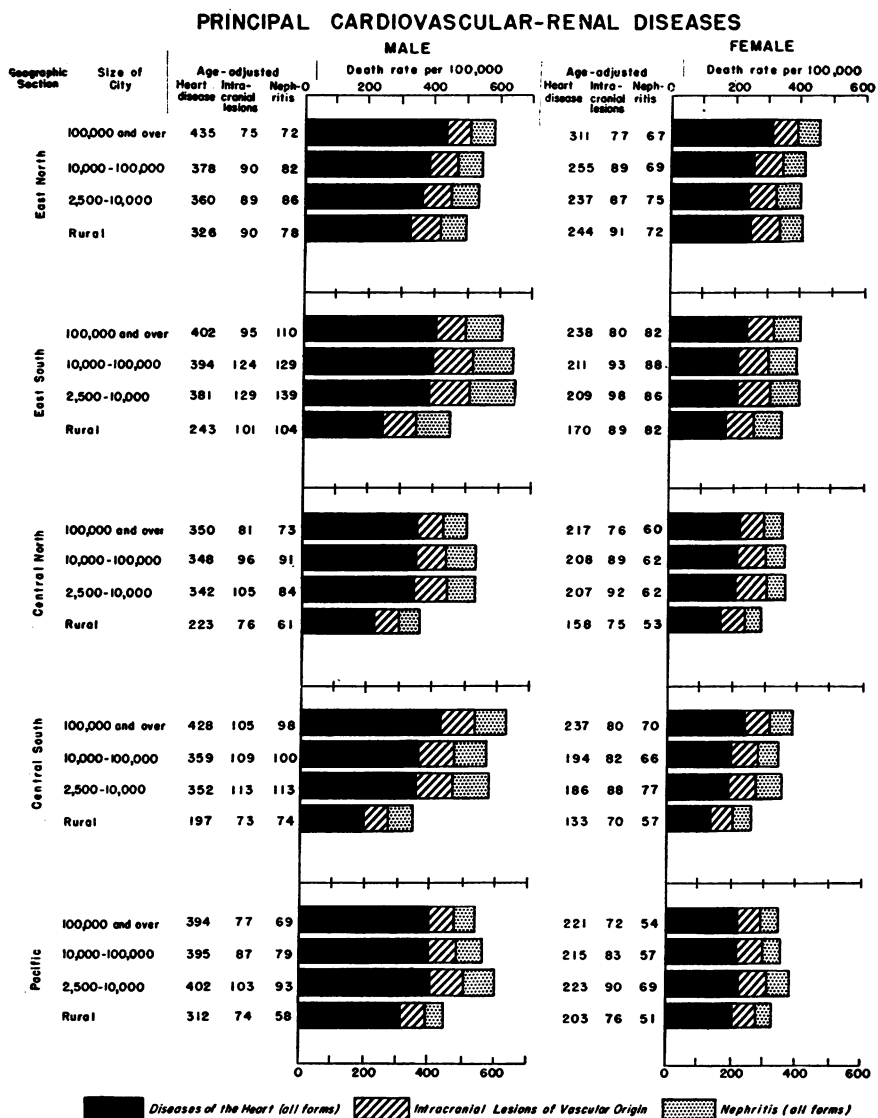
Figure 4. Urban-rural comparison of mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted mortality, specific for sex, population-size, and geographic section, 1940.

much of this difference occasioned by low rural mortality can be caused by inaccuracy of reporting cause of death in rural areas. As a first approximation to an answer we have added to age-adjusted heart disease mortality the combined rate assigned to old-age and ill-defined and unknown causes (age-adjusted) specific for geographic section and size of city, and find that these ill-defined rates are small compared with mortality from heart disease and that therefore their

inclusion with heart disease does not alter any general conclusions.

Approximately half of the total deaths tabulated as ill-defined causes cannot be due to heart disease or an associated old-age cause of death since about that proportion of deaths allocated to ill-defined causes occurs at ages under 45 years. White mortality from ill-defined causes and from senility in the East North section is negligible in both cities and rural areas; in the East South section half the ill-defined rate is approximately 8 per 100,000 in cities and 15 per 100,000 in rural areas, and the senility rate is approximately 9 and 14 per 100,000 in cities and rural areas, respectively. If these old-age rates are added to heart disease mortality for both sexes, the percentage difference between urban and rural rates in North and South (East) is approximately 15 and 35 percent, respectively.

Mortality from both intracranial lesions of vascular origin and nephritis increases, insofar as city rates are concerned, as size of city decreases; the rates in rural areas, however, are the same as in small
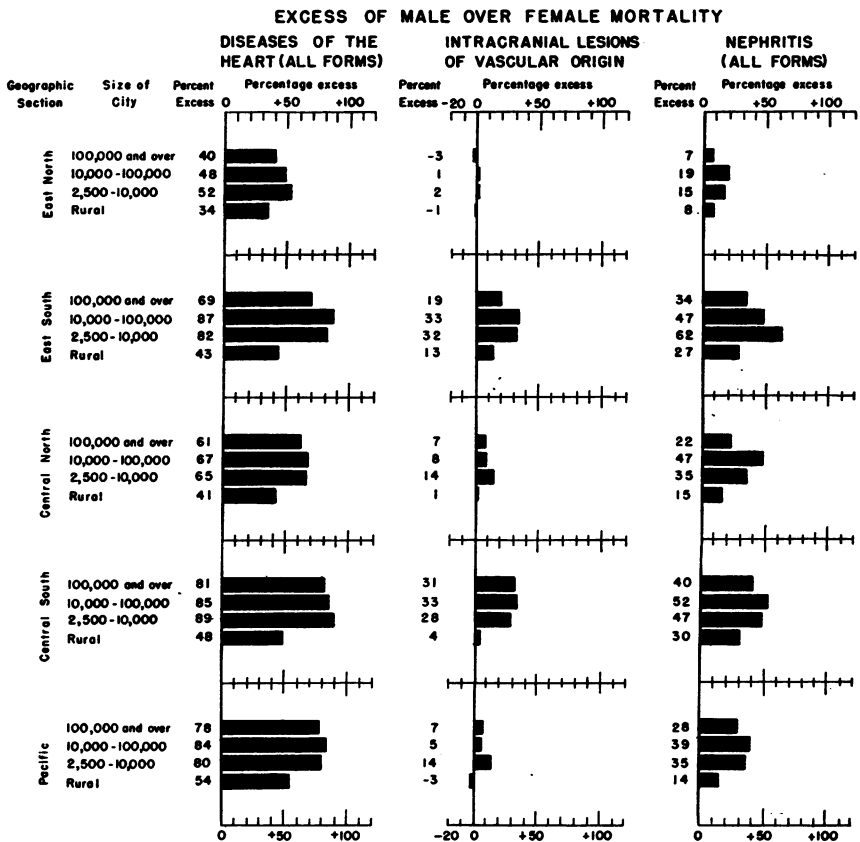

Figure 5. Excess of male over female mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted rates, specific for sex, population-size, and geographic section, 1940.

cities or show a decrease, and in some cases are lower even than in cities of 100,000 population and over (fig. 4).

Male-Female Comparison

The percentage excess of male heart disease mortality over female (fig. 5) is higher in cities than in rural areas; and is also higher in the South than the North for all sizes of city and rural areas. Sex ratios of mortality from intracranial lesions of vascular origin and from nephritis show the same relationships with size of city and geographic section as heart disease, but with a considerably smaller male percentage excess.

Summary

Resident age-adjusted mortality from all forms of heart disease specific for sex, race, geographic section and population-size is considered in this study. Numbers of deaths are from available tabulations of the National Office of Vital Statistics, supplemented by a special tabulation. A later study will present the tabulated subdivisions of heart disease specific for the same variables. In this greater detail of diagnosis the rates permit further analysis. The broader aspects of mortality from all forms of heart disease, however, are dealt with here and are as follows:

Age-adjusted resident mortality from diseases of the heart (all forms) specific for geographic section and population-size is (1) markedly higher for men than women, (2) slightly higher in North than South and in East than Central sections, and (3) higher in cities than in rural areas. The observed association of heart disease mortality and geographic section may conceivably be due to a secondary association with industrialization including such associated variables as income, and medical and hospital facilities.

Age-adjusted rates for heart disease and other cardiovascular-renal diseases in separate States are included in the appendix table.

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Appendix

White resident mortality from the principal cardiovascular. renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [2]			Nephritis [2]			Cardiovascular-renal diseases [2]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Alabama:												
100,000 and over	277.8	386.1	187.5	87.8	99.5	78.0	91.2	122.3	64.9	458.8	613.2	330.3
10,000–100,000	333.0	449.2	241.4	120.1	164.2	86.1	113.9	130.2	100.9	564.3	739.1	426.4
2,500–10,000	242.7	325.5	172.6	96.4	90.9	100.9	116.1	153.4	84.8	455.2	570.1	358.2
Rural	190.7	224.8	154.5	91.0	95.1	86.5	102.8	117.7	87.0	383.8	437.1	327.3
Arizona:												
100,000 and over												
10,000–100,000	406.8	566.1	253.7	135.2	159.1	113.7	101.9	130.9	74.5	634.3	835.6	439.9
2,500–10,000	425.2	552.2	289.0	99.5	111.2	87.5	109.8	116.0	102.8	634.7	779.4	479.1
Rural	135.6	168.0	90.5	37.9	38.8	36.7	39.9	41.7	37.4	212.5	248.1	162.9
Arkansas:												
100,000 and over												
10,000–100,000	304.7	412.5	208.5	97.3	112.8	83.2	110.5	143.6	80.4	511.1	670.6	369.2
2,500–10,000	239.7	317.3	169.9	110.2	123.3	98.1	99.0	120.0	80.1	447.5	558.9	346.7
Rural	139.2	162.9	111.0	71.0	73.5	68.0	67.9	80.7	52.7	277.8	316.8	231.4
California:												
100,000 and over	306.5	408.1	223.1	70.1	73.3	67.5	56.0	65.1	48.5	432.1	546.1	338.9
10,000–100,000	299.5	398.3	220.4	79.0	82.1	76.5	58.1	68.4	49.9	436.2	548.2	346.7
2,500–10,000	307.8	395.6	227.3	90.3	95.4	85.7	69.6	81.5	58.8	467.8	572.6	372.0
Rural	298.5	353.4	228.7	73.1	72.1	74.4	52.1	55.2	48.2	423.4	480.6	350.9
Colorado:												
100,000 and over	266.2	325.0	214.2	75.5	74.5	76.4	77.9	79.3	76.7	418.9	477.6	367.0
10,000–100,000	233.1	303.0	170.3	79.2	88.9	70.5	76.1	92.9	60.9	388.2	483.7	301.9
2,500–10,000	286.2	359.4	211.5	92.5	97.1	87.8	76.8	89.4	64.3	453.3	544.1	361.0
Rural	203.8	231.9	166.9	71.6	66.4	78.6	66.7	69.3	63.3	341.5	367.3	307.8
Connecticut:												
100,000 and over	357.9	428.0	297.7	85.4	86.8	84.3	63.0	73.2	54.2	505.4	587.5	435.0
10,000–100,000	342.9	402.9	290.5	94.6	91.6	97.2	74.2	74.9	73.5	510.9	569.1	460.5
2,500–10,000	420.3	482.1	369.9	140.2	128.2	150.4	81.5	104.2	64.5	638.0	710.0	579.6
Rural	273.7	319.6	230.3	68.6	69.9	67.3	51.3	59.7	43.4	393.2	449.0	340.7
Delaware:												
100,000 and over	291.6	350.2	243.2	97.7	110.0	87.4	115.1	115.9	114.5	502.5	573.3	444.0
10,000–100,000												
2,500–10,000	251.7	300.0	211.6	80.0	83.4	77.0	120.7	155.7	93.2	465.0	558.0	388.6
Rural	294.1	330.2	256.6	88.6	89.4	87.8	96.9	102.7	90.9	475.7	519.0	430.9
District of Columbia:												
100,000 and over	293.3	406.7	210.5	79.5	89.5	72.2	99.2	115.7	87.1	472.1	612.9	369.5
Florida:												
100,000 and over	262.7	348.7	180.9	82.3	94.0	71.3	80.3	97.6	64.2	425.1	538.9	316.8
10,000–100,000	246.9	330.6	173.4	86.2	105.6	69.4	75.7	92.3	60.9	408.1	527.9	303.2
2,500–10,000	274.5	372.5	182.3	106.2	118.0	95.0	92.1	119.1	66.0	471.9	607.0	343.6
Rural	194.8	232.1	150.3	86.4	92.5	79.1	74.6	80.9	67.0	355.6	405.1	296.4
Georgia:												
100,000 and over	291.9	440.9	183.4	97.0	119.8	80.6	124.1	160.2	97.8	511.3	715.1	362.1
10,000–100,000	339.9	488.8	226.0	110.5	144.0	85.2	136.0	177.9	103.7	587.7	811.2	416.2
2,500–10,000	299.1	446.3	183.8	125.0	161.7	96.2	145.0	182.6	115.2	570.9	791.0	397.1
Rural	177.0	219.9	133.7	103.3	120.0	86.4	114.3	132.2	96.3	394.3	471.2	316.5
Idaho:												
100,000 and over												
10,000–100,000	281.9	320.7	240.8	114.4	104.2	125.3	100.0	121.3	77.5	492.9	541.6	441.2
2,500–10,000	339.4	434.7	236.4	122.2	151.6	90.9	90.1	95.6	84.4	553.5	690.6	409.5
Rural	219.9	247.7	178.7	62.7	54.6	74.8	53.6	53.8	53.3	337.4	356.9	308.3
Illinois:												
100,000 and over	392.6	481.8	309.9	70.3	71.0	69.7	93.5	93.0	94.0	556.3	646.1	473.3
10,000–100,000	313.3	375.8	259.5	84.0	88.1	80.4	81.9	93.9	71.7	478.7	557.5	411.2
2,500–10,000	263.9	322.1	213.3	80.3	84.7	76.4	79.0	88.2	71.0	423.0	495.3	360.4
Rural	268.0	299.0	233.5	86.5	82.7	90.7	84.1	87.9	79.9	438.4	469.3	404.1
Indiana:												
100,000 and over	313.7	390.8	246.5	88.3	92.3	84.9	101.5	104.0	99.3	503.1	587.3	430.1
10,000–100,000	298.8	362.6	241.1	109.6	114.0	105.7	95.5	102.4	89.3	503.7	578.7	436.1
2,500–10,000	277.6	330.4	231.8	106.9	111.7	102.8	105.8	126.1	88.2	489.6	567.5	422.2
Rural	239.0	271.5	203.4	95.4	95.7	95.1	88.7	95.4	81.4	423.1	462.6	379.7
Iowa:												
100,000 and over	262.2	323.9	210.7	96.2	99.9	93.1	53.0	71.2	38.1	411.8	493.5	343.1
10,000–100,000	274.5	340.0	217.9	100.7	93.6	106.9	70.6	80.3	62.0	445.8	514.1	386.9
2,500–10,000	268.4	332.4	212.3	101.4	108.1	95.7	61.8	61.8	50.8	426.2	503.0	359.2
Rural	190.8	218.5	160.3	79.3	81.1	77.3	46.9	49.1	44.6	316.9	348.6	282.0
Kansas:												
100,000 and over	241.9	322.3	168.9	97.4	104.5	90.9	74.2	80.6	68.7	412.9	507.4	327.7
10,000–100,000	264.0	349.5	193.1	87.5	94.4	81.7	85.8	105.8	69.3	437.1	550.2	343.5
2,500–10,000	277.6	344.3	219.8	100.7	104.3	97.5	86.6	99.0	75.7	464.6	548.6	391.9
Rural	196.0	229.5	158.0	78.9	78.4	79.6	66.2	73.5	57.8	341.1	381.1	295.6

See footnotes at end of table.

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]—Continued

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [2]			Nephritis [2]			Cardiovascular-renal diseases [2]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Kentucky:												
100,000 and over	348.3	450.3	270.0	84.1	87.8	81.3	85.7	98.9	75.4	515.7	633.7	425.0
10,000–100,000	302.7	365.3	253.0	114.5	122.6	108.0	80.8	92.5	71.4	496.4	578.3	431.1
2,500–10,000	297.0	377.2	230.9	120.9	143.5	102.5	85.0	113.1	61.8	502.6	633.9	394.9
Rural	195.1	216.8	170.7	90.6	92.4	88.6	68.2	76.4	59.1	353.5	385.1	318.1
Louisiana:												
100,000 and over	429.4	566.4	331.9	82.9	113.1	61.5	117.8	131.8	108.0	629.9	813.8	500.2
10,000–100,000	317.0	476.7	181.9	80.4	98.0	65.2	97.8	131.4	68.4	493.3	704.4	313.4
2,500–10,000	370.0	507.7	252.1	86.5	94.8	79.5	116.5	126.8	107.7	574.1	727.5	442.5
Rural	233.5	275.8	186.2	67.8	66.1	69.8	73.3	77.4	68.8	374.1	419.0	324.0
Maine:												
100,000 and over												
10,000–100,000	314.7	401.9	245.0	100.7	113.2	90.9	86.1	89.5	83.3	500.6	603.7	418.4
2,500–10,000	314.7	404.2	238.3	88.3	108.4	71.5	84.2	85.4	83.2	486.3	598.2	391.3
Rural	262.5	293.7	229.4	100.4	102.5	98.3	62.0	63.5	60.4	425.2	460.0	388.2
Maryland:												
100,000 and over	377.3	460.5	311.4	79.2	82.0	77.1	110.2	123.5	99.7	565.7	665.8	486.8
10,000–100,000	329.3	398.8	270.3	99.3	112.5	88.1	115.5	137.0	97.0	539.7	646.1	449.9
2,500–10,000	294.0	393.4	217.5	82.1	84.2	80.6	137.9	173.2	110.5	520.0	659.9	412.5
Rural	301.7	351.5	252.5	98.1	101.4	94.9	104.4	113.8	95.1	503.9	565.2	443.1
Massachusetts:												
100,000 and over	385.0	460.5	325.3	96.1	89.8	100.9	64.1	67.5	61.4	544.8	617.4	487.6
10,000–100,000	319.8	383.0	269.9	84.8	83.1	86.1	57.8	62.6	54.1	462.1	528.7	409.8
2,500–10,000	301.6	361.9	249.1	78.0	72.3	82.9	67.1	72.8	62.2	446.8	507.9	393.8
Rural	339.2	403.5	279.5	91.4	86.5	96.0	61.9	63.9	60.1	492.7	553.2	436.4
Michigan:												
100,000 and over	322.9	387.8	261.3	81.4	76.6	85.9	57.0	59.7	54.5	461.1	524.7	400.9
10,000–100,000	296.7	358.1	241.7	98.0	94.9	100.7	61.7	68.8	55.3	456.0	521.8	397.2
2,500–10,000	297.6	357.1	244.0	100.3	102.4	98.4	51.8	60.8	43.7	449.5	519.6	386.2
Rural	297.9	327.7	261.8	95.9	96.1	95.7	55.9	58.0	53.3	449.3	481.3	410.6
Minnesota:												
100,000 and over	275.7	336.5	220.8	80.3	79.5	81.1	28.4	31.9	25.2	384.0	448.0	326.4
10,000–100,000	257.8	323.9	196.0	116.5	120.3	113.0	51.3	60.1	43.1	422.7	499.1	350.7
2,500–10,000	253.8	287.7	198.4	92.9	97.4	88.2	48.8	60.3	36.8	385.0	444.5	323.3
Rural	207.4	229.8	178.5	78.9	79.3	78.5	38.1	39.5	36.3	324.1	348.3	293.7
Mississippi:												
100,000 and over												
10,000–100,000	281.1	402.0	184.0	110.2	113.7	107.5	120.8	156.4	92.2	512.9	673.6	384.3
2,500–10,000	290.2	363.1	232.4	67.0	85.4	52.9	136.7	163.1	116.2	492.8	606.1	402.7
Rural	196.5	234.8	155.2	88.0	97.3	78.0	95.9	105.1	86.1	380.1	437.0	318.8
Missouri:												
100,000 and over	297.0	378.6	229.2	72.4	77.3	68.3	98.1	112.6	86.1	467.0	568.3	383.2
10,000–100,000	279.4	359.7	213.6	84.2	89.7	79.7	90.4	116.2	69.4	453.9	564.6	363.1
2,500–10,000	262.7	343.3	193.3	91.5	95.8	87.8	102.3	123.8	83.7	456.5	562.1	365.1
Rural	193.9	226.5	157.2	79.9	82.0	77.6	79.6	88.0	70.2	353.3	396.3	305.0
Montana:												
100,000 and over												
10,000–100,000	327.1	379.5	269.9	86.6	77.2	97.0	61.1	60.4	61.9	475.9	519.2	428.8
2,500–10,000	285.1	360.4	199.5	97.3	102.9	90.9	66.5	74.3	57.9	445.1	532.8	345.5
Rural	227.6	262.8	172.5	77.2	76.2	78.8	46.8	47.8	45.2	350.8	386.1	295.3
Nebraska:												
100,000 and over	285.5	359.6	218.3	90.5	90.0	90.9	51.0	51.9	50.1	424.0	497.4	358.0
10,000–100,000	237.4	298.6	183.4	87.2	99.0	77.0	70.8	95.5	49.1	396.0	495.5	309.1
2,500–10,000	254.7	299.3	212.7	107.0	128.4	87.3	54.8	57.5	52.2	418.1	483.8	355.7
Rural	182.8	211.5	149.0	85.2	90.1	79.3	57.6	63.9	50.1	325.4	365.4	278.3
Nevada:												
100,000 and over												
10,000–100,000	375.5	482.3	243.8	72.8	99.2	40.4	76.7	65.2	93.2	527.6	649.4	374.0
2,500–10,000	441.6	603.4	195.0	133.4	151.6	106.1	110.7	122.3	95.1	662.0	848.0	383.0
Rural	273.1	319.6	186.6	61.2	62.5	58.9	51.4	51.6	51.0	386.6	437.5	293.2
New Hampshire:												
100,000 and over												
10,000–100,000	330.5	425.4	255.0	89.6	87.8	91.0	74.2	84.7	65.7	493.2	559.0	409.7
2,500–10,000	273.9	340.1	217.0	57.9	72.8	45.5	31.2	33.4	29.3	358.3	443.2	286.4
Rural	285.5	332.2	237.2	78.1	81.7	74.4	71.3	77.1	65.4	434.5	490.1	376.9
New Jersey:												
100,000 and over	388.7	456.3	327.4	95.0	91.7	97.9	70.1	74.8	65.9	553.2	622.4	490.7
10,000–100,000	321.8	394.4	261.0	81.6	77.2	85.2	70.1	76.1	65.2	473.1	547.8	410.9
2,500–10,000	326.9	401.6	263.3	77.6	68.4	85.5	78.9	80.8	77.0	483.1	550.6	425.7
Rural	359.7	399.1	320.0	94.2	93.3	95.1	87.3	89.0	85.7	540.4	580.1	500.6
New Mexico:												
100,000 and over												
10,000–100,000	248.8	330.4	170.9	87.3	105.5	69.1	122.3	145.3	99.2	449.7	571.8	331.2
2,500–10,000	238.2	261.4	213.7	109.5	103.9	115.4	106.0	116.0	95.1	444.3	474.3	412.6
Rural	139.1	138.1	140.3	42.7	41.0	44.9	48.0	43.5	54.0	229.7	222.4	239.6

See footnotes at end of table.

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]—Continued

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [2]			Nephritis [2]			Cardiovascular-renal diseases [2]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
New York:												
100,000 and over	393.3	464.0	330.5	60.4	58.5	62.1	55.6	58.6	52.9	509.2	581.5	445.3
10,000–100,000	327.0	397.7	269.7	86.0	84.0	87.5	73.7	79.0	69.4	486.0	560.0	426.2
2,500–10,000	325.9	388.9	274.4	89.4	83.2	94.4	77.1	76.3	77.8	492.1	548.3	446.2
Rural	353.6	403.2	302.3	86.6	80.9	92.4	73.6	74.7	72.4	513.3	558.3	466.8
North Carolina:												
100,000 and over	334.0	477.3	217.3	115.5	125.1	108.3	74.7	91.7	61.1	523.2	702.8	382.0
100,000–100,000	292.9	413.7	198.2	119.2	141.1	102.4	124.9	144.2	109.9	537.1	697.9	411.2
2,500–10,000	264.6	335.1	207.1	123.7	141.1	110.0	128.7	175.5	90.3	517.2	651.0	408.2
Rural	219.3	258.3	179.6	113.2	123.4	102.9	117.3	128.3	106.3	449.2	509.3	387.9
North Dakota:												
100,000 and over												
10,000–100,000	302.0	338.6	265.4	77.0	93.7	59.7	52.1	48.9	55.2	429.8	481.3	378.5
2,500–10,000	356.0	461.0	246.1	139.9	138.6	141.5	55.2	63.4	45.9	544.4	664.3	418.5
Rural	206.1	226.1	179.0	76.2	80.8	69.9	53.6	56.4	49.9	335.3	363.0	297.8
Ohio:												
100,000 and over	311.5	370.1	259.9	90.4	90.8	90.1	63.4	69.8	57.8	464.9	530.4	407.4
10,000–100,000	273.6	327.1	228.8	100.7	102.6	99.0	65.9	72.3	60.6	439.9	501.3	388.5
2,500–10,000	260.9	318.7	212.3	102.4	105.2	100.0	74.6	80.2	69.9	437.5	503.9	381.8
Rural	258.1	296.6	215.4	99.9	103.0	96.4	71.9	76.6	66.7	429.9	476.2	378.5
Oklahoma:												
100,000 and over	281.8	386.3	184.1	96.4	121.8	73.0	67.7	81.5	54.8	446.1	590.7	312.0
10,000–100,000	249.5	333.9	170.5	115.2	136.4	90.9	86.4	88.6	72.5	442.0	556.9	333.7
2,500–10,000	240.8	300.4	181.8	120.5	132.5	108.4	86.7	99.1	74.7	448.1	534.2	363.2
Rural	147.0	172.1	115.4	73.6	77.2	69.0	62.3	66.7	56.8	282.5	315.6	241.1
Oregon:												
100,000 and over	282.8	372.0	202.5	81.7	81.1	82.2	97.0	98.7	95.5	461.1	551.8	379.7
10,000–100,000	304.2	404.5	204.4	128.8	124.6	133.1	167.3	202.1	133.1	599.7	730.3	470.0
2,500–10,000	323.7	426.5	220.6	109.5	119.7	99.1	124.9	144.2	106.0	560.4	691.7	428.4
Rural	194.3	225.5	151.9	70.1	66.9	74.3	69.7	72.9	65.3	333.6	364.6	291.5
Pennsylvania:												
100,000 and over	381.3	454.3	319.7	79.8	82.6	77.4	93.5	91.9	94.9	554.1	628.5	491.4
10,000–100,000	330.1	410.1	261.1	87.8	85.8	89.5	95.9	104.7	88.4	513.2	601.1	438.5
2,500–10,000	317.8	386.7	258.2	80.7	79.4	81.8	100.2	103.1	97.7	498.2	568.8	437.3
Rural	324.6	362.9	283.1	94.3	95.8	92.7	94.7	96.0	93.3	513.0	553.8	468.7
Rhode Island:												
100,000 and over	357.1	427.0	301.0	93.1	95.0	91.6	92.9	103.2	84.8	543.1	625.5	477.4
10,000–100,000	346.5	396.5	304.9	92.0	101.8	83.9	89.9	100.0	81.5	527.8	596.3	470.7
2,500–10,000	232.7	306.8	168.1	94.4	115.8	78.8	81.5	88.9	75.3	404.8	501.3	322.4
Rural	320.9	371.1	271.1	97.6	93.7	101.3	80.2	70.3	89.4	501.6	536.1	467.7
South Carolina:												
100,000 and over												
10,000–100,000	334.6	506.3	206.0	131.0	148.0	118.1	155.6	206.4	117.8	621.5	864.9	440.1
2,500–10,000	341.5	482.9	233.6	145.5	179.1	120.6	147.2	195.7	108.0	631.6	858.1	458.7
Rural	236.0	297.5	174.1	119.0	135.4	102.7	118.3	135.0	101.6	472.5	566.7	377.9
South Dakota:												
100,000 and over												
10,000–100,000	270.6	344.5	198.2	101.4	120.0	83.5	40.8	52.4	29.7	412.7	512.9	313.8
2,500–10,000	260.2	292.5	229.6	121.3	107.2	134.9	75.0	105.3	47.0	455.4	504.9	408.8
Rural	188.2	219.3	149.1	73.6	75.8	71.0	45.9	50.3	40.3	307.5	345.2	260.2
Tennessee:												
100,000 and over	279.8	377.2	202.1	103.1	112.4	95.7	61.9	78.3	49.1	443.4	565.3	346.3
10,000–100,000	247.2	333.6	169.6	113.7	130.8	98.5	100.9	104.0	98.3	459.8	560.8	368.5
2,500–10,000	262.4	361.2	182.1	110.6	135.6	90.9	73.0	87.4	61.1	445.0	581.3	334.2
Rural	172.8	204.3	139.0	85.3	91.8	78.3	73.8	84.6	62.3	331.7	380.5	279.4
Texas:												
100,000 and over	298.7	405.6	207.5	92.8	95.5	90.5	73.0	91.0	57.7	463.6	590.7	355.1
10,000–100,000	269.0	348.9	198.1	90.4	99.7	82.2	73.8	89.2	60.0	432.9	538.2	339.7
2,500–10,000	262.2	351.3	179.4	93.7	107.3	81.1	90.7	113.5	69.4	446.4	572.2	329.5
Rural	172.4	205.4	134.2	71.9	72.8	70.9	65.0	73.5	55.2	309.1	351.4	260.0
Utah:												
100,000 and over	313.3	377.6	257.6	68.6	63.7	72.8	48.6	45.9	51.0	429.1	485.9	380.0
10,000–100,000	310.5	358.6	267.0	60.6	45.5	73.9	68.2	87.8	50.6	438.2	496.9	386.6
2,500–10,000	302.1	359.3	244.8	86.0	87.7	84.2	65.5	75.2	55.4	447.6	511.8	381.6
Rural	276.5	303.5	246.6	74.2	67.7	81.3	60.7	62.6	58.8	409.9	433.1	384.5
Vermont:												
100,000 and over												
10,000–100,000	315.9	427.6	236.7	77.1	98.5	62.4	75.3	85.2	67.9	463.5	601.6	364.6
2,500–10,000	393.9	484.9	321.8	126.9	148.8	110.0	85.2	126.5	53.6	596.1	747.7	477.4
Rural	275.7	318.2	231.6	93.1	87.3	99.2	60.4	58.1	62.8	428.9	463.8	392.9
Virginia:												
100,000 and over	307.8	390.1	245.4	99.9	117.6	86.8	102.6	109.0	97.7	509.4	613.9	430.1
10,000–100,000	309.3	440.4	207.5	104.6	124.0	89.7	103.4	135.6	78.4	518.6	702.9	376.3
2,500–10,000	327.7	428.8	237.9	123.1	137.2	110.3	112.5	118.3	107.3	567.6	691.7	457.6
Rural	246.7	287.0	204.4	99.9	102.6	97.1	100.4	113.4	86.8	446.8	503.0	387.8

See footnotes at end of table

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]—Continued

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [2]			Nephritis [2]			Cardiovascular-renal diseases [2]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Washington:												
100,000 and over	309.4	375.7	242.7	89.9	89.1	90.7	63.9	70.6	57.1	463.3	535.8	390.6
10,000–100,000	309.0	374.9	239.7	111.8	101.0	123.0	77.7	82.3	72.9	497.1	556.4	434.8
2,500–10,000	319.9	401.5	232.8	110.4	114.4	106.1	77.0	80.1	73.8	504.6	590.8	411.7
Rural	244.7	291.0	181.7	82.0	83.6	79.9	52.8	55.6	49.0	379.8	430.2	311.0
West Virginia:												
100,000 and over												
10,000–100,000	279.4	371.9	199.3	101.0	107.2	95.6	96.2	113.6	80.9	476.6	592.0	376.4
2,500–10,000	318.8	390.1	252.7	133.6	151.6	117.2	104.0	132.1	78.6	553.5	668.8	446.8
Rural	199.4	220.7	174.5	86.2	85.2	87.4	77.7	85.5	68.5	362.8	390.8	329.9
Wisconsin:												
100,000 and over	309.5	365.6	260.3	84.5	87.2	82.1	50.0	57.4	43.4	443.7	509.9	385.6
10,000–100,000	280.0	332.6	233.0	84.0	81.5	86.2	56.3	62.4	50.7	420.1	476.4	369.8
2,500–10,000	254.2	303.5	209.1	86.9	92.7	81.6	55.1	64.8	46.3	395.1	459.3	336.6
Rural	244.1	267.2	215.9	87.6	88.7	86 2	51.2	53.7	48.2	382.6	409.4	350.1
Wyoming:												
100,000 and over												
10,000–100,000	301.9	356.8	241.1	85.0	102.3	66.1	66.4	77.8	54.3	448.1	537.7	352.6
2,500–10,000	346.1	409.6	264.2	144.7	167.9	111.2	107.3	126.0	81.5	577.3	693.9	428.5
Rural	216.3	247.6	168.9	66.7	77.0	51.7	57.1	59.8	53.0	339.5	382.1	274.9

[1] Adjusted for age by the indirect method (see Pearl, Raymond, Medical Biometry and Statistics, ed. 3, pp. 270–274) to the total population of the United States, enumerated 1940. All crude and age-specific rates are based on the enumerated population, 1940. The rates for a total of the principal cardiovascular-renal diseases were adjusted separately; they are not the sums of the adjusted rates for the three specified causes of death.

[2] Principal cardiovascular-renal diseases:

	International List Code Numbers			
	1920	1921	1930	1939
Diseases of the heart (all forms)	77–80	87–90	90–95	90–95
Intracranial lesions of vascular origin	64–66, 82	74, 75, 83	82	83
Nephritis (all forms)	119, 120	128, 129	130–132	130–132

Raffinose Serum Tellurite Agar Slants as a Replacement for Loeffler's Medium in Diphtheria Diagnosis

By Ona R. Whitley, M. S., and Samuel R. Damon, Ph. D.*

Routine diagnosis of diphtheria is probably based on microscopic examination of stained smears made from nose and throat cultures grown on Loeffler's coagulated blood serum slants in the great majority of laboratories. The general use of this medium stems from its introduction by Loeffler (1) as a satisfactory base upon which to grow *Corynebacterium diphtheriae*, the belief that it possesses certain peculiar growth-promoting properties for the organism, that it is to some degree, at least, selective in its action, and that on it the organism exhibits characteristic cellular morphology and arrangement.

Over the years, the ideas expressed above have been widely disseminated and very generally accepted. The utility of the medium for diagnostic purposes would, therefore, appear to be above question. Certain disadvantages of Loeffler's medium have been recognized, however, and may be catalogued as follows:

1. It is sometimes rendered useless due to liquefaction by proteolytic organisms, therefore necessitating an "unsatisfactory" report.

2. It varies greatly from lot to lot, depending on the animal source of the serum used in its preparation, and on other factors which affect its composition.

3. Variation in composition materially affects its productivity as well as the cellular morphology of organisms.

4. It does not produce such definitive cellular morphology in *C. diphtheriae* as to make the organism positively identifiable when there are numerous diphtheroids in the culture.

5. *C. diphtheriae* is often overgrown or completely inhibited by commensal organisms.

6. Certain types of *C. diphtheriae* are either completely inhibited or, if they do grow, present such bizarre cellular morphology as to be unrecognizable.

7. Growth of certain other organisms, such as bacillary streptococci, often makes recognition of *C. diphtheriae* very difficult.

Further light has been thrown on the nutritive requirements of *C. diphtheriae* by the more recent studies of Mueller (2). From this work it appears that Loeffler's medium is a relatively poor base on which to grow the organism and that quite different results may be anticipated as to luxuriance of growth and morphology of *C.*

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diphtheriae depending on how the medium is prepared. In particular, there can be no uniformity in its preparation as different formulae call for beef, sheep or pig serum.

Experimental

Because of the objections to Loeffler's medium cited above, extended efforts have been made by the authors to develop a satisfactory substitute. Many substrates, of varying composition, have been tried during the past several years and, for one reason or another, abandoned. These have contained peptones, infusions, carbohydrates, blood, serum, tellurite and agar in different combinations and proportions. Some of the formulae were quickly dropped; others were more promising and merited further trial. Only two have appeared worthy of critical and extended trial in comparison with Loeffler's medium. One of these—dextrose serum tellurite agar— has been recommended as a plating medium (*3*) upon which to study colonial and cellular morphology and from which to isolate pure cultures for virulence tests.

However, in slant form on which nose and throat specimens were to be planted, as on Loeffler's medium, this did not prove to be an entirely satisfactory base. Further study resulted in the development of raffinose serum tellurite agar and its routine use for over a year has shown it to possess very definite advantages over Loeffler.

Preparation of Raffinose Serum Tellurite Agar Slants

To prepare 100 cc. of the medium
    Weigh out 4.5 grams of Difco proteose No. 3 agar.
    Dissolve the above in the Arnold sterilizer in 100 cc. buffered distilled water pH 7.1–7.2.*
    Sterilize at 15 lbs. for 15 minutes in autoclave.
    Cool to 50° C. in a water bath. This is important.
    Add 10.0 cc. of stock raffinose serum tellurite solution aseptically. Mix thoroughly.**
    Tube and slant aseptically. Make long slants if possible.
    Incubate at 37° C. to test sterility.
    Store slants in cold room; if tightly plugged they are satisfactory indefinitely.

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*Preparation of Buffered Distilled Water.
    a. M/15 anhydrous disodium phosphate (Na_2HPO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. of distilled water.
    b. M/15 anhydrous sodium acid phosphate (NaH_2PO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. distilled water.

c. To prepare 1,000 cc. buffered distilled water of pH 7.2 add 72.0 cc. of
(a) above and 28.0 cc. of (b) above to 900 cc. of distilled water.

**Preparation of Stock Raffinose Serum Tellurite Solution.

The following sterile components are combined aseptically to give the
stock solution.   Human serum is specified, as it is easily obtainable
from the serologic laboratory, but beef or other serum may be sub-
stituted although our results with these have not been as good as with
human serum.   Either crystalline potassium tellurite or the powdered
salt is satisfactory and is used in 0.5 percent concentration.

Human serum_____ 30.0 cc.
Raffinose solution (10%)_____ 24.0 cc.
Potassium tellurite solution (0.5%)_____ 6.0 cc.

Note: For preparation of above:
1. Human (Wassermann) serum is pooled and sterilized by Seitz filtration.
2. Raffinose solution (10%) is sterilized by Seitz filtration.
3. Preparation of potassium tellurite solution (0.5%) is as follows:
   Grind 0.5 gram of C. P. dry potassium tellurite very fine in a small dry mortar. Add buffered dis-
   tilled water (10.0 cc.) gradually after grinding. Stir. Allow to settle. Remove clear supernatant
   by pipette to 100 cc. graduate. Repeat this process until all the tellurite appears to be dissolved.
   Add a few drops (0.33 ml.) of 10% KOH to the mortar. Rinse sides of mortar with 10 cc. distilled
   water. Add to graduate and make up volume to 100 cc. The final pH will be about 9.6. Seitz filter.
   Caution: Keep C. P. potassium tellurite powder in a dessicator. If powdered tellurite is used add 0.33
   ml. of 10% KOH to the solution.

Use and Advantages of Raffinose Serum Tellurite Agar Slants

Nose and throat swabs from suspected cases of diphtheria were
planted, as received, on both Loeffler and raffinose serum tellurite
slants, the Loeffler slants being inoculated first. After incubation
for 18–22 hours smears were made, stained with methylene blue,
and examined under the microscope.

The results of this comparative study, in the course of which
hundreds of cultures were examined, have led to the following con-
clusions:

1. All strains and types of *C. diphtheriae* that we know of—includ-
ing the small colony variety—grow luxuriantly on the medium.

2. Individual cells of *C. diphtheriae* are longer, fatter, and more
pleomorphic when grown on raffinose serum tellurite agar than on
Loeffler's medium

3. The cellular morphology of all types of *C. diphtheriae* is distinc-
tive on this medium.   Thus typing is facilitated.

4. Many varieties of commensal organisms are either completely
inhibited or greatly restricted in their growth.

5. Certain streptococci, which are often confusing because of their
growth in bacillary form on Loeffler's medium, appear as definite cocci
or in chain formation on raffinose serum tellurite agar.

6. Rarely is there any need to plate out doubtful cultures since
typical *C. diphtheriae* is often visible in discrete colonies on the slant.

7. Because the cellular morphology of all organisms is more distinct
than on Loeffler's, those cultures diagnosed as negative are so reported

with more assurance than would otherwise be possible.   Positives are likewise more definitely positive.

8. Cultures can be examined just as early as on Loeffler's medium.

9. The medium is stable and reproducible, the ingredients are easily obtainable, and large or small quantities are prepared with equal ease.

10. A higher percentage of positives will be obtained from raffinose serum tellurite agar slants than from Loeffler's. .

Conclusions

1. The formula for a medium to replace that of Loeffler in the diagnosis of diphtheria has been presented.

2. This medium is inhibitory for some of the commensal organisms found growing with *C. diphtheriae* in the nose and throat.

3. The medium is stable and reproducible.

4. No strain of *C. diphtheriae* has yet been encountered that is inhibited on this medium.

5. More positive findings result from planting nose and throat cultures on raffinose serum tellurite agar slants than from planting the same swabs on the Loeffler medium.

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INCIDENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 19, 1949

Of the total of 28,054 cases of measles reported (last week 28,520, 5-year median 22,266), the largest numbers, aggregating 14,905 cases were reported in the Middle Atlantic (5,817), South Atlantic (4,854), and West South Central (4,234) areas. Slight increases were reported in the North Central, South Atlantic, and Mountain areas. States reporting the largest increases are Wisconsin (940 cases last week to 1,425), Georgia (407 to 773), Arkansas (541 to 832), Oklahoma (335 to 613), North Carolina (827 to 1,083), and Colorado (417 to 630). For the year to date, 217,804 cases have been reported, as compared with a 5-year median of 152,241 and a total of 153,809 for the corresponding last year.

Of 3,780 cases of influenza reported (last week 3,948, 5-year median 4,054), Texas reported 1,517 (last week 1,873), South Carolina 754 (last week 549), Virginia 288 (last week 387), and Arkansas 265 (last week 193). No other State reported more than 154 cases. The total for the year to date is 49,087 cases, less than half any corresponding figure of the past 5 years except that of 1945 (46,295).

A total of 51 cases of poliomyelitis was reported (last week 64, 5-year median 24), of which Texas reported 14 (last week 7) and California 11 (last week 13). No other State reported more than 3 cases. The total for the 52-week period since the average date of seasonal low incidence is 28,250 cases, as compared with a 5-year median of 13,803 and 25,409, in the 1946-47 period, the largest corresponding figure of the past 5 years.

Two cases of psittacosis were reported in Maryland, and 2 cases of smallpox, 1 each in Michigan and Kansas.

The cumulative figures for Rocky Mountain spotted fever (no cases reported currently) and tularemia are, respectively, 12 and 315 cases, as compared with corresponding 5-year median expectancies of 4 and 218.

Deaths registered during the week in 94 large cities in the United States totaled 9,799, as compared with 9,829 last week, 10,045 and 10,226, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946-48) median of 10,045. The total to date is 108,676, as compared with 113,408 for the corresponding period last year. Infant deaths totaled 676, last week 682, 3-year median 624. The cumulative figure is 7,401, same period last year, 7,669.

Telegraphic case reports from State health officers for week ended Mar. 19, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever d	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			514					60				23	
New Hampshire			1	110		5			6				5	
Vermont				236	1	2			7				4	
Massachusetts	11	1		1,455	1				260				60	
Rhode Island				114	1				1				7	
Connecticut	2		7	531		94			44			1	7	
MIDDLE ATLANTIC														
New York	12		b 4	2,156	3	302	1		° 333			3	116	6
New Jersey	5		3	1,244		75	2		171			1	42	6
Pennsylvania	15		(b)	2,417	7				292			5	81	2
EAST NORTH CENTRAL														
Ohio	13		1	275	4	56			443		1	2	60	15
Indiana	3		1	125		11			125			5	16	18
Illinois	5		71	79	3	159			209			2	40	
Michigan *	1			677	2	55			488	1		1	33	
Wisconsin	1	2	56	1,425	1	11			79				44	
WEST NORTH CENTRAL														
Minnesota	1			123	5	9	1		58				2	
Iowa			11	37	1	2			24			1	4	4
Missouri	4		11	564	3	32	3		60			1	5	
North Dakota			21	37					17				2	
South Dakota	1			11										
Nebraska	1		1	149	2	4			9				1	
Kansas			54	1,238	1	11			27	1			1	
SOUTH ATLANTIC														
Delaware				22					20					
Maryland *			2	1,179	1	42			° 31			3	7	
District of Columbia				105	1	19			14				6	
Virginia	2		288	1,062	3	89			22				13	
West Virginia			61	133		6			20				9	1

Area	1	2	3	4	5	6	7	8	9	10	11	12
North Carolina	8	754	1,083	3	211		22		2	2	2	14
South Carolina	1		396	1	32	1	6					15
Georgia		20	773		15	1	6				1	2
Florida	4	1	101	1			6				1	1
EAST SOUTH CENTRAL												
Kentucky	1	3	372	3	13	3	34				2	5
Tennessee	4	148	524	5	175	5	46		1		6	15
Alabama	1	130	667	1	76	1	19				1	8
Mississippi[a]	6	49	126		24		4		3		1	4
WEST SOUTH CENTRAL												
Arkansas	0	265	832	1	147	1	5			1	2	3
Louisiana	4	2	15		17		3		1	2	2	1
Oklahoma	2	48	613	2	33	2	8		1	1		2
Texas	12	1,517	2,774	6	471	6	18		2	2	2	116
MOUNTAIN												
Montana		1	62		3		11					
Idaho		3	98		12		[c]22					5
Wyoming			22		12		4					1
Colorado	1	54	630		30		14					9
New Mexico	1	2	248		27		15					
Arizona	3	154	124	3	22	3	7					1
Utah[a]	1	3	97		3		6					12
Nevada			2		3							36
PACIFIC												
Washington	2	10	335	2	8	3	53					3
Oregon		7	504	1	22	3	21				1	28
California	8	26	1,638	4	43	11	[c]102				1	33
Total	137	3,780	28,054	70	2,380	51	3,252		2	16	47	901
Median, 1944–48	262	4,054	22,266	186		24	4,024		8	12	52	2,269
Year to date 11 weeks	1,939 (27th)	49,087 (30th)	217,804 (35th)	940 (37th)	26,975	923 (11th)	31,484 (32nd)		22 (35th)	316	460 (11th)	11,341 (39th)
Median, 1944–48	3,233	113,008	152,241	2,233		397	36,525		85		485	24,659
Seasonal low week ends	July 10	July 31	Sept. 4	Sept. 18	Mar. 20	Mar. 20	Aug. 14		Sept. 4		Mar. 20	Oct. 2
Since seasonal low week	7,054	85,357	270,197	1,784	28,250		54,182		37		3,579	21,374
Median, 1943–48	10,799	156,566	178,365	3,737	13,803		75,096		161		4,726	49,039

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infection and septic sore throat.
[d] Including paratyphoid fever; currently reported separately, as follows: Connecticut, 1; Indiana, 1; South Carolina, 1; Georgia, 1; salmonella infections, not included, were reported as follows: New York, 2; Pennsylvania, 2.
  Alaska: Influenza, 13; measles, 1; pneumonia, 2; streptococcal sore throat, 1; rabies in animals, 1.
  Territory of Hawaii: Influenza, 92; diphtheria, 1; measles, 221; lobar pneumonia, 1; poliomyelitis, 3.

PLAGUE INFECTION IN TEXAS AND WASHINGTON

Under dates, respectively, of March 18 and 16, 1949, plague infection was reported proved in specimens taken in Yoakum County, Tex., and Yakima County, Wash., as follows:

TEXAS

Yoakum County.—In a pool of 441 fleas from 13 nests of pack rats, *Neotoma* sp., collected January 25 and 27.

WASHINGTON

Yakima County.—In a pool of 104 fleas from 62 short-tailed meadow mice, *Lagurus curtatus*, trapped February 25 on the United States Army firing range 10 miles northeast of Yakima, a pool of 416 fleas from 136 white-footed mice, *Peromyscus maniculatus*, trapped at the same location, and a pool of 106 fleas from 81 white-footed mice, *Peromyscus maniculatus*, trapped March 1 on Hanford Road, 18 miles east of Yakima.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in rodents and fleas).—Under date of March 12, 1949, plague infection was reported proved on February 4 in a mass inoculation of tissue from 10 rats trapped in District 16A, in Kailua Gulch in the Makawao District, Island of Maui, T. H.

Under date of March 16, 1949, 3 plague infections were reported found on February 24, 1949, in Hamakua District, Island of Hawaii, T. H., in mass flea inoculations as follows: In 7 fleas from rats trapped in District 6B; in 12 fleas from rats trapped in District 7A; and in 10 fleas from rats trapped in District 6A.

DEATHS DURING WEEK ENDED MAR. 12, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 12, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9, 829	9, 829
Median for 3 prior years	9, 829	
Total deaths, first 10 weeks of year	98, 877	103, 363
Deaths under 1 year of age	682	640
Median for 3 prior years	639	
Deaths under 1 year of age, first 10 weeks of year	6, 725	7, 040
Data from industrial insurance companies:		
Policies in force	70, 550, 203	66, 819, 835
Number of death claims	14, 913	14, 725
Death claims per 1,000 policies in force, annual rate	11. 0	11. 5
Death claims per 1,000 policies, first 10 weeks of year, annual rate	9. 8	10. 7

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended February 26, 1949.— During the 4 weeks ended February 26, 1949, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	8		Measles	24	1
Diphtheria	21	2	Tuberculosis	7	
Leprosy	8		Typhoid fever	9	1

Provinces—Notifiable diseases—4 weeks ended February 26, 1949.— During the 4 weeks ended February 26, 1949 cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana [1]	Matanzas	Santa Clara	Cama-guey	Oriente	Total
Cancer	6	17	10	24	4	12	73
Chickenpox		9		3	4	2	18
Diphtheria	1	32	4		1	1	39
Leprosy		9				1	10
Malaria		2		3	3	21	29
Measles		29	2	3			34
Poliomyelitis						3	3
Tuberculosis	7	21	4	18		12	62
Typhoid fever	1	17	2	7	2	38	67
Whooping cough		20				1	21
Yaws						2	2

[1] Includes the city of Habana.

GOLD COAST

*Cerebrospinal meningitis.—*Further information on the outbreak of cerebrospinal meningitis in Gold Coast, French West Africa, states that 1,721 cases with 128 deaths occurred during the week March 2–9 in Northern Territories, and that a total of 5,380 cases with 421 deaths has been reported to date. In Ashanti 8 cases and 20 suspected cases have been reported.

JAMAICA

*Notifiable diseases—4 weeks ended February 26, 1949.—*For the 4 weeks ended February 26, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	12	23	Leprosy	1	
Diphtheria	1	3	Tuberculosis (pulmonary)	22	66
Dysentery	1		Typhoid fever	7	58
Erysipelas	2	3	Typhus fever	1	

NEW ZEALAND

Notifiable diseases—4 weeks ended January 29, 1949.—During the 4 weeks ended January 29, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6		Ophthalmia neonatorum	1	
Diphtheria	15	1	Poliomyelitis	104	4
Dysentery:			Puerperal fever	8	
Amebic	4		Scarlet fever	62	
Bacillary	7		Tetanus	1	
Encephalitis, lethargic	2	2	Tuberculosis (all forms)	148	41
Erysipelas	10		Typhoid fever	11	1
Food poisoning	16		Undulant fever	1	
Malaria	1				

SWITZERLAND

Notifiable diseases—January—December 1948.—During the year 1948 (January–December), cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	January	February	March	April	May	June
Cerebrospinal meningitis	7	6	12	3	8	6
Chickenpox	388	378	358	255	213	283
Diphtheria	420	258	223	159	162	155
Dysentery		1	2			7
Encephalitis, lethargic			1		1	1
Hepatitis, epidemic	38	73	45	19	21	42
Influenza	286	175	183	88	47	46
Measles	330	317	496	382	312	338
Mumps	187	153	207	138	97	85
Paratyphoid fever	4	2	4	5	9	7
Poliomyelitis	7	3	3	4	24	44
Scarlet fever	405	385	479	864	306	385
Trachoma						1
Tuberculosis	267	296	364	281	338	419
Typhoid fever	1	3	5	5	8	6
Undulant fever	8	7	18	9	16	21
Whooping cough	296	283	442	537	529	742

Disease	July	August	September	October	November	December
Cerebrospinal meningitis	7	3	6	8	10	6
Chickenpox	228	163	89	140	200	434
Diphtheria	89	152	206	219	202	210
Dysentery	8	35	1	1	1	
Encephalitis, lethargic	2	1	1			
Hepatitis, epidemic	20	46	72	30	44	54
Influenza	8	44	29	50	94	520
Malaria	1					
Measles	228	179	226	188	247	777
Mumps	75	66	106	90	99	227
Paratyphoid fever	13	37	48	16	5	8
Poliomyelitis	42	110	177	82	32	16
Scarlet fever	229	1, 523	988	439	371	356
Trachoma				1		
Tuberculosis	257	281	373	223	267	320
Typhoid fever	3	6	15	8	2	1
Undulant fever	17	17	19	12	7	6
Whooping cough	511	531	746	471	639	823

NOTE.—Imported cases, not included in above tables, are as follows: Diphtheria, 9; leprosy, 1; malaria, 1; poliomyelitis, 1; scarlet fever, 9; typhoid fever, 2.

MADAGASCAR

Notifiable diseases—January 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during January 1949 as follows:

Disease	January 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			93	0
Cerebrospinal meningitis			6	4
Diphtheria	2	0	7	2
Dysentery:				
Amebic	11	0	229	5
Bacillary	2	0	1	0
Erysipelas	1	0	18	0
Influenza	17	0	1,794	42
Leprosy			22	0
Malaria	416	5	36,393	229
Measles	1	0	60	1
Mumps	7	0	128	0
Plague	1	0	22	18
Pneumonia, broncho	1	1	237	48
Pneumonia, pneumococcic	3	0	264	50
Poliomyelitis			1	0
Puerperal infection			3	1
Scarlet fever	1	0		
Trachoma			1	0
Tuberculosis, pulmonary	6	2	108	19
Typhoid fever	6	0	27	3
Whooping cough			305	3

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

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

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera was declared epidemic in Caluctta, India, on January 18, 1949. Reported incidence in that city since January 1, 1949, is as follows: January 1–31, 638 cases, 192 deaths; February 1–19, 447 cases, 158 deaths; week ended February 26, 95 cases, 35 deaths; week ended March 5, 103 cases, 35 deaths.

Plague

India—Cawnpore.—During the week ended March 5, 1949, 14 cases of plague with 2 deaths were reported in Cawnpore, India.

Indochina (French)—Cambodia—Pnom-Penh.—During the week

ended March 12, 1949, 5 cases of plague were reported in Pnom-Penh, Cambodia State, French Indochina.

Peru—Lambayeque Department.—During the period February 1-28, 1949, 4 cases of plague were reported at Ucupe Farm, Chiclayo Province, Lambayeque Department, Peru.

Union of South Africa.—Plague has been reported in the Union of South Africa as follows: Week ended February 12, 1949, 3 suspected cases in Glen Grey District, Cape Province; week ended February 26, 3 cases in Orange Free State—2 in Koppies District and 1 in Parys District, and 4 cases in Randfontein District, Transvaal.

Smallpox

Arabia—Aden Protectorate—Makalla.—For the week ended March 12, 1949, 3 cases of smallpox were reported in Makalla, Aden Protectorate.

Bahrein Islands—Bahrein.—For the week ended March 12, 1949, 2 cases of smallpox were reported in Bahrein, Bahrein Islands.

Burma.—Information dated March 19, 1949, states that Rangoon and Moulmein were declared infected with smallpox as of February 6, 1949. During the month of February, Rangoon reported 63 cases with 18 deaths, and Moulmein reported 23 cases with 3 deaths. Reported for week ended March 5 were Rangoon, 16 cases; Moulmein, 5 cases; for week ended March 12, Rangoon, 17 cases; Moulmein, 4 cases.

China.—During the period February 1-28, 1949, smallpox was reported in cities in China as follows: Amoy, 75 cases, 11 deaths; Canton, 56 cases, 4 deaths; Shanghai, 49 cases, 19 deaths.

Cuba—Havana.—Information dated March 18, 1949, reports 1 case of smallpox in the city of Havana. This case is stated to have developed in a citizen who returned to Havana by plane from Mexico City on March 4. The case was diagnosed on March 16, and confirmed on March 20.

India.—Smallpox has been reported in cities in India as follows: In Ahmedabad, week ended February 26, 1949, 71 cases, 55 deaths; in Bombay, week ended March 5, 77 cases, 23 deaths, week ended March 12, 122 cases; Madras, week ended March 5, 44 cases, 7 deaths.

India (Portuguese).—During the week ended February 12, 1949, 14 cases of smallpox were reported in Portuguese India.

Indochina (French)—Tonkin State.—For the week ended March 5, 1949, 136 cases of smallpox, with 5 deaths, were reported in Tonkin State, French Indochina.

Iraq.—During the period December 1-31, 1948, 431 cases of small-

pox with 79 deaths were reported in Iraq, and for the period January 1–31, 1949, 154 cases with 24 deaths were reported.

Peru.—For the period February 1–28, 1949, 294 cases of smallpox were reported in Peru.

Typhus Fever

France.—During the week ended January 29, 1949, 1 case of typhus fever was reported in Seine Department, France.

Pakistan.—During the week ended March 5, 1949, 31 cases of typhus fever, with 7 deaths, were reported in Northwest Frontier Province, Pakistan.

Yellow Fever

No reports of yellow fever were received during the current week.

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