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THE PREVALENCE OF INFLUENZA

United States.—Reports from State health officers for the week ended March 7, 1931, showed a decrease in the prevalence of influenza in the United States generally. For that week 7,811 cases of influenza were reported, as compared with 10,950 cases for the preceding week. (See pp. 663 and 664.)

All of the groups of States except the West South Central, Mountain, and Pacific reported decreased prevalence of influenza for the week ended March 7, 1931.

Europe.—During the week ended February 21, 1931, 509 deaths from influenza were registered in 107 great towns of England and Wales, as compared with 456 influenza deaths for the preceding week and 84 for the corresponding week of last year. In London about half of the persons who died from influenza were over 60 years of age. In Liverpool the epidemic appears to be about over.

For the week ended February 21, influenza was reported in all the military stations in Northern Ireland.

In the 16 principal towns of Scotland 29 influenza deaths were reported for the week ended February 21, 1931. During the preceding week there were 11 influenza deaths in these towns. The general death rate in the 16 towns was below the average for the corresponding weeks of the last five years.

Reports from Switzerland indicated that the epidemic was nearing its end.

In three large cities of the Netherlands (population 1,700,000) 23 deaths from influenza and the same number from pneumonia were registered for the week ended February 14, 1931.

CURRENT PREVALENCE OF COMMUNICABLE DISEASES IN THE UNITED STATES¹

February 1-28, 1931

The prevalence of certain important communicable diseases, as indicated by weekly telegraphic reports from State health departments to the Public Health Service, is summarized below. The

¹ From the Office of Statistical Investigations, U. S. Public Health Service. The numbers of States included for various diseases are as follows: Typhoid fever, 46; poliomyelitis, 47; meningococcus meningitis, 47; smallpox, 47; measles, 44; diphtheria, 46; scarlet fever, 46; influenza, 33.

underlying statistical data are published weekly in the PUBLIC HEALTH REPORTS under the section entitled "Prevalence of Disease."

Influenza.—For the United States as a whole, the influenza wave appears to have been on a decline since the week ended February 14, but in specific regions the pictures are divergent in several respects.

TABLE 1.—Number of influenza cases reported in different geographic sections during recent weeks of the winter of 1930-31 and during the corresponding weeks of the winter of 1929-30

Region	Week ended—													Mar. 7, 1931
	Dec. 6, 1930	Dec. 13, 1930	Dec. 20, 1930	Dec. 27, 1930	Jan. 3, 1931	Jan. 10, 1931	Jan. 17, 1931	Jan. 24, 1931	Jan. 31, 1931	Feb. 7, 1931	Feb. 14, 1931	Feb. 21, 1931	Feb. 28, 1931	
N. E. and Mid. Atl.:														
1930-31	27	40	51	62	102	540	1,390	2,156	2,153	1,243	1,127	649	475	273
1929-30	59	68	120	54	87	104	71	87	93	86	101	100	94	105
E. N. Central:														
1930-31	52	76	49	62	59	89	118	354	670	558	1,045	784	1,581	662
1929-30	60	91	78	104	90	163	190	151	111	91	153	82	131	90
W. N. Central:														
1930-31	8	9	13	9	31	27	24	122	119	101	201	324	476	137
1929-30	16	20	16	20	26	61	80	61	83	41	70	24	22	38
S. Atlantic:														
1930-31	760	769	633	661	868	1,184	1,408	3,682	8,697	6,071	7,122	6,841	5,624	4,324
1929-30	1,127	1,144	786	1,093	1,466	1,368	1,239	1,269	1,232	1,466	1,365	1,145	1,294	1,325
E. and W. S. Central:														
1930-31	214	239	322	180	363	626	679	831	1,087	1,184	1,419	1,460	1,290	1,319
1929-30	429	541	470	415	724	757	561	886	977	1,127	755	838	596	561
Mount. and Pac.:														
1930-31	111	86	121	106	85	157	129	173	261	294	464	568	642	812
1929-30	109	125	96	78	139	162	199	185	189	169	195	134	137	168
Total (all regions): *														
1930-31	1,172	1,219	1,189	1,080	1,520	2,623	3,748	7,318	10,996	9,451	11,378	10,631	10,088	7,527
1929-30	1,800	1,980	1,566	1,764	2,532	2,613	2,340	2,639	2,685	2,980	2,639	2,323	2,274	2,287

* 38 States and the District of Columbia included.

From Table 1 it is evident that the epidemic movement has, in general, been from east to west. It reached its crest in the North Atlantic region during the week ended January 24, in the South Atlantic about two weeks later, and in the Central groups toward the last week of February. It is not yet possible to state whether the latest data from the far West (week ended March 7) represent the peak incidence for that region.

Poliomyelitis.—The reported incidence of poliomyelitis showed a sharp decline from 194 cases during the preceding 4-week period to 96 cases during the current period. There were 79 reported cases during the corresponding period of last year. In other words, the current incidence is 1.21 times that of last year. During the preceding period this ratio stood at 2.52. All sections participated in the decline.

Diphtheria.—The incidence of diphtheria continued at a very satisfactory level, the reported cases numbered 4,542, i.e., about 80 per cent of the cases recorded for the corresponding period of last year. All regions participated in the low record except the West North

Central and East and West South Central groups. Even in those groups only slight increases occurred.

Meningococcus meningitis.—There was a further recession from the high level of the last two years. There were reported during the current period 588 cases, or 58 per cent of the cases of the corresponding period of last year. Last month this ratio stood at 63 per cent. A decline in this index occurred in all regions except the North Atlantic sections, where an increase occurred.

Typhoid fever.—The number of reported cases of typhoid fever (580) has undergone a decline from that of the preceding 4-week period (623), which was somewhat greater than would be expected on seasonal grounds alone. Last year 650 cases were reported for the period. There has, therefore, been a slight decline from the higher levels of last year.

Smallpox.—The incidence of smallpox during the current period (4,137 cases) was about 62 per cent of last year's figure and slightly in excess of the 1929 incidence for the corresponding period. The few exceptions to the lowered incidence have been in some of the Central States, especially Kansas, Oklahoma, and Texas.

Scarlet fever.—The reported incidence (23,563 cases) continues to be about 13 per cent in excess of last year. The current figure is even more (about 25 per cent) in excess of the 1929 incidence. This rising tendency is characteristic of all regions except the far West.

Measles.—The number of cases of measles reported was 47,590, an increase of approximately 18,000 over the preceding 4-week period. All the regions contributed to the increase except the West North Central. In that group a decrease of 800 cases was shown. In general, the incidence during the current period was about 27 per cent in excess of the corresponding period in 1930 and 45 per cent above that of 1929.

Mortality, all causes.—The mortality from all causes in cities reporting to the Bureau of the Census averaged 14.2 per thousand population (annual basis) for the current period, as compared with 13.7 last year and 15.6 in 1929.

THE FUNDAMENTALS OF PUBLIC HEALTH LAW¹

By JAMES E. BAUMAN, *Assistant Director of Health, Ohio State Department of Health, Member of the Columbus (Ohio) Bar*

In the complexities of modern life we are likely to forget or overlook the fundamentals which form the basis of administrative practice and procedure. This is as true, but not more so, in public health work as in other kinds of public service. However, in the field in

¹ Read before the 10th Annual Public Health Conference at Lansing, Mich., Jan. 8, 1931.

which I am most interested, public health law, the task is not as difficult as in other and newer branches of public health work, because there are definite principles and precedents to follow. These principles of law may be readily applied to the new developments as other phases of work are added to the curriculum of the public-health official.

The effort to promote and preserve public health by the pronouncement of edicts by or under authority of sovereign power is of ancient origin. "The ten commands of God respecting moral and civil obligations, written on tablets of stone and given by Moses to the children of Israel, are not older in time than that code of sanitary regulations for the preservation of the health and safety of the people, minute and particular in every detail, wherein God, through Moses, commanded his people to observe frequent purifications and cleansings; to isolate those suffering from communicable diseases; to disinfect houses where the plague had prevailed; to destroy infected articles; to avoid the use of unwholesome foods; and to protect the roofs of their houses by battlements, 'that thou bring not blood upon thine house if any man fall from thence.'" (Public Health and Safety, by Parker and Worthington. Albany, N. Y., 1892, Matthew Bender. P. 37.)

The necessity for sanitary regulations was recognized as soon as people came together in community life; and history tells us of disastrous consequences brought about because of neglect in the observance of such simple procedures as were laid down for the guidance of the Israelites. Where this necessity was recognized and sanitary regulations for the preservation of the public health were enacted and enforced, we find the greatest freedom from pestilential diseases and the greatest advances in civilization. Such knowledge as was had by the ancients would not have been sufficient at any time to have entirely prevented or controlled the epidemics which at various times decimated the populations of European and Asiatic countries; but, had such methods of right living been followed as were known in Biblical days, plagues would not have been so severe as those history records.

Public health law is that body of statutes, regulations, and precedents that have for their purposes the protection and promotion of individual and community health. You will note that this definition includes statutes, regulations, and precedents.

In the term "statutes" we include the constitutions, Federal and State, and the acts of the law-making bodies, such as Congress and the legislatures of the various States. The casual observer of Government might assume that the law of the land is the statutory law. This is theory and not practice. Legislatures are provided to make laws necessary for our Government and the collection of legislative

acts is referred to as "statutes" or statutory law. A person need not be a student of law to reach the conclusion that statutory law constitutes but a very small part of the body of the law. It has been estimated that this proportion is not more than 2 per cent. The work of the lawyer would be very circumscribed if we had no law except legislative enactments. There would be no "science of law" and no legal profession, as law would be in a chaotic state. This may be illustrated by the experience of a candidate for the bar. During his examination it was evident that his knowledge of legal principles was very deficient and he was asked if there was any subject in which he was proficient. His answer was that he was "good on statutes." The wise examiner told him: "That is not enough knowledge for a lawyer, as some fool legislature can come along and repeal all you know."

Regulations, and with these we include municipal ordinances, are those rules of conduct and procedure which emanate from such bodies as boards of health, boards of education, municipal councils, etc., which depend for their authority upon a grant of power by the legislature under sanction of a constitution.

Properly to understand this statement it is necessary to recall the history of the foundation of our State and Federal governments. We know that originally sovereignty was vested in the several States and that the Federal Government was formed by the relinquishment of certain rights by the States and by the delegation of certain powers and functions, and that these are expressed in the Federal Constitution. All powers not relinquished or delegated remained in the States, to be exercised or not as the individual State might elect. All State, county, and municipal administrative boards and officers get their authority to exist and function by delegation of powers coming from the State constitution and State legislature, and from no other source. These are the powers that were not surrendered to the Federal Government.

Precedents form the great bulk of our law, and for this the courts are responsible. These precedents are to be found in the decisions rendered on points of law and the principles thereby established. The building up of this type of law has been going on from time immemorial. It is to be found in thousands of volumes of court reports and analyses of law as given us by writers on law.

From a legal point of view, public health law owes its origin and effectiveness to the inherent right of sovereignty known as police power. Police power has been variously defined, but for our purpose the following definition is sufficient: "Police power is that inherent sovereignty which the Government exercises whenever regulations are demanded by public policy for the benefit of society at large in order to guard its morals, safety, health, order, and the like, in ac-

cordance with the needs of civilization." (Miami County *v.* Dayton, 92 O. S. 215.)

Speaking generally, police power is limited in its exercise to the enforcement of the maxim that "each individual must so conduct himself, so pursue his calling, and so use his property as not to injure or unnecessarily annoy others." In other words, the rights of each individual are conditioned on the equal rights of all other persons to the extent that may be necessary to secure the largest measure of freedom for all. (Public Health and Safety, Sec. 251).

Police powers have their origin in the law of necessity. Before the existence of constitutions or statutory laws it was a well-settled principle of common law that in cases of actual necessity, as in preventing the spread of fire, the ravages of pestilence, or any other great calamity, the private property of the individual might be lawfully taken, used, or destroyed for the relief, protection, or safety of the many. This is recognized as "The law of overruling necessity"—the rights of the individual as against another individual or of the public. In other words, the subject is to be considered as government for the defense of society or of the people whose peace is invaded by any violence.

With the adoption of constitutions and the delegation of legislative authority to the legislative branch of the Government, police power was developed by statutory enactment, with the effect that we now look to the statutes for the authority to exercise police power. The subjects for the exercise of police power are being constantly increased, so that it is not possible to forecast the extent to which this power may be exercised.

Considering the definition of police power as heretofore given, it is seen that the nature of police power is to be determined by its relation to the general welfare and that such power is to be applied by making and enforcing such laws as are necessary to preserve and promote the public health and public safety. Without such laws civil society could not exist. They are justified by necessity and sanctioned by the right of self-preservation.

The power to enact and enforce regulations under police power is lodged by the people with the government of the State qualified only by such conditions as to the manner of its exercise as are necessary to secure the individual citizen against unjust and arbitrary interference.

The State can not divest itself of its obligations under the police power, and the authority of each of the States is supreme and exclusive. In the delegation of powers to the Federal Government, reservation was made to each State of sovereign control over its own internal affairs.

"The police power is so clearly essential to the well-being of the State that the legislature can not by any act or contract, whatever, divest itself of the power nor fetter its discretion in the exercise of the power. The discretion can no more be bargained away than the power itself. In other words, the right to exercise police power can not be alienated, surrendered, or abridged by a State legislature by any act, grant, charter, contract, or delegation, whatsoever, because, it is said it is a governmental function without which the legislature would be powerless to protect those rights which it was especially designed to secure. So that the legislature can not, even by charter granted to a corporation, confer any irrepealable right to continue the exercise of franchises in a way that may become injurious to the public." (Public Health and Safety, Sec. 9.)

The extent to which police power may be exercised is undetermined. The legislative branch of the Government is vested with large discretion, and may determine, primarily, the necessity or expediency of legislation in respect to any particular matter, and as to the means which shall be adopted to accomplish any legitimate object.

This authority in the legislative branch of Government is subject to some control by the judiciary. In any particular case the judiciary has a supervisory function to decide, when properly called upon to do so, whether an act passed for an ostensible or declared purpose is a reasonable exercise of legislative power; that is, whether it is properly related to and appropriate to accomplish the purpose sought to be accomplished.

The judiciary is without authority to determine the expediency of such legislation. This principle is expressed in the following quotation: "Making of laws is committed to the general assembly; it is the judge of the wisdom and policy of all its enactments and no court has the right to overrule its judgment, even as to the extent of its own powers, unless it is clearly and beyond doubt exceeding the legislative functions with which it is vested by the constitution." (Adler *v.* Whitbeck, 44 O. S. 539.) This is so generally recognized as true as to be regarded as axiomatic upon questions as to the power of a legislature to enact a given law.

As stated, a law under the police power must not only not be unreasonable or arbitrary, but it must also confine itself to the protection, preservation, or promotion of the public health or public safety. Under the guise of a police regulation, any law which deviates from the above purpose will be invalid.

Some limitations on the exercise of police power are to be found in the Federal Constitution and some in the constitutions of the various States. These provisions are designed to secure the rights of persons and property against arbitrary and unjust governmental interference.

The constitutional inhibition of State laws impairing the obligation of contracts can have no application to laws which are in their nature legitimate police regulations. Such regulations do not violate the sanctity of contract obligations, since all such engagements are made and entered into subject to the right of the State at any time to enact such laws as the public interest may require.

The police power of the State is superior to any engagements entered into by the State; and all rights, franchises, and privileges, however derived or secured, are held subject thereto. This is the answer to many claims that the exercise of police power is a violation of Amendments V and XIV to the Federal Constitution, and similar provisions in State constitutions.

The fourteenth amendment reads in part: "No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the law."

The United States Supreme Court has held in a number of cases that it is a settled doctrine that this amendment was not designed to interfere with or in any degree abridge or impair the exercise of the police powers of the States. It does prohibit personal enactment favoring some to the impairment of the rights of others. As stated by Justice Field (111 U. S. 746): "The principal, if not the sole, purpose of its prohibitions is to prevent any arbitrary invasions by State authority of the rights of persons and property, and to secure to everyone the right to pursue his happiness unrestrained, except by just, equal, and impartial laws."

The Ohio Supreme Court has this to say regarding the fourteenth amendment to the Federal Constitution: "There is perhaps no provision of the Federal Constitution that is more overworked than the fourteenth amendment. Counsel generally are apparently unanimous in thinking that any judgment or finding as against their client denies such client the equal protection of the laws, or is without due process of law. It has been so many times decided that the fourteenth amendment does not limit the States in the proper exercise of police power, that citation of authorities seems needless. The right of the State through the exercise of police power to subject persons and property to reasonable and proper restraints in order to secure the general comfort, health, and prosperity of the State is no longer open to question." (Ex parte Company, 106 O. S. 50.)

There is a definite prohibition against the States, in the matter of regulating interstate commerce, by the provisions of the Federal Constitution which places this subject exclusively within the jurisdiction of the Federal Government. This, however, does not limit the States in matters of intrastate commerce or in the protection of the individual State by necessary quarantine regulations. The limita-

tions of police power are generally in favor of the States as against the Federal Government.

No provision of the Federal Constitution deprives a State of the right to preserve order within its limits, to pass laws against crimes and punish offenders, to regulate relations between individuals, to control for the public good the use of private property, to protect the health, life, and safety of the people, and, to that end, not only to enact suitable legislation, but to destroy private property that is dangerous to the well-being of the State. In the exercise of this power regard must be paid to the fundamental principles of civil liberty and to processes that are adapted to preserve and secure civil rights; persons can not arbitrarily be deprived of equal protection of the laws or of life, liberty, or property because the State purports to be exercising the police power.

The due process of law that must be observed is necessarily different under different circumstances. Sometimes summary proceedings are sufficient. The summary abatement of nuisances without judicial process or proceedings was well known to the common law prior to the adoption of the Constitution, and it can not be supposed that its provisions were intended to prevent such action. The exercise of this power to secure the destruction of property prejudicial to health, morals, or safety, or to prohibit the use of property in a particular way, is very different from taking property for public use.

However, we are more interested in the administration of public health laws than in discussing questions of constitutional law. Under this topic will be considered the rights and functions of Federal, State, and municipal governments in the exercise of police power.

The authority of the Federal Government to act must be found in the provisions of the Constitution, or in such implied powers as are necessary to carry into effect its express provisions. In like manner, the constitution of the State is a delegation of powers inherent in the people for the purpose of promotion of government. Municipal corporations and other political subdivisions get their authority to exist and their form of government from the constitution of the State and from legislative acts.

The delegation of authority to the Federal Government makes plain the fact that the Constitution of the United States, the acts of Congress, and treaties made by authority of the Constitution are the supreme law of the land. The constitution of the State and the laws enacted by its legislative body come next in authority. Then come the regulations adopted under authority of legislative sanction by State governmental agencies created by the State constitution or by legislative enactment, and, finally, the ordinances, rules, and regulations adopted by the legislative body of a municipal corporation, or by other local agencies. No political subdivision or governmental

agency created by the Constitution or by legislative enactment has any authority except such as is specifically granted.

There must be an understanding of the relations existing between the Federal Government and the State, and the State and the lesser political subdivisions and governmental agencies in order that the relative powers of each be understood.

As has been indicated, the Federal Government must look to the Constitution for its authority in the exercise of police power. Unless such powers are expressly given, or may be implied in order to make effective some express grant of power, the right to exercise such power by the Federal Government does not exist. It is not possible to give in detail the subject matter upon which the Federal Government may legitimately exercise police power. This can best be indicated by a review of the subjects in which the Federal Government has acted, to the exclusion of the right of the State to act, or of the cases where a concurrent power exists, that is, authority in both the Federal Government and in the State to act where there is no conflict.

The constitution of the State may be said to be a declaration of general authority with few prohibitions against legislative enactment. While in the national administration it may be said that police powers are limited, in the States such powers extend and progress in every direction with no well-defined bounds, subject principally to the wisdom of the legislature and the will of the people as they find expression in the constitution and the laws.

The principle of law that all legislation must be general and not special applies under the police power; therefore, every such law must avoid the taint of class legislation and must apply with equal effect in the jurisdiction of the law-making body. This principle applies to national, State, and municipal legislation.

In matters concerning the public health, certain powers have been delegated to State departments of health, and frequently health functions have been assigned to other State agencies. These governmental agencies have been given the authority to adopt and enforce sanitary regulations that come within the police power, and in so far as they are applicable they take precedence over legislation adopted by municipal corporations or by other minor political subdivisions.

The authority of the legislature to delegate rule-making power to an administrative body has been many times disputed, but in only one case that I know of has the power been denied to a State or local board of health. That is a Wisconsin case (*State v. Burdge* 95 Wis. 390). In this case it was held that the State board of health was a purely administrative body and had no regulatory power, and that none could constitutionally be delegated to it. The matter has been more or less definitely settled by the United States Supreme Court in the case of *Zucht v. King* (43 S. C. Rep. 24), in which it is held

"(1) That a State may, consistently with the Federal Constitution, delegate to a municipality authority to determine under what conditions health regulations shall become operative. (2) That the municipality may vest in its officials broad discretion in matters affecting the application and enforcement of a health law. (3) That in the exercise of the police power reasonable classification may be freely applied, and that regulation is not violative of the equal protection clause merely because it is not all embracing."

The Ohio Supreme Court more definitely says: "That the legislature in the exercise of its constitutional authority may lawfully confer on boards of health the power to enact sanitary ordinances having the force of law within the districts over which their jurisdiction extends, is not an open question." (Ex parte Company, 106 O. S., 50.)

We have in the Ohio constitution (article XVIII, section 3,) the following provision: "Municipalities shall have authority to exercise all powers of local self-government and to adopt and enforce within their limits such police, sanitary, and other similar regulations as are not in conflict with general laws." As the valid enactment of sanitary regulations by the State department of health gives to such regulations the force and effect of general laws such regulations take precedence over the provisions of a municipal ordinance or a sanitary regulation adopted by a municipal board of health.

In matters concerning the public health, a municipal corporation can act only where there is specific authority for such action, and the ordinances adopted by the legislative body of the municipal corporation must not only be limited in subject matter to the powers delegated, but they must not conflict with, or attempt to set aside, any provision of the constitution, of State law, or other sanitary regulation of the State.

The same rule applies to the sanitary regulations adopted by a local board of health. These regulations can apply only where the subject matter has by law been placed under the jurisdiction of the board of health, and, in addition to the limitations placed upon a municipal ordinance, these regulations must not be in conflict with the provisions of an existing ordinance. Where there is concurrent jurisdiction, a sanitary regulation adopted by the board of health would stand until the municipal legislative body had acted on the same subject matter. There may be an exception to this rule if the authority given to the board of health is in specific terms and that given to the municipal council is in general terms. The valid enactment of a sanitary regulation gives to it the same force and effect as is given to a municipal ordinance.

Where police powers have been delegated to State or local agencies, there is a responsibility to use the power and an accountability for

the manner in which it is used. When the means for performance are placed at his disposal, a public officer may be compelled to exercise the police power committed to him when the public interests demand such action. Though action may be demanded, the means or manner of enforcement, if left to the discretion of the officer, can not be determined for him. In other words, unless the statutes prescribe the method of procedure, the officer may select his own method. The above is the rule in cases where the public health and safety are involved. A ministerial officer is not liable to an individual for damage caused by an alleged nonfeasance except upon proof showing an omission on his part to perform a plain duty required of him by law. In the exercise of discretionary and legislative powers there is no liability. A body given power to enact laws or regulations can not be compelled to enact certain legislation.

State quarantine laws have been held to be within the powers reserved to the States and not conferred upon the Federal Government. The national quarantine differs from a State and local quarantine in that it can only apply to immigrants and importations and transit and traffic between States.

There can be no conflict between the Federal and State authorities in matters of quarantine as they affect persons afflicted with contagious diseases or of articles unwholesome or unfit for food or dangerous from infection. Such persons and articles are not proper subjects of commerce and are beyond the ordinary rules of its regulation.

The same rule applies to sanitary regulations as applies to State or Federal laws in matters coming under police power. Such regulations can not be arbitrary; they must be uniform in application to all classes to which they may apply; they must not be unreasonable; and they must be appropriate to accomplish the purpose for which they are intended.

The present status of public health law in the United States is well stated in decisions of the Ohio Supreme Court, and similar decisions will be found in the law reports of nearly all States of the Union: "The general assembly, in the exercise of the legislative power conferred by the constitution, has authority to enact general laws prescribing health, sanitary, and similar regulations, effective throughout the State, and to provide such reasonable classification therein as may be deemed necessary to accomplish the object sought. The peace, morals, health and safety of the people are a matter of concern to the State." (State ex rel. *v.* Zangerle, 103 O. S. 566.)

"The measure of the police power of the State is the measure of the public need, limited only by the State and Federal Constitutions. Public health is one of the most vital subjects for the exercise of that power. Primarily, the State legislature is the judge of that need,

and in the exercise of that judgment must be given wide discretion. The legislative judgment in this behalf will not be nullified except when it clearly appears that there has been a gross abuse of such discretion, in undoubted violation of some State or Federal constitutional provision." (*Williams v. Scudder*, 102 O. S. 305.)

PHOSPHORUS, TOTAL CALCIUM, AND DIFFUSIBLE CALCIUM CONTENT OF THE BLOOD SERA OF LEOPERS AND THEIR RELATION TO BONE CHANGES

By JERALD G. WOOLEY, *Acting Assistant Surgeon, United States Public Health Service*, with the technical assistance of HILARY ROSS, *Druggist, United States Marine Hospital (National Leprosarium), Carville, La.*

Bone atrophy and absorption have frequently led investigators to look for changes in serum and blood calcium. Underhill, Hoenig, and Bogert (1) investigated the calcium equilibrium in two lepers and reported an apparent retention in the more advanced case. Boulay and Leger (2) examined three lepers and reported a marked retention of calcium in the less advanced and a loss of calcium in the far advanced case. Conception and Salcedo (3) examined 37 cases, including three who had been discharged as cured, and reported that the calcium content of the blood of their patients in the various stages and of different forms of leprosy revealed that the values of calcium in all the cases examined, except the three paroled and suspected cases, were within normal limits. Average calcium in cases of less than one year's duration was much less than in those of longer duration. A slight increase in calcium was found in the paroled cases. Lemann, Liles, and Johansen (4) report the results of the analysis of the blood for calcium in 54 lepers and conclude that there is no relationship between calcium content of the blood and bone absorption in lepers. Cruz, Lara, and Paras (5) examined a group of 70 lepers and concluded that the serum calcium in leprosy is usually within normal limits and that type, advancement, duration of the disease, antileprosy treatment, and the presence of bone changes had no influence on the level of serum calcium. They did, however, find low calcium in lepra fever.

Price (6) states, in substance, that the interrelationship between calcium and inorganic phosphorus, the factor which constitutes a yardstick for determining the capability of a blood to deposit calcium for use, is important, and that while either might vary within given ranges, the one should increase if the other decreases, and therefore their ratio is an expression of normality or divergence from it. This ratio, termed calcium-phosphorus balance (serum calcium \times inorganic phosphorus), is, under ordinary conditions, between 30 and 40 in adults.

Giving consideration to the above hypothesis, 47 patients in this hospital were selected without regard to the duration of leprosy, stage of activity, or type of the disease, and their sera were analyzed for calcium by Clark-Collip modification of the Kramer-Tisdall method (7) and for phosphorus by Benedict-Theis method (8), with the following findings:

TABLE I

Reg. No.	Ca.	P.	Ca.-P. balance	Reg. No.	Ca.	P.	Ca.-P. balance
38	9.0	4.16	37.4	585	9.1	3.7	34.0
46	8.9	3.6	32.0	591	8.9	3.4	30.2
73	9.2	3.1	28.5	579	9.0	3.3	29.7
43	9.8	3.2	31.3	575	9.4	3.0	28.2
117	10.8	3.9	42.1	571	9.5	2.8	26.6
155	8.8	4.0	37.2	566	10.0	2.5	25.0
207	9.4	3.7	34.7	564	11.5	3.4	40.1
234	10.7	3.7	30.5	563	9.1	4.16	37.8
256	10.5	3.4	35.7	578	10.2	3.7	37.7
276	10.0	3.2	32.0	584	9.1	3.1	28.2
307	9.1	3.4	30.9	586	10.0	3.1	31.0
333	10.9	3.16	33.7	589	9.1	3.4	30.9
332	9.5	4.4	41.8	595	9.1	3.7	33.6
391	9.0	2.9	27.1	594	11.0	2.9	31.9
436	9.0	3.1	27.9	592	10.0	3.0	30.0
450	10.0	3.0	30.0	600	9.6	3.9	37.4
466	9.2	3.1	28.5	601	9.9	3.8	37.6
485	9.8	4.18	40.9	621	9.3	3.4	31.6
511	10.6	3.12	33.0	618	9.8	3.4	33.2
520	8.9	3.5	31.1	609	10.4	2.9	30.1
523	9.9	3.7	36.6	619	8.9	3.4	30.2
529	11.0	3.1	34.1	604	9.2	3.6	33.1
526	9.8	3.75	36.7				
528	10.0	3.7	37.0	Average	9.9	3.42	33.1
570	9.8	2.3	22.5				

From 3 to 4 mgm. of inorganic phosphorus per 100 c. c. of blood serum in an adult is usually considered normal. Our average findings of 3.42 mgm., therefore, are well within the normal range. In this series only six patients had less than 3 mgm. present; of these, three were determined as 2.9 mgm.; one as 2.8; one as 2.5; and one as 2.3 mgm. Only two of these six showed a compensatory rise of serum calcium. Case No. 594 had calcium 11 mgm. and phosphorus 2.9 mgm., and case No. 609 had calcium 10.4 mgm. and phosphorus 2.9 mgm.

The average total calcium in these sera was 9.9 mgm. per 100 c. c. Only five were found to be below 9 mgm. Four of these were 8.9, and one 8.8 mgm.

Ten patients had a calcium-phosphorus balance ratio of less than 30, the lowest of which was 22.5, while the others ranged from 25 to 29.7.

Having concluded from our own observations, which confirmed the findings of others, that bone changes in leprosy are not dependent on total calcium, and the evident failure of calcium-phosphorus balance ratio to explain the bone deficiencies, we determined to investigate the diffusible or dializable calcium content of lepromatous blood.

Calcium is said to exist in the blood in three forms—the first an ionized form, and the second a nonionized form; of these, both are diffusible or dializable through an animal membrane; while the third, an un-ionized form, is combined with protein, is in a colloidal state, and is not diffusible. The first two forms can be separated from the colloidal combination by processes of ultrafiltration, compensation dialysis, or negative pressure filtration through a collodion membrane which keeps back the proteins.

Sera from 53 lepers were analysed for phosphorus, total calcium, and diffusible calcium; the per cent of diffusible calcium, the calcium-phosphorus balance ratio, and the diffusible calcium-phosphorus ratio were calculated. These 53 patients represented the following types and stages of progression:

	Nodular	Mixed	Anesthetic	Arrested	Total
Active, early.....	6	7	1	.....	14
Active, moderately advanced.....	10	14	4	.....	28
Active, far advanced.....	6	2	1	.....	9
Apparently arrested.....	.....	.....	1	.....	1
Arrested.....	.....	.....	.....	1	1
Total.....	22	23	7	1	53

The following nationalities were represented: Americans (white), 26; Americans (negro), 6; Mexican, 7; Greek, 3; Filipino, 3; Chinese, 1; Italian, 2; Portuguese, 2; Jew, 1; British West Indies (white), 1; Hawaiian, 1; 41 were males and 12 females.

Control sera were collected from 15 young men, physicians who had recently passed rigid physical examinations for entrance into the United States Public Health Service, and were analyzed coincidentally with the patients' sera.

METHOD

Approximately 15 c. c. of blood was collected from a cubital vein, allowed to clot, was centrifuged, and the serum collected and analyzed for inorganic phosphorus (8), total calcium (7), and diffusible calcium by a method described by Moritz (10), which consists of the separation of the diffusible from the colloidal calcium by placing the serum (2 c. c.) in a collodion sac which is immersed in distilled water and subjected to a negative pressure of 150 mm. of mercury for five hours. The filtrate was then analyzed for diffusible calcium (7) and tested for proteins to determine the possibility of any leakage of colloidal material through the sac.

TABLE II.—*Controls*

Name	Phos- phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium- phosphorus balance	Diffusible calcium- phosphorus balance
	<i>Mgms. per 100 c. c. of serum</i>	<i>Mgms. per 100 c. c. of serum</i>	<i>Mgms. per 100 c. c. of serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
1-HGB-----	3.07	10.0	6.0	60.0	30.7	18.42
2-WPG-----	3.26	9.6	5.5	58.3	31.2	17.93
3-RSW-----	3.26	9.5	5.4	57.1	30.9	17.60
4-RLE-----	3.12	9.8	5.6	57.1	30.5	17.47
5-JOD-----	3.40	9.6	5.6	58.3	32.6	19.04
6-WDP-----	3.22	9.6	5.6	58.3	30.9	18.03
7-JWC-----	3.26	11.5	6.0	52.1	37.4	19.66
8-GVG-----	2.90	10.8	6.0	55.5	31.3	17.40
9-JPG-----	3.34	10.5	6.2	59.0	35.0	20.70
10-OFH-----	3.34	9.6	6.2	64.5	32.0	20.70
11-JFJ-----	3.40	10.0	6.1	61.0	34.0	20.74
12-KRN-----	3.00	10.2	5.8	56.8	30.6	17.40
13-JWB-----	3.12	10.6	6.0	56.6	33.0	18.72
14-IWS-----	3.40	10.0	5.6	56.0	34.0	19.04
15-H-----	3.10	11.2	6.5	58.9	34.7	20.15
Average-----	3.21	10.1	5.8	57.8	32.4	18.80

The quantity of diffusible calcium that should exist in the serum of a normal adult has not been definitely determined. But it would seem from our series of controls, who, in so far as physical examinations reveal, are in a normal state of health, that 5.5 to 6.5 mgm. per 100 c. c. of serum, representing 55 to 65 per cent of the total calcium, would approximate the normal range.

TABLE III

No.	Race	Age	Sex	Approximate duration of leprosy, years	Type	Stage of progression ¹	Bone changes; X-ray findings	Eats freely of—	Eats sparingly of—	Medication, general ²							
38698°	White...	31	—	2	43	White...	Anesthetic. A.F.A	General rarefaction, both feet, with spindle deformity and absorption in phalanges.	Cereals and fruit...	Cod-liver oil irregularly, ultra-violet light to hands 16 months.	3.2	9.8	4.6	43.9	31.3	14.7	
136	Negro...	22	8	—	174	Mexican.	Nodular... A.M.A	Spindle deformity in phalanges of feet. Slight rarefaction in metacarpals and osteoperiostitis in proximal phalanges.	Cereals, milk, fruit, vegetables, bread. Vegetables, fruit, milk, eggs, meat, etc.	Meat...	C. O. *	3.56	10.5	4.9	43.6	37.3	17.4
241	White...	32	12	Mixed...	275	Greek...	Mixed... A.M.A	Rarefaction of medo- and metatarsals with spindle deformity of proximal phalanges. Rarefaction of metacarpals and osteoperiostitis in proximal phalanges.	Cooked vegetables, cereals, milk. All kinds...	Meat...	Olive oil; C. O. 15 minims.	3.25	10.8	4.8	44.4	35.1	16.6
276	White...	25	20	Nodular...	332	—do—	F 39	Mixed... A.F.A	Marked rarefaction of bones of hands and feet.	Vegetables, fruits, cereals, eggs, bread.	C. O. *; cod-liver oil emulsion daily.	4.3	10.2	4.1	40.1	43.8	17.6
335	—do—	M 28	9	—do—				Moderate atrophy of bones of feet; marked in hands with absorption in distal phalanges of both third fingers.	Vegetables, cereals, fruit, milk.	Meat, eggs...	C. O. *; olive oil daily.	3.34	12.0	0.2	51.6	40.0	20.7
									Meat...	Cod-liver oil and olive oil occasionally. C. O. * C. O. 225 minims.	3.12	10.0	5.4	54.0	31.2	16.8	
									Meat, eggs...	C. O. *; olive oil daily.	4.16	9.7	5.5	56.7	40.3	22.6	
									Cereal, milk, eggs, bread.	C. O. *; olive oil daily; cod-liver oil irregularly.	4.5	8.6	3.8	44.1	38.7	17.1	

¹A.F.A.—Active, far advanced; A.M.A.—Active, moderately advanced; AE—Active, early; Arrested—Paroled; Ap.Ar.—Apparently arrested but not on parole.
²C. O. *—Benzocaine-chaulmoogra oil, 5 c. c. intramuscularly semiweekly; C. O.—Chaulmoogra oil, daily oral dose.

TABLE III—Continued

No.	Race	Type	Stage of progression	Bone changes; X-ray findings	Eats freely of—	Eats sparingly of—	Medication, general	Diffusible calcium (mgms. per 100 c. serum)	Calcium total (mgms. per 100 c. serum)	Diffusible phosphorus (mgms. per 100 c. serum)	Phosphorus (mgms. per 100 c. serum)	Diffusible calcium-phosphorus balance (ratio)	Diffusible calcium-phosphorus balance (ratio)	Diffusible calcium-phosphorus balance (ratio)	
370	White...	M	26	8	Mixed....	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers, both hands. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Meat.....	C. O.*; cod-liver oil irregularly; ultra-violet to 0 feet 22 months.	9.8	4.2	42.8	33.3	14.2		
401	Greek...	M	39	12	do.....	Atrophy throughout metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers, both hands. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Meat, spinach.....	C. O.*.....	11.0	5.8	52.7	35.2	18.5		
482	White...	M	31	4	Nodular ...	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers, both hands. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Meat.....	C. O. 75 minims....	11.2	5.1	45.6	41.4	18.6		
485	Negro...	M	30	13	Mixed....	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers, both hands. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Meat, carrots.....	C. O. 200 minims ..	9.9	5.0	50.0	38.7	19.5		
504	White...	M	29	11	Nodular ..	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Cereals, eggs, potatoes.....	C. O. 200 minims ..	9.1	5.0	64.8	30.9	17.0		
614	do.....	M	27	13	Mixed....	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	All kinds.....	C. O.*; ultra-violet to feet.	10.2	4.4	43.5	34.6	14.9		
618	Negro...	M	33	10	Nodular ..	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Vegetables, meat, milk, eggs, Cereals, milk, eggs, vegetables, fruit, bread.	None.....	9.0	4.4	48.8	30.6	14.9		
622	Jew....	M	55	7	Anesthetic.	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Vegetables, meat, milk, eggs, Cereals, milk, eggs, vegetables, fruit, bread.	C. O.°.....	9.6	4.6	47.8	28.8	13.8		
623	White...	M	15	4	Mixed....	Atrophy throughout metatarsals and metatarsals, with slight deformity in phalanges. Rarification throughout hands, with absorption in distal phalanges of first and fifth fingers. Spindle deformity in phalanges of feet; slight atrophy throughout hands. Spindle deformity in phalanges second, third, fourth, and fifth toes; proliferation in first toe, with rarefaction throughout.	Vegetables, fruit, cereals.	C. O.*.....	9.0	4.3	47.7	33.3	16.9		

526	Negro...	M	34	11	Nodular -	A.F.A	Atrophy throughout bones of feet, with absorption at interphalangeal joints, both great toes. Spindle deformity of phalanges of other toes. Atrophy throughout hands.	All kinds.....	C. O.*; C. O. 125 minims.	3.75	9.4	4.6	43.9	36.2	17.3	
527	White...	M	33	11	Mixed.....	AE	Proliferative osteitis in middle phalanges of fifth fingers. No atrophy in hands. Marked spindle deformity of proximal phalanges of all toes.	Fruit, cereals, milk, eggs.	Vegetables, meat..	C. O.*; C. O. 25 minims.	3.75	10.0	5.1	51.0	37.5	19.1
528	do.....	M	40	0	Nodular -	AMA	Rarefying osteitis of second, third, fourth, and fifth phalanges of both feet, with some rarefaction in base of all metatarsals. Rarefaction throughout hands. Slight atrophy in bones of hands.	Milk, cereal, bread, fruit.	Vegetables, meat, butter.	C. O.*; ultra-violet 8 months.	2.88	9.4	4.9	32.0	27.0	14.3
535	Filipino.	M	23	4	Mixed.....	AMA	Rarefaction of medio- and base of metatarsals, with spindle deformity of metatarsal and phalanges. Some rarefaction in bones of lower legs.	Vegetables, fruit, milk.	Meat, eggs.....	C. O.*; C. O. 45 minims; ultra-violet hands and feet 6 months.	3.75	10.3	5.2	50.4	38.6	19.5
536	do.....	M	30	5	Anesthetic.	Arrested.....	Marked rarefaction in bones of hands and feet.	All kinds.....	.....do.....	C. O.*; C. O. 30 minims; ultra-violet to arms, hands and feet 11 months.	1.9	9.6	3.8	30.5	18.2	7.2
537	Chinese.	M	27	2	Mixed.....	AE	Atrophy throughout feet. Proliferative osteitis of proximal phalanges of fingers. Some atrophy throughout hands and feet.	Milk, fruit, cereal.	Vegetables, meat..	C. O.*; C. O. 300 minims; ultra-violet to hands 12 months.	3.07	10.4	3.1	29.8	31.1	9.5
540	Greek...	F	25	1½	Nodular -	AE	Marked atrophy throughout hands and feet.	All kinds.....	.....do.....	C. O.*; C. O. 225 minims; olive oil daily.	3.0	10.0	4.8	48.0	30.0	14.4
543	White...	F	20	3	Mixed.....	AE	Atrophy throughout hands and feet. Moderate atrophy in metatarsal bones. Partial absorption of distal phalanges of fifth toes.	Cereals, milk, bread, eggs, fruit.	Meat, vegetables..	C. O.*; ultra-violet to thigh.	3.3	10.6	5.4	50.9	34.9	17.8
545	do.....	M	45	2	Nodular -	AE	.....	.....	.....	C. O.*; C. O. 60 minims; cod-liver oil irregularly.	2.7	11.2	3.0	34.8	30.2	14.4

TABLE III—Continued

No.	Race	Age	Sex	Approximate duration of leprosy, years	Type	Stage of progression	Bone changes; X-ray findings	Eats freely of—	Eats sparingly of—	Medication, General	Dissoluble calcium-phosphorus balance (ratio)	Dissoluble calcium-phosphorus balance (ratio)	Dissoluble calcium-phosphorus balance (ratio)	
550	White...	M	28	20	Anesthetic	AMA	Marked atrophy throughout, with spindle deformity of metatarsal and phalanges; necrosis of first and second metatarsals, right foot. Left foot amputated because of bone absorption, necrosis, and ulceration. General atrophy throughout hands.	All kinds.....	Meat.....	C. O.*; C. O. 20 minims.	10.4	3.0	37.4	31.2
552	do...	F	55	19	Nodular	A.F.A	Marked atrophy, with spindle deformity in bones of feet. Marked atrophy in bones of hands.	Cereals, eggs, milk, eggs, vegetables, spinach, etc.	do.....	C. O.*; C. O. 30 minims.	2.5	9.5	4.6	23.7
553	do...	M	61	4	Mixed.....	AMA	Moderate atrophy throughout hands; absorption in distal phalanges of second, third, and fourth fingers, left. Absorption in distal phalanges; rarefaction all phalanges of hands and all bones of feet. Spindle deformity in feet.	Cereals, eggs, vegetables, bread, fruit.	do.....	Ethyl esters C. O. 2 c.c. weekly.	2.7	10.3	5.3	27.8
557	Negro...	F	31	21	Anesthetic	AMA	All kinds.....	All kinds.....	do.....	C. O.*	3.25	10.2	3.2	33.1
558	White...	M	25	7	Mixed.....	AMA	Marked rarefaction in bones of hands and feet. Spindle deformity in first phalanges of feet. Practically normal hands and feet.	do.....	do.....	C. O.*; C. O. 30 minims.	9.6	3.4	35.4	31.6
659	Portuguese	M	25	3	Nodular	A.E	do.....	do.....	do.....	C. O.*; C. O. 100 minims.	2.22	11.5	4.9	42.5

560	Italian--	M	34	6	do	AMA	Marked atrophy of tarsals and metatarsals, with slight spindle deformity of phalanges of feet. Rateyng osselets of phalanges of fingers. Proliferative changes in proximal phalanges. Atrophy throughout hands. Proliferative changes in middle phalanges of both middle fingers. Atrophy throughout feet.	Milk, cereals, eggs, vegetables, fruit, cereals, eggs, milk, bread.	Meat.....	C. O.**; C. O. 375 minims.	3.7	11.9	4.6	47.0	44.0	20.6
605	Negro--	M	16	0	do	AMA	do.....	do.....	C. O.**; C. O. 20 minims.	20	7.5	9.6	5.0	52.0	72.0	37.4
606	White--	M	20	11	do	A.F.A	do.....	do.....	C. O.*.....	3.66	10.5	5.1	43.5	37.3	18.1	
608	Mexican	F	45	15	Mixed--	A.F.A	Marked atrophy throughout feet with absorption of all distal phalanges. Rarefaction and spindle deformity of all bones of feet. Absorption of distal phalanges.	All kinds.....	C. O.**; C. O. 50 minims.	3.7	11.0	4.5	40.9	40.7	16.6	
491	Italian--	M	42	5	Nodular--	A.M.A	General atrophy throughout hands and feet. Rarefaction of hands and feet. Spindle deformity in feet.	Eggs, fruit, bread.....	Meat, vegetables.....	C.O.400-525 minims.	4.16	11.4	5.2	45.7	47.3	21.6
602	Mexican	M	37	3	Mixed--	A.M.A	Rarefaction of medio and base of metatarsals. Negative for rarefaction, hands and feet. Spindle deformity of metacarpals.	Cereals, milk, eggs, fruit, bread.....	Vegetables.....	C. O.**; C. O. 300 minims.	3.11	11.2	5.1	45.5	34.7	14.8
605	do	M	36	2	Nodular--	A.E	General atrophy throughout hands of feet with spindle deformity of metatarsals and phalanges. Atrophy throughout hands, with spindle deformity of metacarpals.	All kinds.....	C. O.**; C. O. 75 minims.	3.0	11.2	5.3	47.3	33.6	15.9	
606	Portuguese.	M	48	19	Mixed--	A.M.A	Rarefaction through out bones of feet with spindle deformity of metatarsals and phalanges. Atrophy throughout hands, with spindle deformity of metacarpals.	do.....	C. O.**; C. O. 50 minims.	3.02	10.0	3.8	38.0	30.2	11.4	
615	Mexican	M	40	11	Anesthetic.	A.P. Ar.	do.....	do.....	C. O.**; C. O. 50 minims.	2.8	10.0	5.5	35.0	28.0	13.4	

TABLE III—Continued

No.	Race	Sex	Age	Approximate duration of leprosy, years	Type	State of progression	Bone changes; X-ray findings	Eats freely of— Food	Eats sparingly of— Food	Medication general
610	White...	M	32	12	Mixed...	A.M.A.	Hands and feet normal.....	Cereals, eggs, milk, vegetables, fruit.	Meat.....	C. O. *, C. O. 100 minims.
618	Jamaican...	F	35	3	Nodular...	A.M.A.	Moderate degree of rarefaction throughout hands and feet. Slight rarefaction hands and feet; early absorption distal and second phalanges, both feet.	Spinach, carrots, celery, fruit. Meat, milk, eggs, vegetables, fruit.	Cereals.....	C. O. *, C. O. 25 minims.
625	Mexican...	M	28	1	do...	A.E.	Marked rarefaction bones of feet, with spindle deformity of proximal phalanges. Periyodontitis throughout all phalanges of hands and some rarefaction of other bones.	Vegetables, fruit bread.	Meat, spinach.....	C. O. *, C. O. 75 minims.
626	White...	M	52	1½	do...	A.M.A.	General atrophy throughout feet, with marked spindle deformity of metatarsals and phalanges. Hands normal.	Vegetables, fruit, milk, eggs.	Meat.....	C. O. *, C. O. 25 minims.
627	do...	F	62	do...	Mixed...	A.E.	Atrophy and spindle deformity in phalanges of feet; atrophy throughout hands.	do.....	do.....	do.....
628	do...	F	27	2½	do...	A.E.	Moderate atrophy hands and feet. Spindle deformity and some absorption in phalanges of feet.	do.....	do.....	do.....
630	do...	M	55	1	Nodular...	A.M.A.	Moderate atrophy hands and feet. Spindle deformity and some absorption in phalanges of feet.	do.....	do.....	do.....
63	do...	F	27	20	Mixed...	A.M.A.	Meat, milk, vegetables, fruit.	Eggs, cereals.....	do.....	do.....

632	do.	M	55	5	Anesthet- ic.	AMA	Small amount of atrophy in bones of hands and feet.	Fruit, vegetable, spinach, bread.	Cereals, meat.	C. O. 30 minims	3.12	9.5	4.5	47.3	29.6	14.0
634	Filipino.	M	23	1/2	do	AE	Hands normal.	All kinds	None		2.8	9.2	4.0	43.4	25.7	11.2
636	Mex- ican.	F	42	3/4	Nodular	AE	Practically no changes.	Vegetables, eggs, milk, bread	Meat, fruit.	do.	2.8	9.5	5.8	61.0	26.6	16.2
637	Hawai- ian.	F	23	1/2	Mixed	AE	Rarefaction throughout feet with spindles, de- formity of proximal phalanges. Atrophy throughout hands.	Vegetables, fruit bread.	Meat	do.	3.0	9.8	4.8	48.9	29.7	14.7
					Average											
											3.38	10.1	4.75	46.8	34.1	14.0

In the above series the average findings of inorganic phosphorus, total calcium, and consequently the calcium-phosphorus balance ratio, were practically the same in the sera of the lepromatous patients as in the control sera and were well within the normal range. The average findings of diffusible calcium, however, were considerably lower in the patients than in the controls, the patients averaging 4.75 mgm. per 100 c. c. of serum to controls 5.8 mgm.; thus the per cent of calcium that was diffusible in the patients was 46.8, against 57.8 in the controls. The diffusible calcium-phosphorus balance ratio (diffusible calcium \times inorganic phosphorus) averaged 16 in the patients, as compared to 18.8 in the controls. A very wide range of diffusible calcium was found in the patients' sera; the largest quantity was 6.2 mgm., while the smallest was 3.1 mgm. per 100 c. c. of serum. The per cent of calcium that was diffusible ranged between 61 and 29.8. In the controls the quantity of diffusible calcium ranged between 6.5 mgm. and 5.4 mgm. per 100 c. c. of serum, and the per cent of calcium that was diffusible was between 64.5 and 52.1.

Fourteen patients were taking 75 or more minims of chaulmoogra oil daily by mouth over a long period of time; one of these, taking 100 minims daily, had 5.8 mgm. of diffusible calcium in the serum, representing 58 per cent of the total calcium, while another, taking 300 minims, had 3.1 mgm., representing 29.8 per cent, showing that chaulmoogra oil probably does not have any influence on the diffusible calcium.

The food served to these patients represented the best that could be purchased and was served in excellent variety. An investigation was made of the varieties that were eaten freely and those eaten sparingly, and it was concluded that the food had no influence on the chemical findings in the serum of this series.

Bones of the hands and feet of 48 of the 53 patients were examined by X ray, and it was found that 44 had atrophy either in the form of decalcification or bone absorption to some degree. Twenty-one of these 48 patients had marked bone atrophy, 10 had atrophy in a moderate degree, 6 had slight atrophy and 4 were practically normal, while 10 showed atrophy in varying degrees, with evidence of proliferation or regenerative changes.

The diffusible calcium of the 21 patients showing marked bone atrophy (Table IV) averaged 4.5 mgm. per 100 c. c. of serum; only 2 of these patients had diffusible calcium within the normal range. Patient No. 275 had 6.2 mgm. and No. 401 had 5.8., while 15 of these patients had less than 5 mgm. per 100 c. c. of serum, the lowest of which was 3.1 mgm. Of the 10 patients showing moderate bone atrophy (Table V), an average of 4.8 mgm. was found. Two of these patients had diffusible calcium barely within normal limits, 5.5 mgm.,

while five patients had less than 5.0 mgm. per 100 c. c. of serum. Of six patients showing slight bone atrophy (Table VI), the average findings were 5.0 mgm., and for the four patients having practically normal bones (Table VII) the average findings were 5.1 mgm. per 100 c. c. of serum. Of the seven patients showing evidence of proliferative changes and bone atrophy (Table VIII), the average findings were 5.0 mgm. per 100 c. c. of serum.

TABLE IV.—*Patients showing marked bone atrophy*

Reg. No.	Phos- phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium- phosphorus balance	Diffusible calcium- phosphorus balance
	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
43	3.2	9.8	4.6	46.9	31.3	14.7
275	3.34	12.0	6.2	51.6	40.0	20.7
276	3.12	10.0	5.4	54.0	31.2	16.8
370	3.4	9.8	4.2	42.8	33.3	14.2
401	3.2	11.0	5.8	52.7	35.2	18.5
525	3.75	9.4	4.6	48.9	35.2	17.2
528	2.88	9.4	4.9	52.0	27.0	14.3
536	1.9	9.6	3.8	39.5	18.2	7.2
537	3.07	10.4	3.1	29.8	31.1	9.5
549	3.0	10.4	3.9	37.4	31.2	11.7
552	2.5	9.5	4.6	48.4	23.7	11.5
557	3.25	10.2	3.2	31.3	33.1	10.4
558	3.4	9.6	3.4	35.4	31.6	11.5
590	3.56	10.5	5.1	48.5	37.3	18.1
598	3.7	11.0	4.5	40.9	40.7	16.6
491	4.16	11.4	5.2	45.7	47.3	21.6
606	3.02	10.0	3.8	38.0	30.2	11.4
627	4.16	10.9	4.2	38.5	45.6	17.4
628	2.6	10.2	4.5	44.1	26.5	11.7
630	3.12	10.2	5.0	49.0	31.8	15.6
637	3.0	9.8	4.8	48.9	29.7	14.7
Average	3.2	10.2	4.5	44.0	32.9	14.5

TABLE V.—*Patients showing moderate bone atrophy*

Reg. No.	Phos- phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium- phosphorus balance	Diffusible calcium- phosphorus balance
	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
174	3.25	10.8	4.8	44.4	35.1	15.6
332	4.16	9.7	5.5	56.7	40.3	22.6
452	3.7	11.2	5.1	45.5	41.4	18.6
514	3.4	10.2	4.4	43.5	34.6	14.9
523	3.7	9.0	4.3	47.7	33.3	15.9
545	2.7	11.2	3.9	34.8	30.2	14.4
553	2.7	10.3	5.3	51.4	27.8	14.0
615	2.8	10.0	5.5	55.0	28.0	15.4
618	3.2	9.8	5.0	51.0	31.3	16.5
631	2.88	9.2	4.6	50.0	26.4	13.3
Average	3.24	10.1	4.8	48.0	32.8	16.1

TABLE VI.—*Patients showing slight bone atrophy*

Reg. No.	Phos-phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
535	3.75	10.3	5.2	50.4	38.6	19.5
543	3.3	10.6	5.4	50.9	34.9	17.8
602	3.11	11.2	5.1	45.5	34.7	15.8
605	3.0	11.2	5.3	47.3	33.6	15.9
625	3.6	10.5	4.8	45.7	37.8	17.2
632	3.12	9.5	4.5	47.3	29.6	14.1
Average.....	3.31	10.5	5.0	47.8	34.8	16.7

TABLE VII.—*Patients having practically no bone changes*

Reg. No.	Phos-phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
559	2.22	11.5	4.9	42.5	25.5	10.8
616	3.5	10.0	5.8	58.0	35.0	20.3
634	2.8	9.2	4.0	43.4	25.7	11.2
636	2.8	9.5	5.8	61.0	28.6	16.2
Average.....	2.83	10.0	5.1	51.2	28.2	14.5

TABLE VIII.—*Patients showing bone atrophy and proliferative changes*

Reg. No.	Phos-phorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Mgms. per 100 c. c. serum</i>	<i>Per cent</i>	<i>Ratio</i>	<i>Ratio</i>
485	3.9	9.9	5.0	50.0	38.7	19.5
504	3.4	9.1	5.0	54.8	30.9	17.0
522	3.0	9.6	4.6	47.8	28.8	13.8
527	3.75	10.0	5.1	51.0	37.5	19.1
540	3.0	10.0	4.8	48.0	30.0	14.4
560	3.7	11.9	5.6	47.0	44.0	20.5
565	7.5	9.6	5.0	52.0	72.0	37.5
Average.....	4.03	10.0	5.0	50.0	40.3	20.2

A study of the patients' sera in the various types and stages of progression of leprosy was made, and the diffusible calcium was found to average lower in the mixed and anesthetic types than in the nodular type of the disease and lower in the far advanced stage than in the early or moderately advanced. (Tables IX, X, XI, and XII.) The per cent of diffusible calcium was slightly lower in the early stage than in the moderately advanced stage of progression.

TABLE IX.—*Stage of progression: Active far advanced leprosy*
NODULAR TYPE

Reg. No.	Duration (years)	X-ray findings	Phos-phorus	Cal-cium (total)	Diffus-ible cal-cium	Diffus-ible cal-cium	Cal-cium-phos-phorus balance	Diffus-ible cal-cium-phos-phorus balance
276	20	Marked bone atrophy	Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Per cent	Ratio	Ratio
504	11	Bone atrophy with proliferation	3.12	10.0	5.4	54.0	31.2	16.8
518	10		3.4	9.1	5.0	54.8	31.9	17.0
526	11	Marked bone atrophy	3.4	9.0	4.4	48.8	30.6	14.9
552	19	do	3.75	9.4	4.6	48.9	35.2	17.2
590	11	do	2.5	9.5	4.6	48.4	23.7	11.5
Average			3.56	10.5	5.1	48.5	37.3	18.1
			3.28	9.5	4.8	50.5	31.6	15.9

ANESTHETIC TYPE

43	17	Marked bone atrophy	3.2	9.8	4.6	46.9	31.3	14.7
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MIXED TYPE

335	9	Marked bone atrophy	4.5	8.6	3.8	44.1	38.7	17.1
598	15		3.7	11.0	4.5	40.9	40.7	16.6
Average			4.1	9.8	4.1	42.5	42.7	16.8

TABLE X.—*Stage of progression: Active moderately advanced leprosy*
NODULAR TYPE

Reg. No.	Duration (years)	X-ray findings	Phos-phorus	Cal-cium (total)	Diffus-ible cal-cium	Diffus-ible cal-cium	Cal-cium-phos-phorus balance	Diffus-ible cal-cium-phos-phorus balance
174	11	Moderate bone atrophy	Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Per cent	Ratio	Ratio
136	8		3.25	10.8	4.8	44.4	35.1	15.6
452	4	Moderate bone atrophy	3.56	10.5	4.9	46.6	37.3	17.4
528	6	Marked bone atrophy	3.7	11.2	5.1	45.5	41.4	18.6
560	6	Bone atrophy with proliferation	2.88	9.4	4.9	52.0	27.0	14.3
565	6	do	3.7	11.9	5.6	47.0	44.0	20.5
491	5	Marked bone atrophy	7.5	9.6	5.0	52.0	72.0	37.5
618	3	Moderate bone atrophy	4.16	11.4	5.2	45.7	47.3	21.6
626	1	Moderate bone atrophy	3.2	9.8	5.0	51.0	31.3	16.5
630	1	Marked bone atrophy	3.26	10.0	5.5	55.0	32.6	17.0
Average			3.12	10.2	5.0	49.0	31.8	15.6
			3.83	10.4	5.1	48.8	39.8	19.4

ANESTHETIC TYPE

522	7	Bone atrophy with proliferation	3.0	9.6	4.6	47.8	28.8	13.8
549	20	Marked bone atrophy	3.0	10.4	3.9	37.4	31.2	11.7
557	21	do	3.25	10.2	3.2	31.3	33.1	10.4
632	5	Slight bone atrophy	3.12	9.5	4.5	47.3	29.6	14.1
Average			3.09	9.9	4.0	40.9	30.7	12.5

TABLE X.—*Stage of progression: Active moderately advanced leprosy—Continued*

MIXED TYPE

Reg. No.	Duration (years)	X-ray findings	Phosphorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
241	12							
275	11	Marked bone atrophy	4.3	10.2	4.1	40.1	43.8	17.6
332	8	Moderate bone atrophy	3.34	12.0	6.2	51.6	40.0	20.7
370	8	Marked bone atrophy	4.16	9.7	5.5	56.7	40.3	22.6
401	12	do	3.4	9.8	4.2	42.8	33.3	14.2
514	13	Moderate bone atrophy	3.2	11.0	5.8	52.7	35.2	18.5
523	4	do	3.4	10.2	4.4	43.5	34.6	14.9
535	4	Slight bone atrophy	3.7	9.0	4.3	47.7	33.3	15.9
553	4	Moderate bone atrophy	3.75	10.3	5.2	50.4	38.6	19.5
558	7	Marked bone atrophy	2.7	10.3	5.3	51.4	27.8	14.0
602	3	Slight bone atrophy	3.4	9.6	3.4	35.4	31.6	11.5
606	19	Marked bone atrophy	3.11	11.2	5.1	45.5	34.7	15.8
616	12	Normal bones	3.02	10.0	3.8	38.0	30.2	11.4
631	20	Moderate bone atrophy	3.5	10.0	5.8	58.0	35.0	20.3
Average			2.88	9.2	4.6	50.0	26.4	13.3
				3.41	10.1	4.8	47.4	34.5
								16.5

TABLE XI.—*Stage of progression: Active early leprosy*

NODULAR TYPE

Reg. No.	Duration, (years)	X-ray findings	Phosphorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
540	1½	Bone atrophy with proliferation	3.0	10.0	4.8	48.0	30.0	14.4
545	2	Moderate bone atrophy	2.7	11.2	3.9	34.8	30.2	14.4
559	3	Normal bones	2.22	11.5	4.9	42.5	25.5	10.8
605	2	Slight bone atrophy	3.0	11.2	5.3	47.3	33.6	15.9
625	1	do	3.6	10.5	4.8	45.7	37.8	17.2
636	½	Normal bones	2.8	9.5	5.8	61.0	26.6	16.2
Average			2.88	10.6	4.9	46.5	30.6	14.8

ANESTHETIC TYPE

634	½	Normal bones	2.8	9.2	4.0	43.4	25.7	11.2
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MIXED TYPE

485	13	Bone atrophy with proliferation	3.9	9.9	5.0	50.0	38.7	19.5
527	11	do	3.75	10.0	5.1	51.0	37.5	19.1
537	2	Marked bone atrophy	3.07	10.4	3.1	29.8	31.1	9.5
543	3	Slight bone atrophy	3.3	10.6	5.4	50.9	34.9	17.8
627	½	Marked bone atrophy	4.16	10.9	4.2	38.5	45.6	17.4
628	2½	do	2.6	10.2	4.5	44.1	26.5	11.7
637	½	do	3.0	9.8	4.8	48.9	29.7	14.7
Average			3.39	10.2	4.5	44.7	34.8	15.6

TABLE XII.—*Stage of progression*

ARRESTED

Reg. No.	Duration, (years)	X-ray findings	Phosphorus	Calcium (total)	Diffusible calcium	Diffusible calcium	Calcium-phosphorus balance	Diffusible calcium-phosphorus balance
			Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Mgms. per 100 c. c. serum	Per cent	Ratio	Ratio
536-----	5	Marked bone atrophy-----	1.9	9.6	3.8	39.5	18.2	7.2

APPARENTLY ARRESTED: ANESTHETIC TYPE

615-----	11	Moderate bone atrophy-----	2.8	10.0	5.5	55.0	28.0	15.4
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The diffusible calcium-phosphorus balance ratio (diffusible calcium \times inorganic phosphorus in the serum) was calculated, and it was found that this factor was lower in the patients having marked and moderate bone atrophy than in those having slight atrophy and atrophy with proliferation due to the lower amounts of diffusible calcium. Patients having practically no bone changes also had a low balance ratio, due to low inorganic phosphorus content, though the diffusible calcium was relatively high. The diffusible calcium-phosphorus balance ratio in the sera of the controls averaged higher than in the patients'.

SUMMARY

Sera from 47 lepers were analyzed for calcium and inorganic phosphorus; the results were found to be within the range usually considered normal.

Sera from 15 normal, healthy young men were examined for inorganic phosphorus, total calcium, diffusible calcium; the per cent of calcium that was diffusible, the calcium phosphorus, and the diffusible calcium-phosphorus balance ratios were determined. Sera from 53 lepers, representing the various types and stages of progression of the disease, were similarly examined.

The diffusible calcium and the per cent of total calcium that was diffusible averaged considerably lower in the lepers than in the normal young men, and in only a few instances did the diffusible calcium in the lepers approximate the level found in the controls.

Radiographic studies of the bones of the hands and feet of 48 of these lepers showed bone atrophy in 44 (91.0 per cent), the condition manifesting itself either as decalcification or absorption.

The writers appreciate that the records here submitted do not include a sufficient number of cases, observed over a sufficiently long period, to warrant the drawing of conclusions; it is thought,

however, that deviation from the presumed normal has been marked enough to justify continuation of the investigation.

ACKNOWLEDGMENTS

It is desired to express appreciation to Dr. Paul McIlhenny, consulting orthopedist, for interpreting the Röntgenograms, and to Dr. O. E. Denney, medical officer in charge, for his helpful suggestions throughout this experiment.

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DEATHS FROM INFLUENZA AND PNEUMONIA IN LARGE CITIES

Deaths from influenza and pneumonia (all forms) in certain large cities of the United States during the three weeks ended February 28, 1931—a continuation of the table appearing on page 483 of the Public Health Reports dated February 27, 1931. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

City	Influenza			Pneumonia		
	Week ended—			Week ended—		
	Feb. 28	Feb. 21	Feb. 14	Feb. 28	Feb. 21	Feb. 14
Total.....	316	352	341	1,409	1,484	1,485
Akron.....	1	3	0	8	5	4
Albany.....	1	1	2	9	9	14
Atlanta.....	16	14	10	18	15	11
Baltimore.....	7	13	17	42	55	62
Birmingham.....	3	7	1	8	12	8
Boston.....	3	7	7	35	48	66
Bridgeport.....	2	3	1	5	6	5
Buffalo.....	0	4	2	50	43	33
Cambridge.....	1	0	0	6	3	8
Camden.....	1	5	4	5	11	7
Canton.....	0	0	0	4	3	2
Chicago.....	18	26	54	88	104	130
Cincinnati.....	15	11	3	24	23	11
Cleveland.....	15	20	8	33	44	29
Columbus.....	4	1	4	7	10	11

Deaths from influenza and pneumonia (all forms) in certain large cities of the United States during the three weeks ended February 28, 1931—a continuation of the table appearing on page 483 of the Public Health Reports dated February 27, 1931. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Influenza			Pneumonia		
	Week ended—			Week ended—		
	Feb. 28	Feb. 21	Feb. 14	Feb. 28	Feb. 21	Feb. 14
Dallas.....	5	5	0	6	10	7
Dayton.....	1	2	1	7	8	8
Denver.....	4	7	6	21	12	12
Des Moines.....	0	0	0	5	2	8
Detroit.....	21	27	11	56	64	52
Duluth.....	5	2	0	2	4	1
El Paso.....	1	1	1	5	8	4
Erie.....	0	2	2	0	7	5
Fall River.....	1	1	0	5	3	4
Flint.....	3	1	1	6	2	3
Fort Worth.....	2	4	1	3	1	4
Grand Rapids.....	1	2	0	2	0	2
Houston.....	0	1	5	12	13	5
Indianapolis.....	3	1	5	38	27	24
Jersey City.....	1	1	2	18	18	21
Kansas City, Kans.....	0	0	1	10	6	5
Kansas City, Mo.....	2	1	3	23	21	21
Knoxville.....	3	1	4	4	8	3
Long Beach.....	1	0	0	3	3	0
Los Angeles.....	6	5	1	23	20	14
Louisville.....	4	1	1	18	18	14
Lowell.....	0	0	2	3	1	7
Lynn.....	0	0	0	3	7	3
Memphis.....	4	7	2	10	11	8
Miami.....	1	1	3	3	2	0
Milwaukee.....	14	8	7	19	14	18
Minneapolis.....	8	3	2	18	10	13
Nashville.....	6	6	2	14	14	6
New Bedford.....	0	0	0	3	8	11
New Haven.....	1	2	0	8	5	5
New Orleans.....	5	14	16	22	19	16
New York.....	32	30	49	265	277	308
Newark, N. J.....	0	3	2	13	19	21
Oakland.....	2	2	1	4	4	2
Oklahoma City.....	0	1	0	8	15	3
Omaha.....	0	4	0	16	8	1
Paterson.....	2	1	0	7	3	6
Philadelphia.....	16	27	35	66	75	89
Pittsburgh.....	26	21	15	61	70	85
Portland, Oreg.....	1	0	0	3	5	6
Providence.....	1	0	5	15	21	16
Richmond.....	3	9	3	5	9	9
Rochester.....	5	2	0	13	15	11
St. Louis.....	0	0	9	61	68	70
St. Paul.....	2	0	0	8	6	2
Salt Lake City.....	0	0	0	3	4	2
San Antonio.....	3	7	2	13	9	11
San Diego.....	0	1	0	0	2	1
San Francisco.....	8	4	4	18	15	15
Schenectady.....	1	1	1	3	1	2
Seattle.....	0	1	1	6	4	4
Somerville.....	0	0	1	9	5	9
South Bend.....	1	1	0	5	3	3
Spokane.....	0	1	0	2	0	1
Springfield, Mass.....	2	0	2	5	9	14
Syracuse.....	4	0	0	2	4	4
Tacoma.....	1	0	1	4	3	2
Toledo.....	6	5	1	19	15	10
Trenton.....	1	1	2	6	10	3
Utica.....	0	1	1	4	9	7
Washington, D. C.....	3	4	8	29	35	28
Waterbury.....	1	1	3	1	4	7
Wilmington, Del.....	2	0	2	5	3	12
Worcester.....	0	2	1	5	3	6
Yonkers.....	0	0	0	5	5	4
Youngstown.....	3	1	0	3	9	6

DEATHS DURING WEEK ENDED FEBRUARY 28, 1931

Summary of information received by telegraph from industrial insurance companies for the week ended February 28, 1931, and corresponding week of 1930. (From the Weekly Health Index issued by the Bureau of the Census, Department of Commerce)

	Week ended February 28, 1931	Corresponding week, 1930
Policies in force-----	75, 133, 159	75, 508, 041
Number of death claims-----	16, 973	16, 741
Death claims per 1,000 policies in force, annual rate-----	11. 8	11. 6

Deaths¹ from all causes in certain large cities of the United States during the week ended February 28, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)

[The rates published in this summary are based upon mid-year population estimates derived from the 1930 census]

City	Week ended Feb. 28, 1931				Corresponding week, 1930		Death rate ² for first 9 weeks	
	Total deaths	Death rate ²	Deaths under 1 year	Infant mortality rate ³	Death rate ²	Deaths under 1 year	1931	1930
Total (81 cities)-----	9, 569	14. 0	920	4. 73	14. 1	890	14. 2	13. 4
Akron-----	42	8. 5	3	30	7. 3	3	8. 4	8. 7
Albany ⁴ -----	43	17. 4	2	40	20. 0	5	15. 5	16. 9
Atlanta-----	86	16. 2	6	61	21. 5	9	16. 7	17. 6
White-----	47		2	32		2		
Colored-----	39	(6)	4	115	(6)	7	(6)	(6)
Baltimore ⁵ -----	257	16. 5	26	88	14. 9	23	17. 6	15. 4
White-----	193		21	91		18		
Colored-----	64	(6)	5	78	(6)	5	(6)	(6)
Birmingham-----	78	15. 1	9	91	16. 7	11	15. 0	14. 5
White-----	42		4	69		5		
Colored-----	36	(6)	5	122	(6)	6	(6)	(6)
Boston-----	239	15. 9	21	60	16. 3	31	17. 7	15. 9
Bridgeport-----	40	14. 2	3	50	14. 2	4	14. 1	14. 2
Buffalo-----	207	18. 6	26	106	17. 9	22	15. 3	14. 5
Cambridge-----	28	12. 8	5	101	16. 5	1	14. 4	13. 9
Camden-----	41	18. 0	8	139	14. 1	11	19. 2	14. 5
Canton-----	32	15. 6	1	23	16. 8	4	11. 2	12. 4
Chicago ⁶ -----	787	11. 9	97	86	12. 8	78	12. 4	11. 8
Cincinnati-----	192	21. 9	16	96	19. 8	18	18. 2	17. 7
Cleveland-----	233	13. 3	16	47	12. 6	28	12. 0	12. 3
Columbus-----	87	15. 4	8	78	20. 7	7	14. 6	15. 4
Dallas-----	72	13. 8	8	-----	11. 3	11	12. 7	13. 7
White-----	51		6			10		
Colored-----	21	(6)	2		(6)	1	(6)	(6)
Dayton-----	65	16. 4	8	112	11. 6	3	13. 8	10. 8
Denver-----	85	15. 2	11	106	15. 0	9	16. 1	15. 6
Des Moines-----	33	11. 9	1	18	7. 3	1	12. 4	12. 8
Detroit-----	362	11. 4	70	112	11. 6	57	9. 6	10. 7
Duluth-----	29	14. 9	3	74	9. 2	2	12. 4	11. 5
El Paso-----	30	14. 9	3	-----	13. 2	5	20. 4	19. 2
Erie-----	28	12. 4	1	19	9. 9	3	11. 6	11. 4
Fall River ⁷ -----	30	13. 6	4	91	14. 9	0	13. 5	14. 1
Flint-----	32	10. 2	8	102	13. 9	13	7. 7	10. 1
Fort Worth-----	29	9. 0	0	-----	13. 3	2	11. 4	13. 1
White-----	24		0			1		
Colored-----	5	(6)	0		(6)	1	(6)	(6)
Grand Rapids-----	31	9. 4	5	74	12. 9	5	9. 4	11. 1
Houston-----	74	12. 4	9	-----	15. 0	5	12. 2	13. 7
White-----	55		6			5		
Colored-----	19	(6)	3		(6)	0	(6)	(6)
Indianapolis-----	122	17. 2	10	82	14. 3	8	15. 6	16. 8
White-----	109		10	94		8		
Colored-----	13	(6)	0	0	(6)	0	(6)	(6)
Jersey City-----	76	12. 4	7	62	10. 7	13	14. 2	12. 8

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended February 28, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the Weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued

City	Week ended Feb. 28, 1931				Corresponding week, 1930		Death rate ¹ for first 6 weeks	
	Total deaths	Death rate ¹	Deaths under 1 year	Infant mortality rate ²	Death rate ¹	Deaths under 1 year	1931	1930
Kansas City, Kans.	51	21.6	5	103	13.2	1	17.1	13.3
White	39	—	5	123	—	0	—	—
Colored	12	(*)	0	0	(*)	1	(*)	(*)
Kansas City, Mo.	136	17.3	13	99	15.3	5	15.5	14.5
Knoxville	34	16.2	6	128	16.6	1	14.5	15.0
White	23	—	4	95	—	1	—	—
Colored	11	(*)	2	407	(*)	0	(*)	(*)
Long Beach	28	9.6	2	48	8.7	1	10.9	10.2
Los Angeles	330	13.1	34	99	12.1	27	12.4	12.5
Louisville	97	16.4	6	51	12.5	3	17.0	14.8
White	78	—	6	59	—	3	—	—
Colored	19	(*)	0	0	(*)	0	(*)	(*)
Lowell ⁷	27	14.0	4	102	20.7	4	14.6	15.5
Lynn	20	10.2	2	52	17.3	2	12.9	13.0
Memphis	98	19.7	9	95	17.9	8	17.6	17.2
White	49	—	4	67	—	6	—	—
Colored	49	(*)	5	145	(*)	2	(*)	(*)
Miami	38	17.6	3	76	12.7	2	14.5	13.1
White	25	—	0	0	—	1	—	—
Colored	13	(*)	3	265	(*)	1	(*)	(*)
Milwaukee	117	10.3	12	52	11.8	20	10.7	10.9
Minneapolis	114	12.5	7	45	14.5	9	12.6	11.9
Nashville	77	25.8	8	119	13.9	3	18.1	16.8
White	50	—	5	100	—	1	—	—
Colored	27	(*)	3	177	(*)	2	(*)	(*)
New Bedford ⁷	35	16.2	2	53	17.6	2	14.2	12.2
New Haven	46	14.7	2	38	14.4	4	13.4	15.3
New Orleans	176	19.6	12	66	18.6	15	20.8	20.1
White	98	—	6	50	—	10	—	—
Colored	78	(*)	6	98	(*)	5	(*)	(*)
New York	1,676	12.3	159	68	13.0	174	14.1	12.1
Bronx Borough	241	9.4	22	50	9.7	19	10.2	8.6
Brooklyn Borough	543	10.8	65	69	12.3	75	13.1	11.2
Manhattan Borough	689	19.8	49	83	18.5	62	21.3	17.9
Queens Borough	164	7.4	18	49	7.5	11	9.3	7.8
Richmond Borough	39	12.4	5	90	22.9	7	14.4	15.4
Newark, N. J.	101	11.8	6	31	16.2	10	14.4	14.7
Oakland	59	10.5	2	26	13.0	1	12.0	12.4
Oklahoma City	42	11.1	3	41	12.2	5	11.5	10.7
Omaha	77	18.5	8	90	17.5	2	15.5	14.7
Paterson	59	22.2	3	52	19.6	4	15.8	13.7
Philadelphia	553	14.7	51	74	14.7	54	16.5	13.9
Pittsburgh	241	18.6	18	62	16.2	16	18.1	15.6
Portland, Oreg.	75	12.7	3	36	12.1	3	13.0	14.2
Providence	84	17.2	8	74	14.2	13	16.0	15.5
Richmond	61	17.3	4	58	17.4	5	18.2	16.7
White	38	—	2	44	—	2	—	—
Colored	23	(*)	2	87	(*)	3	(*)	(*)
Rochester	110	17.3	7	64	13.6	4	14.2	12.7
St. Louis	324	20.4	17	57	15.1	8	18.8	15.2
St. Paul	50	9.4	6	62	12.4	3	10.8	11.6
Salt Lake City ³	35	12.8	3	45	15.6	3	12.9	14.7
San Antonio	67	14.6	14	—	16.5	13	15.4	19.4
San Diego	42	14.0	1	20	12.9	2	16.4	16.2
San Francisco	171	13.7	7	46	16.4	8	14.8	14.5
Schenectady	25	13.6	5	147	9.3	0	11.6	10.5
Seattle	93	13.0	8	76	14.1	3	12.6	11.9
Somerville	30	14.9	4	149	14.0	3	12.3	13.1
South Bend	25	12.1	1	25	12.4	1	8.8	10.2
Spokane	20	13.4	1	26	14.9	1	13.1	13.6
Springfield, Mass.	49	16.8	3	46	14.9	6	14.3	14.8
Syracuse	53	13.0	3	36	15.4	3	13.5	13.4
Tacoma	28	13.5	3	77	14.1	0	14.9	12.5
Toledo	87	15.4	10	92	15.4	4	13.2	14.4
Trenton	43	18.1	4	70	27.5	9	19.6	19.1
Utica	29	14.8	0	0	16.9	3	16.2	15.4

Footnotes at end of table.

Deaths from all causes in certain large cities of the United States during the week ended February 28, 1931, infant mortality, annual death rate, and comparison with corresponding week of 1930. (From the weekly Health Index, issued by the Bureau of the Census, Department of Commerce)—Continued.

City	Week ended Feb. 28, 1931				Corresponding week, 1930		Death rate ² for first 9 weeks	
	Total deaths	Death rate ¹	Deaths under 1 year	Infant mortality rate ³	Death rate ¹	Deaths under 1 year	1931	1930
Washington, D. C.	185	19.6	19	105	14.7	7	19.0	16.2
White	114		4	33		4		
Colored	71	(6)	15	258	(6)	3	(6)	(6)
Waterbury	16	8.3	3	90	8.9	1	11.2	10.6
Wilmington, Del.	28	13.7	1	22	16.1	4	16.5	16.0
Worcester	52	13.7	3	41	17.6	9	15.4	15.4
Yonkers	26	9.8	4	105	12.3	6	11.1	9.3
Youngstown	29	8.7	6	84	12.8	3	11.4	.0
								11

¹ Deaths of nonresidents are included. Stillbirths are excluded.

² These rates represent annual rates per 1,000 population, as estimated for 1931 and 1930 by the arithmetical method.

³ Deaths under 1 year of age per 1,000 live births. Cities left blank are not in the registration area for births.

¹ Date for 76 cities.

² Deaths for week ended Friday.

³ For the cities for which deaths are shown by color, the percentage of colored population in 1920 was as follows: Atlanta, 31; Baltimore, 15; Birmingham, 39; Dallas, 15; Fort Worth, 14; Houston, 25; Indianapolis, 11; Kansas City, Kans., 14; Knoxville, 15; Louisville, 17; Memphis, 38; Miami, 31; Nashville, 30; New Orleans, 26; Richmond, 32; and Washington, D. C., 25.

¹ Population Apr. 1, 1930; decreased 1920 to 1930; no estimate made.

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 March 7, 1931, and March 8, 1930

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 7, 1931, and March 8, 1930

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930
New England States:								
Maine	2	3	116	27	31	82	1	0
New Hampshire		5	12		18	13	0	1
Vermont	1	1	3		1	2	0	0
Massachusetts	44	62	30	7	524	680	3	3
Rhode Island	10	13	3			4	1	0
Connecticut	6	22	13	20	503	39	2	0
Middle Atlantic States:								
New York	123	132	149	124	1,427	761	20	25
New Jersey	69	130	50	27	728	659	5	6
Pennsylvania	100	138			2,884	915	24	5
East North Central States:								
Ohio	48	56	167	33	615	747	1	10
Indiana	39	21	95		787	135	9	23
Illinois	187	145	90	13	1,496	578	19	13
Michigan	25	64	209	10	141	603	23	37
Wisconsin	9	12	196	34	337	979	1	2
West North Central States:								
Minnesota	12	6	1		58	284	4	6
Iowa	13	11	1		16	690	3	1
Missouri	33	48	56	15	397	80	6	20
North Dakota	2	4			17	36	0	3
South Dakota	8	3			27	225	0	1
Nebraska	14	25	10	22	15	541	0	2
Kansas	7	16	70	1	21	365	1	3
South Atlantic States:								
Delaware	2	3	33	1	46	3	0	0
Maryland ¹	19	26	228	48	801	27	2	2
District of Columbia	30	13	4	4	154	11	2	0
West Virginia	11	25	229	42	40	96	1	2
North Carolina	24	31	185	21	574	50	5	5
South Carolina	17	9	2,652	1,072	99		3	6
Georgia	9	10	956	154	167	285	1	5
Florida	9	13	222	4	127	275	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 March 7, 1931, and March 8, 1930—Continued

Division and State	Diphtheria		Influenza		Measles		Meningococcus meningitis	
	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930
East South Central States:								
Kentucky					284	114	6	3
Tennessee	10	18	312	82	137	269	6	54
Alabama	26	11	442	153	641	242	8	3
Mississippi	9	16					3	25
West South Central States:								
Arkansas	4	20	319	118	35	8	0	4
Louisiana	30	25	40	53	26	69	2	5
Oklahoma	7	19	138	82	23	359	2	4
Texas	31	51	59	77	92	192	1	2
Mountain States:								
Montana	4	2			5	31	1	0
Idaho		1			2	38	1	0
Wyoming		3			1	12	0	2
Colorado	9	13			346	256	0	5
New Mexico	5	4	18	2	47	101	3	2
Arizona	6	5	11	48	180	5	1	7
Utah		3	19	4	5	139	0	5
Pacific States:								
Washington	9	5	1	2	44	243	0	2
Oregon	3	1	161	60	58	57	1	2
California	70	52	602	52	1,205	1,514	6	5

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930
New England States:								
Maine	0	0	33	37	0	0	3	0
New Hampshire	0	0	2	13	0	0	0	0
Vermont	0	0	5	5	0	5	0	0
Massachusetts	0	0	318	284	0	0	2	2
Rhode Island	0	0	55	28	0	6	0	0
Connecticut	0	0	62	163	0	0	1	0
Middle Atlantic States:								
New York	1	1	876	558	11	1	10	9
New Jersey	0	1	291	290	0	0	2	3
Pennsylvania	0	2	643	557	0	2	24	17
East North Central States:								
Ohio	2	2	508	328	51	240	3	11
Indiana	0	0	400	212	149	160	2	4
Illinois	2	3	677	612	36	97	2	2
Michigan	0	0	366	363	19	63	10	0
Wisconsin	3	0	178	208	8	31	7	0
West North Central States:								
Minnesota	0	0	141	145	4	15	3	6
Iowa	0	0	127	87	75	66	1	3
Missouri	0	1	261	106	40	51	4	4
North Dakota	0	0	8	42	8	12	3	1
South Dakota	0	0	19	15	19	63	0	0
Nebraska	1	0	50	71	60	35	0	0
Kansas	1	0	59	113	75	68	3	1
South Atlantic States:								
Delaware	0	0	30	15	0	0	0	0
Maryland	0	0	104	82	0	0	2	4
District of Columbia	0	0	25	11	0	0	0	0
West Virginia	2	0	17	39	14	26	0	45
North Carolina	0	0	50	52	2	20	1	2
South Carolina	2	0	7	12	0	1	1	6
Georgia	0	0	89	18	0	0	3	7
Florida	0	2	11	6	2	0	2	3

* Week ended Friday.

* Figures for 1931 are exclusive of Oklahoma City and Tulsa.

* Typhus fever, 1931: 2 cases in Texas.

Cases of certain communicable diseases reported by telegraph by State health officers for weeks ended March 7, 1931, and March 8, 1930—Continued

Division and State	Poliomyelitis		Scarlet fever		Smallpox		Typhoid fever	
	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930	Week ended Mar. 7, 1931	Week ended Mar. 8, 1930
East South Central States:								
Kentucky	0	0	76	70	8	87	4	1
Tennessee	0	0	68	127	1	67	1	4
Alabama	1	0	36	28	8	8	3	7
Mississippi	0	0	25	20	27	1	3	6
West South Central States:								
Arkansas	0	0	24	37	41	15	3	1
Louisiana	0	0	20	18	23	3	3	17
Oklahoma ²	0	0	37	48	66	103	0	17
Texas ⁴	5	2	42	104	55	350	9	9
Mountain States:								
Montana	0	0	44	40	4	20	5	4
Idaho	0	0	5	5	5	9	1	0
Wyoming	0	0	21	11	2	10	0	0
Colorado	1	0	41	20	11	26	0	3
New Mexico	0	0	14	4	7	1	0	0
Arizona	0	1	1	20	0	29	0	0
Utah ³	0	0	17	7	2	0	0	0
Pacific States:								
Washington	1	0	49	70	25	74	1	0
Oregon	0	1	37	40	33	20	1	1
California	12	3	150	207	71	53	6	7

² Week ended Friday.

³ Figures for 1931 are exclusive of Oklahoma City and Tulsa.

⁴ Typhus fever, 1931: 2 cases in Texas.

SUMMARY OF MONTHLY REPORTS FROM STATES

The following summary of cases reported monthly by States is published weekly and covers only those States from which reports are received during the current week.

State	Menin-goc-cus menin-gitis	Diph-theria	Influ-enza	Malaria	Meas-sles	Pel-lagra	Polio-my-eli-tis	Scarlet fever	Small-pox	Ty-phi-od fever
<i>January, 1931</i>										
Arkansas	6	36	522	32	17	105	1	77	91	22
California	31	267	443	3	1,840	1	32	567	453	33
Idaho	11	24	33				1	89		12
Kansas	8	76	32		141		4	260	507	8
Wisconsin	11	114	433		1,208		6	695	34	10
<i>February, 1931</i>										
Arizona	14	24	45		760		0	2	7	
New Mexico	4	19	88	1	148		0	30	11	2

<i>January, 1931</i>		Cases	Hookworm disease:	Cases
Chicken pox:			Arkansas	
Arkansas		121	California	1
California		2,224	Leprosy:	
Kansas		804	California	2
Wisconsin		2,452	Lethargic encephalitis:	
Dysentery:			California	5
California (amebic)		1	Kansas	2
California (bacillary)		8	Wisconsin	1
German measles:			Mumps:	
California		51	Arkansas	34
Kansas		8	California	1,097
Granuloma, coccidioidal:			Kansas	199
California		2	Wisconsin	2,000

	Cases	Whooping cough—Continued.	Cases
Paratyphoid fever:			
California.....	8	Kansas.....	126
Kansas.....	1	Wisconsin.....	667
Rabies in animals:			
California.....	82	<i>February, 1931</i>	
Scabies:			
Kansas.....	2	Chicken pox:	
Septic sore throat:			
Kansas.....	2	Arizona.....	78
Tetanus:			
California.....	3	New Mexico.....	70
Trachoma:			
Arkansas.....	5	Conjunctivitis:	
California.....	4	New Mexico.....	3
Trench mouth:			
Kansas.....	1	Dysentery:	
Trichinosis:			
California.....	3	Arizona.....	1
Tularaemia:			
California.....	1	German measles:	
Wisconsin.....	1	Arizona.....	3
Undulant fever:			
California.....	8	New Mexico.....	2
Kansas.....	8	Mumps:	
Vincent's angina:			
Kansas.....	7	Arizona.....	27
Whooping cough:			
Arkansas.....	11	New Mexico.....	79
California.....	637	Puerperal septicemia:	
		New Mexico.....	1
		Trachoma:	
		Arizona.....	8
		New Mexico.....	1
		Vincent's angina:	
		New Mexico.....	1
		Whooping cough:	
		Arizona.....	16
		New Mexico.....	12

GENERAL CURRENT SUMMARY AND WEEKLY REPORTS FROM CITIES

The 95 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 32,765,000. The estimated population of the 88 cities reporting deaths is more than 31,220,000. The estimated expectancy is based on the experience of the last nine years, excluding epidemics.

Weeks ended February 28, 1931, and March 1, 1930

		1931	1930	Estimated expectancy
<i>Cases reported</i>				
Diphtheria:				
46 States.....		1,071	1,419	
95 cities.....		439	649	854
Measles:				
45 States.....		13,853	13,374	
95 cities.....		4,390	3,329	
Meningococcus meningitis:				
46 States.....		167	365	
95 cities.....		92	151	
Poliomyelitis:				
46 States.....		22	20	
Scarlet fever:				
46 States.....		6,229	5,910	
95 cities.....		2,358	2,204	1,554
Smallpox:				
46 States.....		950	1,715	
95 cities.....		129	191	59
Typhoid fever:				
46 States.....		145	174	
95 cities.....		45	50	28
<i>Deaths reported</i>				
Influenza and pneumonia:				
88 cities.....		1,566	1,247	
Smallpox:				
88 cities.....		0	0	

City reports for week ended February 28, 1931

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 1922 is included. In obtaining the estimated expectancy, the figures are smoothed when necessary to avoid abrupt deviation 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	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	4	1	0	4	0	0	10	7
New Hampshire:								
Concord	0	0	0		0	0	0	2
Vermont:								
Barre		0						
Massachusetts:								
Boston	69	38	19	12	3	94	14	35
Fall River	3	4	1	1	1	1	11	5
Springfield	2	4	1	1	0	0	4	3
Worcester	11	2	1	4	0	3	8	5
Rhode Island:								
Pawtucket	3	1	3		0	0	1	6
Providence	8	8	5		1	0	0	15
Connecticut:								
Bridgeport	6	6	0	5	2	1	3	3
Hartford	13	5	2	12	0	20	0	9
New Haven	34	1	1	1	1	144	10	8
MIDDLE ATLANTIC								
New York:								
Buffalo	22	13	7	10	3	156	75	50
New York	313	206	83	92	32	687	43	265
Rochester	6	6	2	8	5	1	4	13
Syracuse	10	3	0		4	11	1	2
New Jersey:								
Camden	2	6	2	2	1	78	2	5
Newark	118	16	7	25	1	4	10	12
Trenton	7	2	3	11	1	3	1	6
Pennsylvania:								
Philadelphia	207	68	11	30	16	322	50	66
Pittsburgh	124	20	10	26	26	71	28	61
Reading	11	1	0		0	110	34	6
EAST NORTH CENTRAL								
Ohio:								
Cincinnati	14	8	2	20	15	78	26	24
Cleveland	167	30	12	139	15	11	105	38
Columbus	37	3	2	230	4	3	3	7
Toledo	34	5	6	6	6	3	12	19
Indiana:								
Fort Wayne	3	2	7		1	34	0	8
Indianapolis	68	6	1		3	100	13	33
South Bend	3	1	0		2	1	0	6
Terre Haute	0	0	3		1	1	0	5
Illinois:								
Chicago	106	96	87	32	18	79	60	88
Springfield	5	1	1	8	1	144	1	6
Michigan:								
Detroit	90	47	12	101	23	8	22	64
Flint	20	2	1	149	3	0	8	6
Grand Rapids	10	0	0	1	1	0	0	2
Wisconsin:								
Kenosha	24	1	0	4	0	1	48	2
Madison	38	0	0			1	48	
Milwaukee	132	16	1	16	14	31	303	19
Racine	8	2	0	3	0	3	3	1
Superior	26	0	0		0	0	0	3

City reports for week ended February 28, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumpa, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
WEST NORTH CENTRAL								
Minnesota:								
Duluth	7	0	0		5	0	10	
Minneapolis	68	15	1	1	8	53	63	18
St. Paul	62	7	0		2	1	0	8
Iowa:								
Davenport	1	1	0			0	0	
Des Moines	2	2	0			1	3	
Sioux City	9	0	0			1	7	
Waterloo	2	1	0			0	0	
Missouri:								
Kansas City	5							
St. Joseph	14	0	6		0	0	0	4
St. Louis	23	42	14	21	7	291	16	
North Dakota:								
Fargo	2	0	0		0	0	10	
Grand Forks	1	0	2			0	0	
South Dakota:								
Aberdeen	4	0	0			0	0	
Sioux Falls	0	0	0			0	0	
Nebraska:								
Omaha	16	5	6		0	1	7	16
Kansas:								
Topeka	16	1	0	1	1	1	11	1
Wichita	16	2	0		0	1	3	2
SOUTH ATLANTIC								
Delaware:								
Wilmington	1	2	0		0	9	3	5
Maryland:								
Baltimore	173	24	9	67	7	575	39	42
Cumberland	0	0	0	4	0	0	0	4
Frederick	1	0	0	3	0	2	1	0
District of Columbia:								
Washington	44	16	23	8	3	91	0	29
Virginia:								
Lynchburg	17	0	0		0	2	1	5
Norfolk	10	1	0		0	0	3	5
Richmond	1	3	0		2	490	0	5
Roanoke	4	1	1		1	0	0	3
West Virginia:								
Charleston	1	0	0		0	0	1	8
Wheeling	10	1	0	2	3	0	0	2
North Carolina:								
Raleigh	10	0	0		0	12	0	0
Wilmington	17	0	0		0	6	0	3
Winston-Salem	3	1	0	17	1	0	2	5
South Carolina:								
Charleston	4	0	0	179	1	74	5	12
Columbia	7	1	1		0	1	5	14
Greenville	1	0	0		0	0	0	0
Georgia:								
Atlanta	3	4	5	417	16	58	1	18
Brunswick	0	0	0		0	0	10	0
Savannah	3	1	0	282	2	0	20	7
Florida:								
Miami	14	2	1	3	0	3	2	4
St. Petersburg		0						
Tampa	1	2	0	6	4	98	0	1
EAST SOUTH CENTRAL								
Kentucky:								
Covington	1	0	2	1	2	6	0	10
Tennessee:								
Memphis	48	3	1		4	32	0	10
Nashville	0	1	0		0	27	1	14
Alabama:								
Birmingham	13	2	6	38	3	113	1	8
Mobile	0	1	0	11	3	0	0	1
Montgomery	43	1	1	20		1	0	

City reports for week ended February 28, 1931—Continued

Division, State, and city	Chicken pox, cases reported	Diphtheria		Influenza		Measles, cases reported	Mumps, cases reported	Pneumonia, deaths reported
		Cases, estimated expectancy	Cases reported	Cases reported	Deaths reported			
WEST SOUTH CENTRAL								
Arkansas:								
Fort Smith	4	0	0			1	0	
Little Rock	1	1	0		0	0	2	3
Louisiana:								
New Orleans	4	14	15	6	5	0	0	22
Shreveport	7	0	3		0	0	0	5
Oklahoma:								
Muskogee	4	1	0	6		0	2	
Tulsa	20	1	1			3	0	
Texas:								
Dallas	55	6	11	6	5	0	34	6
Fort Worth	27	4	3		2	0	0	3
Galveston	0	1	1		0	0	0	3
Houston	8	5	3		0	1	0	12
San Antonio	4	3	6		3	5	2	13
MOUNTAIN								
Montana:								
Billings	10	0	0		0	0	0	0
Great Falls	6	0	0		0	1	0	0
Helena	0	0	0		0	0	0	0
Missoula	0	0	0		0	0	0	0
Idaho:								
Boise	0	0	0		0	1	0	1
Colorado:								
Denver	9							
Pueblo	2	1	0		0	121	2	2
New Mexico:								
Albuquerque	2	1	0		0	0	3	2
Arizona:								
Phoenix	3	0	0		0	3	0	2
Utah:								
Salt Lake City	12	2	2		0	0	6	3
Nevada:								
Reno	0	0	2	1	0	0	0	0
PACIFIC								
Washington:								
Seattle	17	5	2			1	24	
Spokane	13	2	0			9	0	
Tacoma	10	2	2		1	0	0	4
Oregon:								
Portland	15	7	1	25	1	31	13	3
Salem	1	0	1			4	17	
California:								
Los Angeles	92	35	23	122	6	89	25	23
Sacramento	21	1	1	41	2	4	6	4
San Francisco	62	15	1	286	8	11	1	7

Division, State, and city	Scarlet fever		Smallpox			Tuber-cu-losis, deaths re-reported	Typhoid fever			Whoop-ing cough, cases re-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	4	11	0	0	0	1	0	0	0	23	28
New Hampshire:											
Concord	1	1	0	0	0	0	0	0	0	0	6
Vermont:											
Barre	0		0			0					

City reports for week ended February 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber-cu-losis, deaths re-ported	Typhoid fever			Whoop-ing cough, cases re-ported	Deaths, all causes
	Cases, es-ti-mated ex-pectancy	Cases re-ported	Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		
NEW ENGLAND—continued											
Massachusetts:											
Boston	84	126	0	0	0	14	1	1	0	51	239
Fall River	3	18	0	0	0	4	0	0	0	0	30
Springfield	10	3	0	0	0	1	0	0	0	0	48
Worcester	10	22	0	0	0	0	0	0	0	8	52
Rhode Island:											
Pawtucket	2	22	0	0	0	0	0	0	0	3	22
Providence	13	35	0	0	0	4	0	0	0	5	84
Connecticut:											
Bridgeport	13	3	0	0	0	0	0	1	0	4	40
Hartford	7	10	0	0	0	4	0	0	0	1	62
New Haven	10	1	0	0	0	3	1	0	0	0	46
MIDDLE ATLANTIC											
New York:											
Buffalo	30	40	0	0	0	12	0	0	0	27	203
New York	302	404	0	0	0	96	6	13	2	175	1,676
Rochester	9	102	0	0	0	2	0	0	0	21	103
Syracuse	15	13	0	0	0	1	0	0	0	19	53
New Jersey:											
Camden	6	5	0	0	0	3	0	0	0	0	41
Newark	48	41	0	0	0	9	0	0	0	47	106
Trenton	5	9	0	0	0	1	0	0	0	6	43
Pennsylvania:											
Philadelphia	104	205	0	0	0	29	2	0	0	48	553
Pittsburgh	33	34	0	0	0	10	0	1	0	13	241
Reading	6	0	0	0	0	0	0	0	0	0	26
EAST NORTH CENTRAL											
Ohio:											
Cincinnati	21	42	1	0	0	13	0	1	0	9	192
Cleveland	59	69	0	0	0	18	0	0	0	24	—
Columbus	11	7	1	0	0	2	1	0	0	3	87
Toledo	13	7	1	3	0	2	0	0	1	5	87
Indiana:											
Fort Wayne	4	6	1	4	0	2	0	0	0	0	35
Indianapolis	13	80	8	9	0	3	0	1	0	21	—
South Bend	4	1	0	3	0	2	0	0	0	4	26
Terre Haute	2	2	0	0	0	0	0	0	0	0	19
Illinois:											
Chicago	140	237	2	0	0	54	2	2	0	47	787
Springfield	3	3	0	0	0	0	0	0	0	1	28
Michigan:											
Detroit	121	96	2	2	0	32	0	1	0	64	362
Flint	16	10	1	0	0	2	0	0	0	5	32
Grand Rapids	13	16	1	0	0	0	1	0	0	10	31
Wisconsin:											
Kenosha	3	2	0	0	0	0	0	0	0	0	7
Madison	5	3	0	0	0	0	0	1	0	2	—
Milwaukee	35	18	0	0	0	4	0	0	0	16	117
Racine	4	10	0	0	0	1	0	0	0	5	16
Superior	3	1	0	0	0	1	0	0	0	2	7
WEST NORTH CENTRAL											
Minnesota:											
Duluth	10	1	0	0	0	1	1	0	0	3	29
Minneapolis	53	25	1	0	0	6	0	0	0	21	114
St. Paul	35	13	2	0	0	4	0	6	0	18	54
Iowa:											
Davenport	1	2	1	8	—	—	0	0	0	0	—
Des Moines	12	3	1	9	—	—	0	0	0	0	33
Sioux City	1	14	1	3	—	—	0	0	0	1	—
Waterloo	2	0	0	0	0	0	0	0	0	9	—
Missouri:											
Kansas City	23	—	0	—	—	—	0	—	—	0	—
St. Joseph	3	1	0	0	0	1	0	0	0	0	26
St. Louis	39	187	2	0	0	13	0	0	1	14	324

City reports for week ended February 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber-cu-losis, deaths re-ported	Typhoid fever			Whoop-ing cough, cases re-ported	Deaths, all causes
	Cases, es-ti-mated ex-pectancy	Cases re-ported	Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		
WEST NORTH CENTRAL—CON.											
North Dakota:											
Fargo.....	3	2	0	0	0	0	0	0	0	1	9
Grand Forks.....	1	1	1	0	0	0	0	0	0	2	—
South Dakota:											
Aberdeen.....	0	0	0	1	—	—	0	0	0	0	—
Sioux Falls.....	2	1	0	5	—	—	0	0	0	0	4
Nebraska:											
Omaha.....	5	9	2	20	0	2	0	0	0	7	77
Kansas:											
Topeka.....	1	2	0	0	0	1	0	0	0	0	16
Wichita.....	3	1	1	44	0	0	0	0	0	11	24
SOUTH ATLANTIC											
Delaware:											
Wilmington.....	5	11	0	0	0	1	0	0	0	0	28
Maryland:											
Baltimore.....	41	78	0	0	0	20	1	1	0	14	257
Cumberland.....	1	2	0	0	0	0	0	0	0	0	16
Frederick.....	1	0	0	0	0	0	0	0	0	0	6
District of Col.:											
Washington.....	26	18	0	0	0	12	0	0	0	5	185
Virginia:											
Lynchburg.....	0	0	0	0	0	1	0	0	0	0	18
Norfolk.....	2	3	0	0	0	2	—	0	0	3	—
Richmond.....	4	3	0	0	0	4	0	0	0	0	52
Roanoke.....	1	5	0	0	0	1	0	0	0	2	19
West Virginia:											
Charleston.....	1	3	0	0	0	1	1	0	0	0	24
Wheeling.....	2	1	0	0	0	1	0	0	0	0	22
North Carolina:											
Raleigh.....	0	3	0	0	0	0	0	0	0	12	10
Wilmington.....	0	2	0	0	0	1	0	0	0	6	10
Winston-Salem.....	1	0	0	0	0	0	0	0	0	6	12
South Carolina:											
Charleston.....	0	0	0	0	0	2	0	0	0	0	2
Columbia.....	0	1	0	0	0	7	0	0	0	0	40
Greenville.....	0	0	0	0	0	0	0	0	0	0	—
Georgia:											
Atlanta.....	6	57	2	0	0	5	0	7	0	1	86
Brunswick.....	0	0	0	0	0	0	0	0	0	0	1
Savannah.....	1	0	0	0	0	2	0	1	0	1	35
Florida:											
Miami.....	1	1	0	0	0	1	0	1	0	0	38
St. Petersburg.....	0	0	0	0	0	0	1	2	1	34	34
Tampa.....	1	0	0	0	0	0	1	1	1	0	34
EAST SOUTH CENTRAL											
Kentucky:											
Covington.....	1	21	0	0	0	0	0	0	0	0	29
Tennessee:											
Memphis.....	8	51	1	4	0	10	1	0	0	2	98
Nashville.....	3	10	1	0	0	2	0	0	0	1	77
Alabama:											
Birmingham.....	3	8	1	0	0	4	0	0	0	4	78
Mobile.....	1	5	0	0	0	0	1	1	0	0	19
Montgomery.....	0	0	0	0	0	0	0	0	0	3	—
WEST SOUTH CENTRAL											
Arkansas:											
Fort Smith.....	1	1	0	0	0	1	0	0	0	3	—
Little Rock.....	1	1	0	1	0	1	0	1	0	0	—
Louisiana:											
New Orleans.....	8	18	0	7	0	24	2	1	2	0	176
Shreveport.....	2	0	1	1	0	1	0	0	0	0	19
Oklahoma:											
Muskogee.....	1	0	2	2	—	—	0	0	0	0	—
Tulsa.....	2	10	0	0	0	—	1	0	0	0	1

City reports for week ended February 28, 1931—Continued

Division, State, and city	Scarlet fever		Smallpox			Tuber-cu-losis, deaths re-ported	Typhoid fever			Whoop-ing cough, cases re-ported	Deaths, all causes
	Cases, es-ti-mated ex-pectancy	Cases re-ported	Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		Cases, es-ti-mated ex-pectancy	Cases re-ported	Deaths re-ported		
WEST SOUTH CENTRAL—CON.											
Texas:											
Dallas.....	5	7	4	2	0	3	1	1	1	11	72
Fort Worth.....	4	4	2	3	0	2	0	0	0	0	29
Galveston.....	0	0	0	0	0	1	0	0	0	0	18
Houston.....	2	9	4	8	0	4	0	0	0	0	73
San Antonio.....	1	1	0	0	0	9	0	0	0	0	67
MOUNTAIN											
Montana:											
Billings.....	1	0	0	0	0	0	0	0	0	3	2
Great Falls.....	3	5	1	0	0	0	0	0	0	15	7
Helena.....	0	0	0	0	0	0	0	0	0	0	6
Missoula.....	0	0	0	0	0	0	0	0	0	11	4
Idaho:											
Boise.....	0	0	0	1	0	0	0	0	0	0	7
Colorado:											
Denver.....	14	1	1	0	0	0	1	0	0	0	5
Pueblo.....	0	0	0	0	0	0	0	0	0	7	
New Mexico:											
Albuquerque.....	0	0	0	0	0	2	0	0	0	1	14
Arizona:											
Phoenix.....	1	1	1	0	0	3	0	0	0	0	
Utah:											
Salt Lake City.....	3	3	0	0	0	0	0	0	0	26	35
Nevada:											
Reno.....	0	0	0	0	0	0	0	0	0	0	7
PACIFIC											
Washington:											
Seattle.....	11	8	3	0	0	0	0	0	0	32	
Spokane.....	7	10	10	8	0	0	0	0	0	0	
Tacoma.....	2	5	3	0	0	1	0	0	0	3	23
Oregon:											
Portland.....	5	4	17	19	0	6	1	0	0	0	75
Salem.....	1	0	1	0	0	0	0	0	0	0	
California:											
Los Angeles.....	45	43	2	10	0	33	2	0	0	22	330
Sacramento.....	3	0	0	0	0	0	0	1	0	32	26
San Francisco.....	27	8	1	2	0	11	0	1	0	19	171

Division, State, and city	Meningo-coccus meningitis		Lethargic encephalitis		Pellagra		Poliomyelitis (infan-tile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, es-ti-mated ex-pectancy	Cases	Deaths
NEW ENGLAND									
Massachusetts:									
Boston.....	3	0	0	0	0	0	0	0	0
Connecticut:									
Hartford.....	0	1	0	0	0	0	0	0	0
MIDDLE ATLANTIC									
New York:									
New York.....	12	8	1	1	0	0	0	1	1
Rochester.....	2	0	0	0	0	0	0	0	0
Pennsylvania:									
Philadelphia.....	8	4	0	1	1	0	0	0	0
Pittsburgh.....	1	2	0	0	0	0	0	0	0

City reports for week ended February 28, 1931—Continued

Division, State, and city	Meningo- coccus meningitis		Lethargic en- cephalitis		Pellagra		Poliomyelitis (infa- ntile paralysis)		
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases, estimat- ed expect- ancy	Cases	Deaths
EAST NORTH CENTRAL									
Ohio:									
Cincinnati.....	1	0	0	0	0	0	0	0	0
Cleveland.....	2	0	1	1	0	0	0	0	0
Columbus.....	1	1	0	0	0	0	0	0	0
Indiana:									
Indianapolis.....	1	2	0	0	0	0	0	0	0
Illinois:									
Chicago.....	8	4	1	0	0	0	0	0	0
Michigan:									
Detroit.....	16	8	1	0	0	0	1	0	0
Flint.....	0	0	1	1	0	0	0	0	0
Wisconsin:									
Racine.....	0	0	0	1	0	0	0	0	0
WEST NORTH CENTRAL									
Minnesota:									
Minneapolis.....	1	0	0	0	0	0	0	0	0
Iowa:									
Sioux City.....	1	1	0	0	0	0	0	0	0
Missouri:									
St. Louis.....	8	5	1	1	0	0	0	0	0
SOUTH ATLANTIC									
Maryland:									
Baltimore.....	1	1	0	0	0	0	1	1	0
District of Columbia:									
Washington.....	1	0	0	0	1	1	0	1	1
North Carolina:									
Raleigh.....	0	0	0	0	1	1	0	0	0
Winston-Salem.....	0	0	0	0	1	1	0	0	0
South Carolina:									
Charleston.....	0	0	0	0	2	0	0	0	0
Columbia.....	0	1	0	0	0	0	0	0	0
Georgia:									
Atlanta.....	2	0	0	0	0	0	2	0	0
Savannah ¹	0	0	0	0	0	0	0	0	0
Florida:									
Tampa.....	2	0	0	0	0	1	0	0	0
EAST SOUTH CENTRAL									
Tennessee:									
Memphis.....	13	7	0	0	0	2	0	0	0
Nashville.....	2	2	0	0	0	0	0	0	0
Alabama:									
Mobile.....	1	0	0	0	1	0	0	0	0
WEST SOUTH CENTRAL									
Louisiana:									
New Orleans.....	4	1	0	0	0	0	0	0	0
Texas:									
Dallas.....	0	0	0	0	2	1	0	0	0
Fort Worth.....	0	0	0	0	1	1	0	0	0
Houston.....	0	0	0	1	0	0	0	0	0
PACIFIC									
Washington:									
Tacoma.....	0	1	0	0	0	0	0	0	0
California:									
Los Angeles.....	1	1	0	0	0	0	0	1	0
San Francisco.....	0	0	0	1	0	0	0	1	0

¹ Typhus fever: 1 case at Savannah, Ga.

The following tables give the rates per 100,000 population for 98 cities for the 5-week period ended February 28, 1931, compared with those for a like period ended March 1, 1930. The population figures used in computing the rates are estimated mid-year populations for 1930 and 1931, respectively, derived from the 1930 census. The 98 cities reporting cases have an estimated aggregate population of more than 33,000,000. The 91 cities reporting deaths have more than 31,500,000 estimated population.

Summary of weekly reports from cities January 25 to February 28, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930¹

DIPHTHERIA CASE RATES

	Week ended—									
	Jan. 31, 1931	Feb. 1, 1930	Feb. 7, 1931	Feb. 8, 1930	Feb. 14, 1931	Feb. 15, 1930	Feb. 21, 1931	Feb. 22, 1930	Feb. 28, 1931	Feb. 1, 1930
98 cities.....	2 89	112	2 78	92	67	95	68	91	2 70	104
New England.....	106	135	82	119	75	104	70	109	2 89	121
Middle Atlantic.....	68	93	53	92	53	78	64	83	56	103
East North Central.....	111	139	96	102	85	114	66	101	78	122
West North Central.....	111	77	99	83	55	107	59	95	61	120
South Atlantic.....	2 73	116	2 75	76	59	102	47	120	77	96
East South Central.....	70	84	52	72	52	66	58	96	58	54
West South Central.....	183	216	156	157	118	136	186	80	132	101
Mountain.....	70	35	78	70	78	62	35	70	68	35
Pacific.....	45	69	69	36	49	75	59	63	57	63

MEASLES CASE RATES

98 cities.....	2 418	278	2 473	317	521	411	668	446	2 699	538
New England.....	438	341	502	322	534	472	541	418	2 636	506
Middle Atlantic.....	306	145	353	176	397	213	652	254	645	346
East North Central.....	142	167	151	171	183	251	255	267	300	345
West North Central.....	1,521	424	1,488	610	1,314	810	1,086	775	2 785	939
South Atlantic.....	2,032	314	2,294	268	1,817	334	2,202	441	2,800	148
East South Central.....	908	54	1,024	72	896	233	1,123	604	1,042	753
West South Central.....	17	293	3	648	17	693	24	745	24	704
Mountain.....	496	396	1,123	405	688	758	1,567	767	2,086	1,507
Pacific.....	110	1,028	112	1,028	168	1,243	243	1,271	223	1,636

SCARLET FEVER CASE RATES

98 cities.....	2 337	262	2 320	323	348	302	346	294	2 375	357
New England.....	519	346	534	530	683	382	589	409	2 609	402
Middle Atlantic.....	328	239	304	260	321	234	342	242	381	308
East North Central.....	378	416	331	427	375	434	353	421	364	510
West North Central.....	386	283	480	370	474	331	497	327	2 574	341
South Atlantic.....	2 312	224	2 304	222	320	252	304	236	363	258
East South Central.....	512	143	419	191	378	149	529	149	553	173
West South Central.....	112	73	88	129	105	108	139	94	125	108
Mountain.....	322	414	261	361	409	423	296	308	136	388
Pacific.....	143	306	145	289	123	269	94	202	145	352

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 estimates as of July 1, 1931 and 1930, respectively.

² Columbia, S. C., not included.

³ Barre, Vt., Kansas City, Mo., and Denver, Colo., not included.

⁴ Barre, Vt., not included.

⁵ Kansas City, Mo., not included.

⁶ Denver, Colo., not included.

Summary of weekly reports from cities January 25 to February 28, 1931—Annual rates per 100,000 population, compared with rates for the corresponding period of 1930

SMALLPOX CASE RATES

	Week ended—									
	Jan. 31, 1931	Feb. 1, 1930	Feb. 7, 1931	Feb. 8, 1930	Feb. 14, 1931	Feb. 15, 1930	Feb. 21, 1931	Feb. 22, 1930	Feb. 28, 1931	Mar. 1, 1930
98 cities.....	2 17	31	2 23	29	18	26	20	24	3 21	30
New England.....	0	0	0	2	0	7	0	0	4 0	0
Middle Atlantic.....	0	0	2	0	0	3	0	0	0	0
East North Central.....	25	39	12	34	10	33	13	20	11	40
West North Central.....	84	48	151	60	84	48	128	93	5 151	91
South Atlantic.....	1 0	6	1 0	4	6	6	2	2	0	2
East South Central.....	17	12	29	0	12	24	17	12	23	6
West South Central.....	51	73	81	94	132	98	51	52	64	111
Mountain.....	0	62	44	18	0	35	44	18	6 17	26
Pacific.....	18	152	24	126	29	89	22	101	39	57

TYPHOID FEVER CASE RATES

98 cities.....	2 5	5	2 4	4	3	6	4	5	3 7	8
New England.....	5	0	2	0	2	2	0	5	4 5	0
Middle Atlantic.....	2	5	1	3	2	6	3	6	6	4
East North Central.....	1	3	2	5	1	3	0	1	3	1
West North Central.....	13	4	2	2	2	10	4	2	5 14	6
South Atlantic.....	1 8	8	2 18	12	0	8	10	14	22	60
East South Central.....	17	6	6	18	29	18	0	6	6	30
West South Central.....	14	3	24	7	14	7	7	3	14	0
Mountain.....	0	9	0	0	0	0	9	9	0	0
Pacific.....	10	14	0	2	10	4	12	10	4	6

INFLUENZA DEATH RATES

91 cities.....	2 70	16	2 60	14	59	20	60	19	3 51	19
New England.....	34	2	46	5	46	5	43	17	4 24	12
Middle Atlantic.....	101	14	68	10	49	14	42	15	40	16
East North Central.....	36	13	52	12	56	17	61	16	61	16
West North Central.....	29	18	21	21	56	12	68	12	5 88	15
South Atlantic.....	2 127	12	2 129	12	118	32	122	22	79	28
East South Central.....	76	52	63	32	63	58	139	71	76	52
West South Central.....	100	82	73	50	159	68	97	68	45	64
Mountain.....	52	9	52	44	17	35	61	26	4 0	18
Pacific.....	14	2	12	7	14	17	26	2	41	10

PNEUMONIA DEATH RATES

91 cities.....	2 259	164	2 231	175	220	171	217	177	3 211	193
New England.....	185	103	286	160	291	193	276	242	4 237	232
Middle Atlantic.....	368	158	293	180	254	191	236	190	217	219
East North Central.....	176	128	176	138	182	128	187	151	193	179
West North Central.....	159	162	135	159	124	111	147	153	5 195	138
South Atlantic.....	2 345	238	2 325	216	373	214	340	222	312	236
East South Central.....	227	239	176	207	164	220	265	239	271	175
West South Central.....	203	292	214	270	176	256	228	174	221	185
Mountain.....	200	229	209	379	183	256	200	247	4 102	247
Pacific.....	115	92	72	130	72	107	70	67	91	62

¹ Columbia, S. C., not included.

² Barre, Vt., Kansas City, Mo., and Denver, Colo., not included.

³ Barre, Vt., not included.

⁴ Kansas City, Mo., not included.

⁵ Denver, Colo., not included.

FOREIGN AND INSULAR

CANADA

Provinces—Communicable diseases—Week ended February 28, 1931.—
 The Department of Pensions and National Health of Canada reports cases of certain communicable diseases for the week ended February 28, 1931, as follows:

Province	Cerebro-spinal fever	Influenza	Small-pox	Typhoid fever
Prince Edward Island ¹				
Nova Scotia		74		
New Brunswick ¹				
Quebec	2	1		4
Ontario	2	8	7	1
Manitoba	1		1	1
Saskatchewan			18	1
Alberta ¹				
British Columbia	2	10	5	4
Total	7	93	31	11

¹ No case of any disease included in the table was reported during the week.

Quebec Province—Communicable diseases—Week ended February 28, 1931.— The Bureau of Health of the Province of Quebec, Canada, reports cases of certain communicable diseases for the week ended February 28, 1931, as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	2	Mumps	15
Chicken pox	139	Puerperal septicemia	2
Diphtheria and croup	26	Scarlet fever	86
Erysipelas	4	Tuberculosis	33
German measles	23	Typhoid fever	4
Influenza	1	Whooping cough	51
Measles	229		

Ontario Province—Communicable diseases—Five weeks ended January 31, 1931.— During the five weeks ended January 31, 1931, and the corresponding period of the year 1930, certain communicable diseases were reported in the Province of Ontario, as follows:

Disease	5 weeks, 1930		5 weeks, 1931	
	Cases	Deaths	Cases	Deaths
Actinomycosis			1	
Cerebrospinal meningitis	7	4	6	3
Chancroid	2			
Chicken pox	1,183		1,827	
Diphtheria	269	13	357	14
Dysentery			1	1
Erysipelas	2			
German measles	177		74	
Gonorrhea	159		174	
Influenza	20	5	32	9
Lethargic encephalitis			1	1
Measles	627		159	
Mumps	223		790	1
Paratyphoid fever			1	
Pneumonia		187		202
Poliomyelitis	2	1	2	
Scarlet fever	739	3	1,029	7
Septic sore throat			3	1
Smallpox ¹	51		47	
Syphilis	110		187	1
Tuberculosis	85	55	121	55
Typhoid fever	21	2	34	4
Undulant fever			15	
Whooping cough	311		266	6

¹ The cases of smallpox were distributed as follows: Sault Ste. Marie, 17; Kingston, 5; Coniston, 4; Ottawa, 4; Ryerson, 3; Nepean, Wolfe Island, and Sudbury, 2 each, and one case each in Chisholm, Tarentor, Kingston Tp., Tyendinaga, Humphrey, Essex Border, Hagar, and Frater.

CUBA

Habana—Communicable diseases—February, 1931.—During the month of February, 1931, certain communicable diseases were reported in the city of Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	1	1	Poliomyelitis ¹	1	
Chicken pox	30		Scarlet fever	7	
Diphtheria	17	3	Tuberculosis	33	5
Malaria ¹	4		Typhoid fever ¹	12	4
Measles	18				

¹ Many of these cases are from the island of Cuba outside of Habana.

ITALY

Communicable diseases—Four weeks ended November 30, 1930.—During the four weeks ended November 30, 1930, cases of certain communicable diseases were reported in Italy as follows:

Disease	Nov. 3-9, 1930		Nov. 10-16, 1930		Nov. 17-23, 1930		Nov. 24-30, 1930	
	Cases	Com-munes affected	Cases	Com-munes affected	Cases	Com-munes affected	Cases	Com-munes affected
Anthrax	25	23	29	28	25	21	23	20
Cerebrospinal meningitis	5	5	10	9	9	9	6	6
Chicken pox	109	65	104	62	188	91	283	108
Diphtheria and croup	854	408	713	345	871	422	886	445
Dysentery	6	6	10	7	6	6	4	3
Lethargic encephalitis	2	2	2	2	1	1	5	5
Measles	1,061	199	847	161	1,230	235	1,507	236
Poliomyelitis	14	13	13	11	14	12	16	13
Rabies							1	1
Scarlet fever	617	228	478	188	553	232	569	231
Typhoid fever	767	411	592	311	592	332	553	292

SPAIN

Vital statistics—Year 1930.—According to provisional figures published by the Health Department of Spain, births and deaths occurred in the Kingdom of Spain during the year 1930 as follows:

Births.....	660,735	Stillbirths.....	21,747
Birth rate per 1,000 population.....	29.03	Stillbirth rate (per 1,000 births).....	31.9
Deaths.....	394,355	Infant mortality rate (per 1,000 live births).....	117
Death rate per 1,000 population.....	17.33		

Death rates per 100,000 population for certain causes of death in Spain for the years 1929 and 1930 are given in the following table:

Death rates per 100,000 population from certain causes during 1929 and 1930

Cause of death	1929	1930	Cause of death	1929	1930
Appendicitis and typhlitis.....	2.9	3.3	Malaria.....	2.5	2.4
Bronchitis, acute.....	89.6	74.4	Measles.....	16.2	23.0
Bronchitis, chronic.....	42.5	39.4	Meningitis.....	49.0	44.7
Cancer and other malignant tumors.....	70.0	72.3	Nephritis and Bright's disease.....	56.9	56.9
Cerebral hemorrhage and softening of the brain.....	124.8	125.7	Organic diseases of the heart.....	168.9	160.9
Cirrhosis of the liver.....	16.0	16.2	Pneumonia.....	43.0	40.1
Congenital debility and malformation.....	60.1	59.1	Other diseases of the respiratory system.....	160.0	144.5
Diphtheria.....	5.4	5.6	Scarlet fever.....	1.0	0.8
Diseases of the stomach (excluding cancer).....	15.0	15.3	Tuberculosis, pulmonary.....	111.3	103.3
Hernia and intestinal obstructions.....	12.8	11.9	Tuberculosis of the meninges.....	11.1	10.5
Influenza.....	24.3	10.6	Tuberculosis, other forms.....	13.9	13.1
			Typhoid fever.....	17.3	16.4
			Whooping cough.....	5.1	4.9

YUGOSLAVIA

Communicable diseases—January, 1931.—During the month of January, 1931, certain communicable diseases were reported in Yugoslavia, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Anthrax.....	33	1	Puerperal septicemia.....	11	8
Cerebrospinal meningitis.....	10	7	Rabies.....	2	2
Diphtheria and croup.....	867	126	Scarlet fever.....	724	104
Dysentery.....	16	2	Tetanus.....	9	4
Erysipelas.....	200	12	Typhoid fever.....	197	29
Measles.....	914	24	Typhus fever.....	20	2
Poliomyelitis.....	1				

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

From medical officers of the Public Health Service, American consuls, International Office of Public Hygiene, Pan American Sanitary Bureau, 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

CHOLERA

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

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

CHOLERA—Continued

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

Place	July, 1930	August, 1930	September, 1930	October, 1930			November, 1930			December, 1930			January, 1931		
				1-10	11-20	21-31	1-10	11-20	21-30	1-10	11-20	21-31	1-10	11-20	21-31
Indo-China (French) (see also table above):															
Annam	1	3													
Cambodia ¹	43	59	38												
Cochin-China ²	46	27	33	16	6	4									
On vessel: S. S. Malwa from Shanghai	1						1	5		28					
										8					

¹ Figures for cholera in the Philippine Islands are subject to correction.

² During the period from Aug. 24 to Sept. 26, 1930, 26 cases of cholera with 17 deaths were reported in Manilum, Surigao Province, P. I.

Reports incomplete.

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

PLAQUE

U indicates cases; D, deaths; P, present

Place	Week ended—												Mar. 1931
	Aug. 24- Sept. 0, 1930			Sept. 21- Oct. 18, 1930			Oct. 19- Nov. 15, 1930			Nov. 16- Dec. 13, 1930			
	20	27	3	10	17	24	31	7	14	21	28		
Algeria:													
Algiers	C 11	6	1	2	1			1	1				
Bone	D		3										
Constantine, vicinity of	D		1										
Oran	D	10	10	2									
Plague-infected rats	D	1	3	1									
Philipoville	D	1	3	2									
Argentina:													
Cordoba Province	C												
Entre Rios Province—Diamante	D												
Santa Fe	D	6	1										
Belgian Congo	D	3	1	1									
British East Africa (see also table below):													
Tanganyika	C												
Uganda	D	202	165	171	111	18	17	14	18	7			
Ceylon: Colombo	D	191	164	168	112	18	17	14	18	6			
Plague-infected rats	D	2	3	1	9	4	4	1	1	1	6	2	
China:													
Manchuria—Tunglai and Ningan	C	29	1										
Shensi:													
Dutch East Indies:													
Batavia and West Java	C												
Plague-infected rats	D	79	107	143	28	54	56	66	63	56			
Java and Madura	D	76	108	146	26	54	67	66	61	54			
Egypt:													
Alexandria	C	10	9	7	4	1	1	1	1	1			
Plague-infected rats	D	8	6	7	1						1		

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

PLAQUE—Continued

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

Place	Week ended—										February, 1931							March 7, 1931				
	Aug. 22-Sept. 20, 1930			Sept. 18-Oct. 15, 1930			Oct. 16-Nov. 13, 1930			Nov. 10-Dec. 13, 1930			December, 1930			January, 1931			February, 1931			
Tunisia: Tunis	C			1			P	12							1	1						
Union of Socialist Soviet Republics: Transcaucasia—Karabakh.	C																					
Union of South Africa: Cape Province	C	1				1	P															
Orange Free State	D	1																				
On vessel: S. Marlonga de Thermotis at Avonmouth	D	2														2						
	D	2														1						
British East Africa (see also table above):																						
Kenya	C	97	37	53	18	62	50															
Greece (see also table above)	C				2	6	2	5	1													
Indo-China (see also table above)	C	1	2	6																		
Madagascar (see also table above):																						
Ambositra Province	C					4	44															
Antsirabe Province	D	24	11	21	3	3	4	44														
Miarinarivo Province	D	24	11	21	3	18	18															
Moramanga Province	D	1	2	7	18	12	12															
Tananaive Province	D	1	27	18	20	19	17	20	19	125	170	164										
	D	28	39	79	79	116	116															
	D	28	38																			
Peru:																						
Plac.																						
Peru:																						
Senegal:																						
Baol 1																						
Dakar 1																						
Plac.																						
Peru:																						
Plac.																						
C	8																					
D	1																					
C	62																					
D	48																					
C	140																					
D	122																					
C	90																					
D	138																					
C	103																					
D	64																					
C	30																					
D	119																					
C	70																					
D	14																					

1 Reports incomplete.

SMALLPOX

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

SMALLPOX—Continued

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

Calcutta.....	14	12	9	18	10	19	15	28	40	47
Cochin.....	0	11	7	11	7	13	10	16	22	29
Karachi.....	3	12	26	22	6	7	2	6	6	8
Karachi.....	1	1	3	4	1	1	1	1	1	1
Madras.....	2	4	3	1	1	1	1	1	1	1
Madras.....	34	19	9	20	1	3	4	7	3	2
Moulmein.....	6	8	2	3	1	3	4	7	3	2
Nagapatam.....	1	1	1	1	1	1	1	1	1	1
Nagapatam.....	9	14	9	6	1	1	1	1	1	1
Rangoon.....	2	1	1	1	1	1	1	1	1	1
Tuticorin.....	1	1	1	1	1	1	1	1	1	1
Vizagapatam.....	1	1	1	1	1	1	1	1	1	1
India (French):										
Chandernagor.....	3	3	3	5	2	1	3	2	1	3
Karikal.....	2	1	1	2	1	1	2	1	1	2
Pondicherry Province.....	2	1	1	2	1	1	2	1	1	2
India (Portuguese):										
Indo-China (see also table below):										
Phnompeah.....	35	38	11	19	8	7	11	16	8	1
Saigon and Cholon.....	38	36	11	17	7	8	7	10	16	8
Iraq:										
Baghdad.....	4	2	1	1	1	1	1	1	1	1
Mouul Liwa.....	1	1	2	2	2	2	2	1	2	2
Ivory Coast (see table below):										
Mexico (see also table below):										
Jalisco (State) Guadalajara.....	3	1	3	3	1	1	1	1	1	1
Juarez.....	12	13	9	6	1	5	1	1	1	1
Mexico City and surrounding territory.....	6	8	2	6	2	1	1	1	1	1
Vera Cruz.....	1	1	1	1	1	1	1	1	1	1
Morocco (see table below):										
Nicaragua: Porto Cabezas.....	6	5	8	3	2	2	34	27	31	30
Poland.....	1	1	1	1	1	1	1	1	1	1
Portugal: Lisbon.....	27	16	20	37	21	17	34	27	31	30
Siam.....	1	1	1	1	1	1	1	1	1	1
Somalliland, British: Boales.....	6	5	6	2	1	1	1	1	1	1
Spain: Straits Settlements.....	1	1	1	1	1	1	1	1	1	1
Sudan (Anglo-Egyptian).....	128	82	87	5	50	47	5	17	1	7
	52	7	1	5	5	5	1	1	1	4

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

SMALLPOX—Continued

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

Place	July, 1930	Aug. 1930	Sept. 1930	Oct. 1930	Nov. 1930	Dec. 1930	Place	July, 1930	Aug. 1930	Sept. 1930	Oct. 1930	Nov. 1930	Dec. 1930
British East Africa (see also table above)	0						Greece	1	6				
Kenya.....	0						Mexico (see also table above)	D	718	822	838	838	838
Chosen.....	0						Morocco	3	8	4	4	4	4
France.....	0						Turkey	D	51	21	19	74	20
	0								13	4	2	1	

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

TYPHUS FEVER

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

Place	Week ended—										February, 1931							
	Sept. 24—Sept. 26, 1930			Oct. 21—Oct. 23, 1930			November, 1930				December, 1930			January, 1931			February, 1931	
	22	23	24	6	13	20	27	3	10	17	24	31	7	14	21	1	1	
Algeria:																		
Algiers—																		
Constantine Department	C	3	1	2	1	1	1	3	3	3	3	6	6	19	1	1	1	
Oran	C	1	2	1	1	3	2	1	3	6	3	9	1	2	1	1	1	
Bulgaria	D	4	6	3	1	1	3	1	3	6	1	9	2	1	1	1	1	
China:																		
Canton	C	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	
Manchuria—Harbin (see also table below)	C	2	1	1	1	1	1	1	1	1	1	3	3	3	3	3	3	
Shanghai	C	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	
Tientsin	C	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
Tientsin	C	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
Tientsin	C	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	
Czechoslovakia (see table below).																		
Egypt:																		
Alexandria	C	3	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	
Beheira Province	D	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cairo	D	1	2	1	1	2	1	1	1	1	1	1	1	1	1	1	1	
Port Said	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Great Britain—Scotland	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Glasgow	D	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Guatemala, ¹																		
Izurua (see table below).																		
Isthmian (see table below).																		
Mexico (see also table below):																		
Durango City, including municipalities in Federal District	D	1	2	8	11	1	1	12	5	2	4	1	13	12	6	1	1	
Mexico City	C	7	8	2	4	2	3	2	4	1	3	2	8	9	6	1	1	
Distrito.	D	2	2	1	1	1	1	1	1	1	1	8	8	8	8	8	8	
San Luis Potosí	C	2	1	3	1	1	1	1	1	1	1	1	6	6	6	6	6	
Morocco	D	2	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	

Palestine.....	C	3	23	3	3	1	6	21	9	18	1	2	2	1	1	1	3
Poland.....	D	1	22	37	12	1	1	3	3	11	19	21	16	16	1	49	41
Portugal: Oporto.....	C	2	2	4	2	2	2	15	20	28	11	21	1	1	1	1	3
Rumania.....	C	4	14	41	10	10	10	1	2	34	56	54	43	43	1	1	1
Spain.....	C	1	2	2	1	2	1	2	1	2	1	2	1	7	1	1	1
Tunisia.....	D	1	12	6	6	6	6	23	1	1	1	1	1	1	1	1	1
Turkey (see table below).																	
Union of South Africa:																	
Cape Province.....	C	P	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Municipality of East London.....	C	P	1	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Natal.....	C	P	2	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Orange Free State.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Transvaal.....	C	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P
Yugoslavia (see table below).																	

Place	Aug., 1930					Sept., 1930					Oct., 1930					Nov., 1930					Dec., 1930					Place
	Cases	Deaths	Cases	Deaths	Cases	Cases	Deaths	Cases	Deaths	Cases	Cases	Deaths	Cases	Deaths	Cases	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	
China: Harbin (see also table above).	C	5	3	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Chosen: Seoul.....	C	2	1	7	1	16	16	16	16	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28	28
Czechoslovakia.....	C	1	1	4	4	4	4	4	4	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Greece: Athens.....	C	6	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Latvia.....	C	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

YELLOW FEVER

	Cases		Deaths		Cases		Deaths		Cases		Deaths		Cases		Deaths		Cases		Deaths		Cases		Deaths		Cases		
	Sept., 1930	Oct., 1930																									
Brazil:																											
Barbalha.....			1	1																							
Para, July 26, 1930.....																											
Rio de Janeiro State—																											
Cambuci—																											
Jan. 1-25, 1931.....			3	3																							
Feb. 1-7, 1931.....			1	1																							
Friburgo (imported), Jan. 26-30, 1931.....			1	1																							
Barra da Tijuca, Rio de Janeiro, Jan. 26-30, 1931.....																											
Campos, Rio de Janeiro, Jan. 26-30, 1931.....																											
Brasil—Continued.																											
Rio de Janeiro State—Padua—																											
Jan. 18-24, 1931.....																											
Feb. 1-7, 1931.....																											
Gold Coast—																											
July 10, 1930.....																											
Abidjan, Aug. 4, 1930.....																											
Nigeria: Lagos, July 12, 1930 (probably laboratory infection).....																											

¹ The Director General of Public Health of Guatemala reports an unusual outbreak of typhus fever in a small village in Guatemala.

X