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Techniques in Evaluation of Rapid Antisyphilitic Therapy

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The introduction of intensive arsenical treatment for syphilis and later of penicillin therapy resulted in many experimental studies in an effort to discover the most effective treatment schedules. Numerous variables were encountered in these studies. Arsenicals and penicillin were used in combination or alone, with and without bismuth, in varying dosages, at different intervals, and with several forms of fever therapy. Inasmuch as the Venereal Disease Division actively participated in some of these evaluation studies, either directly or in cooperation with State health departments, it was necessary that special methods of statistical handling of the accumulated data be developed if valid conclusions were to be drawn as to the relative value of the various systems of therapy. Furthermore, some basis was needed for comparing these studies with each other, and with those made by other investigating groups.

Before the results of any two studies on the effectiveness of particular schemes of therapy can be compared, it is essential to examine in detail the statistical methods used, in order to determine whether apparent differences are due to diverse statistical techniques rather than to variation in efficacy of treatment schedules.

Faced with the same problems, many other investigators have indicated an interest in the statistical method used by this Division, and in its appraisal of the methods most commonly used elsewhere. This paper, therefore, will present in detail the method used by the Venereal Disease Division and will also discuss the statistical procedures used in other methods.

Eight methods of analysis which have been used by various investigators are discussed in this paper. An actual group of 142 patients, treated with a schedule employing a total of 600,000 units of aqueous penicillin (10,000 units every 3 hours) without arsenic or bismuth,

was subjected to statistical analysis by each of the eight methods. The discussion is presented from the point of view of work steps involved and results obtained. The use of these statistical methods is not necessarily restricted to the evaluation of antisyphilitic therapy, but can also be applied in the evaluation of therapy for any disease where extended post-treatment observation on a large number of patients is necessary to determine the results.

In comparing the results of a particular treatment schedule as evaluated by different investigators there are two main obstacles to be overcome: (1) differences in criteria for determining reinfection and relapse, and (2) differences in the statistical methods used to adjust for incompleteness of observation. Other important considerations are the basis for and the timing of retreatment, especially in seroresistance or pregnancy. Theoretically there are two possible outcomes of any form of treatment for syphilis—"cure" and "failure." It has been suggested by certain investigators that the only indisputable proof of "cure" is a reinfection, and that relapse is positive evidence of treatment "failure." Actually, the success or failure of any antisyphilitic treatment given in the early stage of infection cannot be determined with finality until enough years have passed to ascertain whether or not late manifestations will appear.

As a practical measure, in its current evaluations or comparisons, this Division classifies a case as a "cure" if the serologic reaction reverses to negativity without reappearance of clinical lesions. On the other hand, a case is classified as "failure" to treatment if there is failure of lesions to heal, reappearance of lesions, a non-falling serologic titer, or serologic relapse, singly or in combination. The distinction between reinfection and relapse is a clinical rather than a statistical problem, and the present study will not attempt to solve it. Thus, cases which require retreatment for either reason are combined and classified as "retreated".

A problem constantly arising in the statistical evaluation of antisyphilitic treatment, but which is amenable to statistical manipulation, is the matter of patients lapsing from post-treatment observation. Lapses from observation may be either permanent or temporary. Permanent lapses are those in which the patient is lost completely to the study. In temporary lapses, in which the patient returns after missing one or more of the desired observation periods, certain information is available which permits interpolation as to the probable behavior during the interval of lapse.

For temporary lapses, the statistical section of the Venereal Disease Division does not attempt to estimate the time at which a clinical relapse or reinfection occurred, but rather dates the event from the time the lesions were observed. Serologic relapses similarly are dated

from the time the relapse was observed, regardless of the time interval in which no observation was made. Cases which are positive at two observations separated by a period of lapse are usually considered positive in the interval; likewise, cases which are negative at two observations are considered negative in the interval. For cases which are positive at one observation and negative at the next, one of three methods may be used to estimate the serologic reaction at intermediate periods: (1) consider the case positive at each period up to the point where the negative status was observed; (2) consider the case negative at all intermediate periods; (3) estimate the period in which the serologic reversal took place by studying the record of each patient and interpolating.

Repeated trial estimations by operating statisticians of reversal dates agreed so closely with known dates of reversal that this last method is used in therapy evaluation studies of the Division.

Cases that lapse permanently from observation present even greater problems for the statistician attempting to evaluate therapy. If 100 percent post-treatment could be obtained, statistical studies evaluating schedules of therapy would be relatively simple. Unfortunately this never occurs, and experience has shown that 25 to 60 percent of the patients lapse from observation before the end of a 2-year period. The Venereal Disease Division is now undertaking a study in which selected patients are being carefully followed up in an attempt to approach 100 percent post-treatment observation (Blue Star Study). At the present time this study is maintaining post-treatment observation of approximately 93 percent of the cases. Sufficient observation has not been made yet to arrive at any preliminary conclusions regarding the percentage of cases which must be held to observation in order to arrive at valid conclusions. For the present, therefore, analysts are forced to evaluate schedules of therapy utilizing the amount of observation that is available.

Chart 1 presents the results of treatment at the 22–24 month observation period, as measured by the percentage of cases retreated and the percentage of cases seronegative, determined by the recommended method and by each of the other statistical methods discussed in the appendix. It is apparent from this chart that results vary considerably with the method of analysis. One method shows a retreatment rate of more than 60 percent, whereas the rate as calculated by the other methods falls between 26 and 41 percent. There is also considerable variation in the percentage of cases seronegative as computed by the different methods.

Basic methodology and results of each statistical procedure presented in the chart will be discussed. Specific steps involved in the computation of results, as developed in work tables, are shown for each method

of analysis. All methods other than method 1 are presented in the appendix. In the presentation of the statistical techniques, the importance of the retreatment rate has been stressed as an index of the efficacy of therapy, rather than the seronegativity rate. This was considered desirable because of differences in the definition of seronegativity. Some analysts require that a seronegative case remain seronegative in all subsequent observation periods (sustained seronegativity), and other analysts simply record the serologic status of the patient in each particular period regardless of subsequent observation.

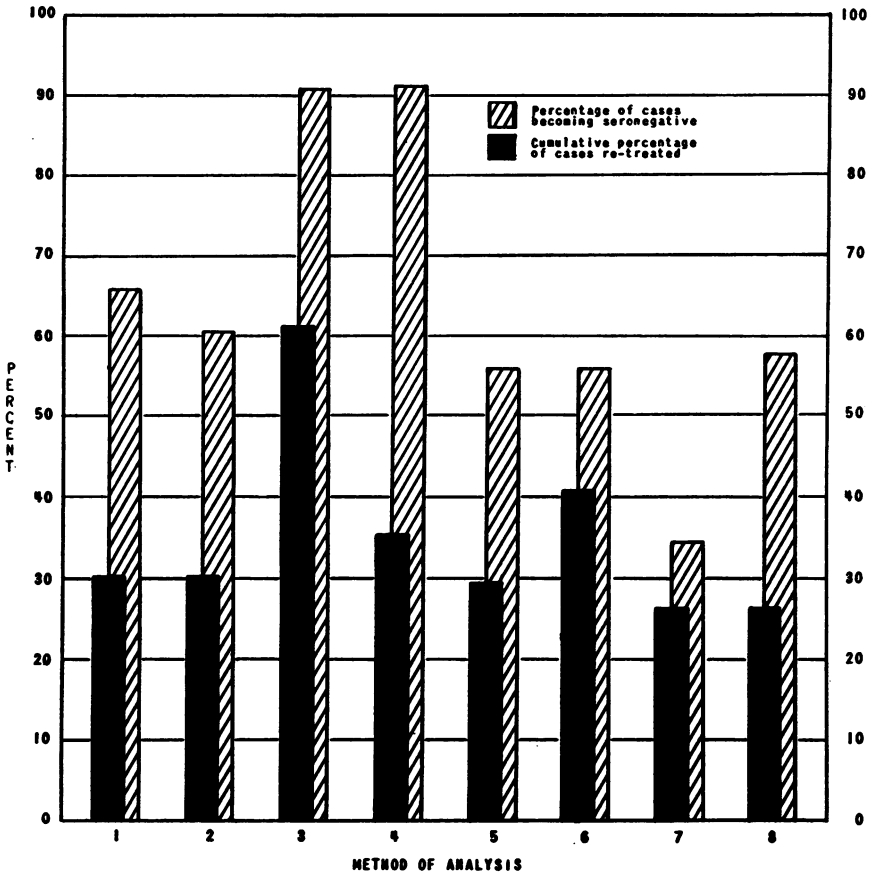

Chart 1.—Status of Cases 22–24 Months After Treatment.

The retreatment rate is usually presented as a cumulative rate, that is, the percentage retreated up to and including a particular period. Sometimes this cumulative rate is given as the sum of the retreated rates for individual periods; sometimes it is calculated directly from the data at a particular period. In general, the methods used can be summarized into four groups:

1. Calculate rates on the basis of the number of patients who started treatment. If there were no lapses from observation, this method

would obviously be correct, but, to the extent that patients do lapse from observation (of whom some, presumably, would require retreatment), the retreated rate and seronegativity rate are underestimated. (See methods 7 and 8 in appendix.)

2. Calculate rates on the basis of the number of patients actually seen during a period, or later, including in the numerator only those retreatments which were observed during the period, and accumulating the retreatment rate. Such a calculation may show an accumulated retreatment rate of more than 100 percent. (See methods 3 and 4 in appendix.)

3. Calculate rates by using as a denominator all patients observed during a period, or later, including (in the denominator) cases retreated which were previously recorded. (See methods 5 and 6 in appendix.)

(a) Include in the numerator all retreated cases which occurred in this and previous periods. To the extent that patients lapse from observation, the rate calculated by this method will tend to be exaggerated.

(b) Include in the numerator only those retreated cases which were observed during the period, and cumulate the retreatment rate. To the extent that patients lapse from observation, this method will tend to underestimate the retreatment rate.

4. Calculate rates by making appropriate adjustments for the loss of patients from observation. The assumption in this and other methods which attempt to adjust for lapses is that persons who have lapsed from observation would have had the same experience as those who remained under observation. The total used for computing retreatment and positive and negative rates is adjusted by including the same proportion of retreated as non-retreated patients remaining under observation. (See method 1.) The same objective is achieved by the technique utilized in the "life table method." (See method 2 in the appendix.) A decision on the use of method 1 or 2 will depend on personal likes regarding arithmetical procedures.

Method 1 [1]

This method is summarized in group 4 (preceding paragraph) and is the one used in the Venereal Disease Division for the evaluation of cases currently under post-treatment observation following treatment by various schemes of intensive therapy. This statistical device was designed to make adjustments for the progressive loss of patients from observation and the continuous addition of new patients to the series.

The method can be used for both current and retroactive series, with essentially the same results. Whether used in the analysis of a series currently being treated, or in the analysis of a series in which the

[1] Method developed by A. P. Iskrant for analysis of a retroactive series and modified by Eleanor V. Price for analysis of current data.

Method 1

Observation period (months)	Total observed this period or later (a)	Percent observed (b)	Cases retreated (c)	Retreated cases carried forward (d)	Adjusted total cases observed (e)	Cases retreated: Percent (f)	Cases retreated: Cumulative percent (g)	Cases not retreated: Seropositive: Number (h)	Cases not retreated: Seropositive: Percent (k)	Cases not retreated: Seronegative: Number (m)	Cases not retreated: Seronegative: Percent (o)
1	142	100.00	0	0.00	142.00	0.00	0.00	135	95.07	7	4.93
2	141	99.30	0	0.00	141.00	0.00	0.00	123	87.23	18	12.77
3	140	99.29	3	0.00	140.00	2.14	2.14	102	72.86	35	25.00
4	134	97.81	4	2.93	136.93	2.92	5.06	84	61.34	46	33.59
5	129	99.23	3	6.88	135.88	2.21	7.27	70	51.52	56	41.21
6	124	98.41	4	9.72	133.72	2.99	10.26	58	43.37	62	46.37
7	118	98.33	6	13.49	131.49	4.56	14.82	45	34.22	67	50.95
8	111	99.11	4	19.32	130.32	3.07	17.89	37	28.39	70	53.71
9	106	99.07	4	23.10	129.10	3.10	20.99	29	22.46	73	56.55
10	100	98.04	2	26.57	126.57	1.58	22.57	26	20.54	72	56.89
11	92	93.88	0	26.82	118.82	0.00	22.57	21	17.67	71	59.75
12	88	95.65	0	25.65	113.65	0.00	22.57	18	15.84	70	61.59
13–15	84	95.45	2	24.48	108.48	1.84	24.41	14	12.91	68	62.68
16–18	74	90.24	2	23.90	97.90	2.04	26.45	11	11.24	61	62.31
19–21	63	87.50	1	22.66	85.66	1.17	27.62	7	8.17	55	64.21
22–24	56	90.32	2	21.37	77.37	2.58	30.20	3	3.88	51	65.92

(a) Number of cases observed in this period or later. This number does not include cases retreated prior to this period.

(b) The number of cases seen in a period divided by the number of cases observed in the previous period after deducting the cases retreated in the previous period expressed as a percentage. The formula for the entry in column *b* for any period "n" is as follows:

$$b_n = \frac{a_n}{a_{(n-1)} - c_{(n-1)}} \times 100$$ where a_n = entry in column *a* for period n, $a_{(n-1)}$ = entry in column *a* for the period prior to n, $c_{(n-1)}$ = entry in column *c* for the period prior to n

(c) The actual number of cases retreated in this period.

(d) The proportion of retreated cases carried forward in a month is the product of the percentage observed, column *b* of that period, times the sum of the retreated cases observed and retreated cases carried forward during the previous period and divided by 100. The formula for the entry in column *d* for any period "n" is as follows:

$$d_n = b_n\left(\frac{c_{(n-1)} + d_{(n-1)}}{100}\right)$$ where b_n = entry in column *b* for period n, etc.

(e) The figures in this column are the adjusted total cases and are equal to the sum of the entries in column *a* and column *d* for any period. It should be emphasized that all percentages of retreatment, and positivity and negativity are calculated with column *e* as a base.

(f) The percentage *c* is of *e*.

(g) The cumulated percentages of *f*.

(h) Number of cases actually observed in period which exhibited a positive blood test plus the number of cases not seen in this period, but considered seropositive on the basis of subsequent observation.

(k) The percentage *h* is of *e*.

(m) The number of cases actually observed in the period which exhibited a negative blood test plus the number of cases not seen this period but considered seronegative on basis of subsequent observation.

(o) The percentage *m* is of *e*.

With this technique the sum of the percentages of retreated cases, seronegative cases, and seropositive (non-retreated) cases is always equal to 100 percent in any observation period considered.

In calculating standard errors on tests of significance between differences the adjusted total cases (column *e*) is used as a base because it includes only cases in which the outcome is actually known.

period of post-treatment observation has been completed, it is relatively simple to compute and interpret. The sample table indicates the procedure used for adjusting total cases observed.

The cumulative retreatment rate (cumulative percent in column b of presentation of cumulative report in sample table) is obtained by adding the retreatment rate in a given observation period to the retreatment rate of the previous period. The exclusion of all cases retreated in previous periods from the total cases observed would increase the retreatment rate; inclusion of all cases retreated would decrease the retreatment rate. It is necessary, therefore, to compute an adjusted

total of cases observed (column f of sample table), and this total becomes the denominator of the fraction used to compute the retreatment and the serologic rates.

Sample Table

PROCEDURE FOR ADJUSTING TOTAL CASES OBSERVED

Observation period	(a) Cases observed in this or subsequent periods	(b) Cases retreated this period	(c) Cases not retreated this period	(d) Proportion of cases not retreated in previous periods, observed this period or later	(e) Proportion of cases retreated in previous periods carried over to this period	(f) Cases observed plus retreated cases carried over (adjusted total)
1	a_1	b_1	$c_1=a_1-b_1$	n. a.	n. a.	$f_1=a_1$
2	a_2	b_2	$c_2=a_2-b_2$	$d_2=a_2\div c_1$	$e_2=b_1\times d_2$	$f_2=a_2+e_2$
3	a_3	b_3	$c_3=a_3-b_3$	$d_3=a_3\div c_2$	$e_3=(b_2+e_2)\times d_3$	$f_3=a_3+e_3$
4	a_4	b_4	$c_4=a_4-b_4$	$d_4=a_4\div c_3$	$e_4=(b_3+e_3)\times d_4$	$f_4=a_4+e_4$
5	a_5	b_5	$c_5=a_5-b_5$	$d_5=a_5\div c_4$	$e_5=(b_4+e_4)\times d_5$	$f_5=a_5+e_5$
6	a_6	b_6	$c_6=a_6-b_6$	$d_6=a_6\div c_5$	$e_6=(b_5+e_5)\times d_6$	$f_6=a_6+e_6$
EXAMPLE						
1	100	1	99	n. a.	n. a.	100.00
2	98	0	98	.9899	.99	98.99
3	93	2	91	.9490	.94	93.94
4	90	2	88	.9890	2.91	92.91
5	88	3	85	1.0000	4.91	92.91
6	84	3	81	.9882	7.82	91.82

PRESENTATION OF CUMULATIVE REPORT

Observation period (months)	(a) Adjusted total (used for calculating rates)	(b) Total cases retreated			(c) Cases not retreated			
		Number	Percent	Cumulative percent	Seropositive		Seronegative	
					Number	Percent	Number	Percent
1	100.00	1	1.0	1.0	99	99.0	0	0.0
2	98.99	0	0.0	1.0	95	96.0	3	3.0
3	93.94	2	2.1	3.1	80	85.2	11	11.7
4	92.91	2	2.2	5.3	62	66.7	26	28.0
5	92.91	3	3.2	8.5	43	46.3	42	45.2
6	91.82	3	3.3	11.8	31	33.8	50	54.5

In the example shown, 100 cases were treated, and of these one was retreated in the first period. Of the remaining 99 cases (non-retreated group) only 98, or 98.99 percent, were observed in the second period. This 98.99 percent is applied to the one case retreated in the first period and 0.99 of one case is carried forward and included in the total for the second period. This calculation is done for each period. Up to the sixth period, eight patients had been retreated. Of this number, 7.82 are added to the cases observed in the sixth period, changing the total from 84 to 91.82.

These adjusted totals for each period are used to calculate percentages in the sample table. By this method, 100 percent [2] of the cases

[2] In actual practice the sum of these three percentages may vary one or two hundredths percent (0.01 or 0.02 percent) above or below 100 percent unless "rounding off" is used to force the three percentages to equal exactly 100 percent. In order that the reader may follow computations, the percentages in the examples are not "forced."

Method 2

Work steps	Month of post-treatment observation															
	1	2	3	4	5	6	7	8	9	10	11	12	13–15	16–18	19–21	22–24
(a) Number of patients under observation	142	141	140	134	129	124	118	111	106	100	92	88	84	74	63	56
(b) Number of cases retreated at indicated time	0	0	3	4	3	4	6	4	4	2	0	0	2	2	1	2
(c) Apparent percent retreated	0.00	0.00	2.14	2.99	2.33	3.23	5.08	3.60	3.77	2.00	0.00	0.00	2.38	2.70	1.59	3.57
(d) Apparent percent not retreated	100.00	100.00	97.86	97.01	97.67	96.77	94.92	96.40	96.23	98.00	100.00	100.00	97.62	97.30	98.41	96.43
(e) Cumulative percent not retreated	100.00	100.00	97.86	94.93	92.72	89.73	85.17	82.10	79.00	77.42	77.42	77.42	75.58	73.54	72.37	69.79
(f) Cumulative percent of cases retreated	0.00	0.00	2.14	5.07	7.28	10.27	14.83	17.90	21.00	22.58	22.58	22.58	24.42	26.46	27.63	30.21
(g) Number becoming seronegative for the first time	5	10	21	8	11	4	6	2	5	10	4	2	1	0	0	0
(h) Apparent percent becoming seronegative	3.52	7.09	15.00	5.97	8.53	3.23	5.08	1.80	4.72	10.00	4.35	2.27	1.19	0.00	0.00	0.00
(k) Percent becoming seronegative corrected for those already retreated	3.52	7.09	14.68	5.67	7.91	2.90	4.33	1.48	3.73	7.74	3.37	1.76	0.90	0.00	0.00	0.00
(m) Cumulative percent becoming seronegative	3.52	10.61	25.29	30.96	38.87	41.77	46.10	47.58	51.31	59.05	62.42	64.18	65.08	65.08	65.08	65.08
(o) Number who became seronegative but who were subsequently retreated	0	0	1	1	1	0	1	0	0	1	0	0	0	1	0	0
(p) Apparent percent of retreated cases in seronegative patients	0.00	0.00	0.71	0.75	0.78	0.00	0.85	0.00	0.00	1.00	0.00	0.00	0.00	1.35	0.00	0.00
(q) Corrected percent of retreated cases in seronegative patients	0.00	0.00	0.69	0.71	0.72	0.00	0.72	0.00	0.00	0.77	0.00	0.00	0.00	0.99	0.00	0.00
(s) Cumulative percent of retreated cases in seronegative patients	0.00	0.00	0.69	1.40	2.12	2.12	2.84	2.84	2.84	3.61	3.61	3.61	3.61	4.60	4.60	4.60
(t) Cumulative percent becoming and remaining seronegative	3.52	10.61	24.60	29.56	36.75	39.65	43.26	44.74	48.47	55.44	58.81	60.57	61.47	60.48	60.48	60.48

(a) Number of cases actually observed in period. This number does not include cases previously retreated.
(b) Actual number of cases retreated in this period.
(c) Percentage b is of a.
(d) 100 percent minus c.
(e) Product of percentages in all previous periods in d multiplied by d in given period.
(f) 100 percent minus e.
(The cumulative percentage of cases becoming seronegative is figured in the next section of the table.)
(g) Number of cases observed in this period which exhibited a seronegative blood test for the first time.
(h) Percentage g is of a.
(k) Product of h and e. The result of this multiplication adjusts the seronegativity rate for cases retreated through a given period.
(m) Cumulative k. This rate is now corrected for retreated cases occurring among patients originally seronegative.
(o) Number of cases previously seronegative which were retreated in this period.
(p) Percentage o is of a.
(q) Product of p and e.
(s) Cumulative q.
(t) m minus s.

in each period are distributed among "retreated," "seropositive but not retreated," and "seronegative."

Having presented the explanation of this method and the sample table of 100 hypothetical cases followed for 6 months, method 1 is now applied to the actual group of 142 patients followed for 2 years. The reader may also be guided by the notes below the table.

APPENDIX

Method 2

This method, commonly referred to as the "life table method," accepts the same hypothesis as method 1 (lapsed cases would have had the same experience as observed cases) but adjusts for lapses by a different mathematical technique. The retreatment rate obtained with this method is the same as determined by method 1. The seronegativity rates differ, however. The difference is explained by the fact that method 2 cumulates the sustained seronegativity rates, whereas method 1 computes the seronegativity rate for each particular period based only on cases observed in that period or later.

Method 3

This simple method of analysis is widely used, but is decidedly inadequate. It consists essentially of taking the cases actually observed in a period and calculating the percentage of cases seronegative and the percentage of cases retreated in the period. The percentage of retreated cases is cumulated. The percentage of seronegative cases

Method 3

Work steps	Month of post-treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Cases observed in this period	142	75	101	92	76	71	65	60	46
(b) Number of cases seronegative	0	5	14	30	27	35	33	35	29
(c) Percent of cases seronegative	0.0	6.7	13.9	32.6	35.5	49.3	50.8	58.3	63.0
(d) Number of cases retreated	0	0	0	3	4	3	4	6	4
(e) Percent of cases retreated	0.0	0.0	0.0	3.3	5.3	4.2	6.2	10.0	8.7
(f) Cumulative retreatment percent	0.0	0.0	0.0	3.3	8.6	12.8	19.0	29.0	37.7

Work steps	Month of post-treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Cases observed in this period	47	63	52	49	71	58	52	54
(b) Number of cases seronegative	31	44	40	41	57	48	45	49
(c) Percent of cases seronegative	66.0	69.8	76.9	83.7	80.3	82.8	86.5	90.7
(d) Number of cases retreated	4	2	0	0	2	2	1	2
(e) Percent of cases retreated	8.5	3.2	0.0	0.0	2.8	3.4	1.9	3.7
(f) Cumulative retreatment percent	46.2	49.4	49.4	49.4	52.2	55.6	57.5	61.2

(a) Number of cases actually observed in period. This number does not include cases previously retreated.
(b) Number of cases observed in period who exhibited a negative blood test.
(c) The percentage *b* is of *a*.
(d) The actual number of cases retreated in this period.
(e) The percentage *d* is of *a*.
(f) The cumulated percentages in *e*.

tends to approach 100 and the cumulated retreatment rate is biased upward and could theoretically be cumulated past 100 percent. If cases not observed in a period are subsequently observed in a later period, it results in the actual observed incidence of retreated cases being added to the theoretical incidence of retreated cases, producing duplication. The bias inherent in the method is demonstrated in the series by the fact that the percentage of cases seronegative plus the cumulative percentage of cases retreated adds to 151.9 percent in the 22–24 month period. Even if no patients lapsed from observation, this method would be incorrect.

Method 4

This method entails taking the cases observed in a particular period, or later (excluding cases which had previously been retreated) and calculating a percentage of cases retreated. The retreatment rate is cumulated. Cases are considered negative, even though not observed in a period, if previous and subsequent observations indicate that the case was probably negative in that period. As retreated cases drop from observation, the percentage of cases considered negative approaches 100 percent regardless of the number of cases retreated.

Method 4

Work steps	Month of post-treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Number of cases whose last observation occurred in period	0	1	1	6	5	5	6	7	5
(b) Number of cases observed in this period or later	142	142	141	140	134	129	124	118	111
(c) Number of cases seronegative this period	0	7	18	35	46	56	62	67	70
(d) Percent of cases seronegative this period	0.0	4.9	12.8	25.0	34.3	43.4	50.0	56.8	63.1
(e) Number of cases retreated this period	0	0	0	3	4	3	4	6	4
(f) Percent of cases retreated this period	0.0	0.0	0.0	2.1	3.0	2.3	3.2	5.1	3.6
(g) Cumulative percent of cases retreated	0.0	0.0	0.0	2.1	5.1	7.4	10.6	15.7	19.3

Work steps	Month of post-treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Number of cases whose last observation occurred in period	6	8	4	4	10	11	7	56
(b) Number of cases observed in this period or later	106	100	92	88	84	74	63	56
(c) Number of cases seronegative this period	73	72	71	70	68	61	55	51
(d) Percent of cases seronegative this period	68.9	72.0	77.2	79.5	81.0	82.4	87.3	91.1
(e) Number of cases retreated this period	4	2	0	0	2	2	1	2
(f) Percent of cases retreated this period	3.8	2.0	0.0	0.0	2.4	2.7	1.6	3.6
(g) Cumulative percent of cases retreated	23.1	25.1	25.1	25.1	27.5	30.2	31.8	35.4

(a) Includes all cases whose last observation occurred in the indicated period. If a case was retreated in a particular month, it would not be included in subsequent periods whether seen or not.
(b) Cumulation of *a* from left to right. All cases whose last observation occurred in this or subsequent periods. If a case was retreated, it would be excluded in all subsequent periods of *b*.
(c) Represents the cases which were negative in this period. Included are cases which were not observed in this period but which were considered to be seronegative on basis of previous and subsequent observation.
(d) The percentage *c* is of *b*.
(e) Actual number of cases retreated in this period.
(f) The percentage *e* is of *b*.
(g) The cumulated percentages in *f*.

Similarly, the cumulative retreatment percentage could theoretically add to more than 100 percent. In our actual sample, the percentage of seronegative and the cumulated percentage of retreated cases add to 126.5 in the 22–24 month period. Even if no patients lapsed from observation, this method, too, would be incorrect.

Method 5

This method is similar to method 4 except that all cases retreated in previous periods are carried forward in the total of cases observed for each subsequent period. Method 5 attempts to overcome the bias inherent in methods 3 and 4 by carrying the retreated cases in the base. If no cases lapsed from observation, this method would be correct. As patients, unfortunately, do lapse from observation, this method overadjusts for the previously retreated cases. As will be noted in the table, the combined seronegative and retreatment rates add to 85.4 percent in the 22–24 month period.

Method 5

Work steps	Month of post-treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Number of cases observed in this period or later	142	142	141	140	134	129	124	118	111
(b) Number of cases observed in this period plus cases retreated in earlier periods	142	142	141	140	137	136	134	132	131
(c) Number of cases seronegative this period	0	7	18	35	46	56	62	67	70
(d) Percent of cases seronegative this period	0.0	4.9	12.8	25.0	33.6	41.2	46.3	50.8	53.4
(e) Number of cases retreated this period	0	0	0	3	4	3	4	6	4
(f) Percent of cases retreated this period	0.0	0.0	0.0	2.1	2.9	2.2	3.0	4.5	3.1
(g) Cumulative percent of cases retreated	0.0	0.0	0.0	2.1	5.0	7.2	10.2	14.7	17.8

Work steps	Month of post-treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Number of cases observed in this period or later	106	100	92	88	84	74	63	56
(b) Number of cases observed in this period plus cases retreated in earlier periods	130	128	122	118	114	106	97	91
(c) Number of cases seronegative this period	73	72	71	70	68	61	55	51
(d) Percent of cases seronegative this period	56.2	56.3	58.2	59.3	59.6	57.5	56.7	56.0
(e) Number of cases retreated this period	4	2	0	0	2	2	1	2
(f) Percent of cases retreated this period	3.1	1.6	0.0	0.0	1.8	1.9	1.0	2.2
(g) Cumulative percent of cases retreated	20.9	22.5	22.5	22.5	24.3	26.2	27.2	29.4

(a) Includes all cases observed in this period or later.
(b) All cases whose last observation occurred in this or subsequent periods plus all cases retreated in previous periods. If a case were retreated it would be included in all subsequent periods of *b*.
(c) Represents the cases which were considered negative in this period. Included are cases which were not observed in this period but which were considered because of subsequent observation.
(d) The percentage *c* is of *b*.
(e) Number of cases retreated in this period.
(f) The percentage *e* is of *b*.
(g) The cumulated percentages in *f*.

Method 6

Unlike previous methods, this method reports the results in the final period of observation only, and the final retreatment rate is not obtained by cumulation. The base for calculating seronegative, sero-

Method 6

Status 22–24 months following treatment	Number	Percent
(a) Lost	51	
(b) Seronegative	51	56.0
(c) Seropositive	3	3.3
(d) Retreated	37	40.7

(a) Number of cases lost from observation prior to the 22–24 month period. Cases retreated at any time following initial therapy are excluded from this total.
(b) Number of cases still under observation in the 22–24 month period considered to be seronegative. Base for calculating percentage is total cases still under observation plus all retreated cases.
(c) Number of cases still under observation in the 22–24 month period considered to be seropositive. Same base as in (b) used for calculating percentage.
(d) Total number of cases retreated in the 22–24 month period of post-treatment observation. Same base as in (b) and (c).

positive, and retreatment rates is the number of cases still under observation in the final period plus all retreated cases. The weakness is the same as in method 5 in that no adjustment is made for lapses. The retreatment rate computed by this technique tends to be exaggerated because non-retreated cases which lapse are dropped from the base.

Method 7

Work steps	Month of post-treatment observation								
	ADM	1	2	3	4	5	6	7	8
(a) Total cases	142	142	142	142	142	142	142	142	142
(b) Number cases retreated	0	0	0	3	7	10	14	20	24
(c) Percent retreated	0.0	0.0	0.0	2.1	4.9	7.0	9.9	14.1	16.9
(d) Number seropositive	142	70	87	59	45	33	28	19	13
(e) Percent seropositive	100.0	49.3	61.3	41.6	31.7	23.2	19.7	13.4	9.2
(f) Number seronegative	0	5	14	30	27	35	33	35	29
(g) Percent seronegative	0.0	3.5	9.9	21.1	19.0	24.6	23.2	24.6	20.4
(h) Number status unknown	0	67	41	50	63	64	67	68	76
(k) Percent status unknown	0.0	47.2	28.9	35.2	44.4	45.1	47.2	47.9	53.5

Work steps	Month of post-treatment observation							
	9	10	11	12	13–15	16–18	19–21	22–24
(a) Total cases	142	142	142	142	142	142	142	142
(b) Number cases retreated	28	30	30	30	32	34	35	37
(c) Percent retreated	19.7	21.1	21.1	21.1	22.5	23.9	24.6	26.1
(d) Number seropositive	12	17	12	8	12	8	6	3
(e) Percent seropositive	8.5	12.0	8.5	5.6	8.5	5.6	4.2	2.1
(f) Number seronegative	31	44	40	41	57	48	45	49
(g) Percent seronegative	21.8	31.0	28.2	28.9	40.1	33.8	31.7	34.5
(h) Number status unknown	71	51	60	63	41	52	56	53
(k) Percent status unknown	50.0	35.9	42.3	44.4	28.9	36.6	39.4	37.3

(a) Includes all cases in the study. Remains constant for all observation periods regardless of number of cases actually observed.
(b) Actual number of cases retreated by end of period indicated.
(c) Percentage *b* is of *a*.
(d) Represents the number of seropositive cases observed in this period.
(e) Percentage *d* is of *a*.
(f) Represents the number of seronegative cases observed in this period.
(g) Percentage *f* is of *a*.
(h) Represents the number of cases which were not observed in this period. These "status unknown" cases do not include cases previously retreated.
(k) Percentage *h* is of *a*.

Method 7

This method of evaluation proposes to appraise a schedule of therapy by computing the percent negative, percent positive, and percent retreated, using as the base for calculation the total number of cases beginning treatment. A case, other than one retreated, is classified as "status unknown" if not observed in a particular period, even though subsequently seen. The percentages will, of course, vary with the lapse rate, and no comparison is possible. Applying this method to our sample series, we get a percentage seronegative of 34.5 percent, and a percentage retreated of 26.1 percent in the 22–24 month period.

Method 8

This is a frequently used method of analysis. The rates are calculated at the last period of observation only, and the total cases treated are used as the base. Cases are grouped as seronegative, seropositive, or retreated, according to status at time of last observation. If all patients returned for observation, this method would indicate correct percentage. To the extent that patients lapse from observation, a bias will be introduced. The retreatment rate obtained by the application of this statistical technique would always be underestimated, because no adjustment is made for the potential treatment failures or reinfections among the patients lapsing from observation. Likewise, the percentage of cases attaining seronegativity would be underestimated. The retreatment rate obtained by this method is the same as obtained by method 7.

Method 8

Months since treatment began	No. of patients observed for last time in this period (a)	Seronegative on last observation (b)	Seropositive on last observation (c)	Cases retreated (d)
1	1	0	1	0
2	1	0	1	0
3	6	2	1	3
4	5	1	0	4
5	5	2	0	3
6	6	0	2	4
7	7	0	1	6
8	5	1	0	4
9	6	2	0	4
10	8	4	2	2
11	4	1	3	0
12	4	2	2	0
13–15	10	7	1	2
16–18	11	6	3	2
19–21	7	3	3	1
22–24	56	51	3	2
Total	142	82	23	37
Percent	100.0	57.7	16.2	26.1

(a) The number of patients observed for the last time (including patients retreated in the period) in this period.
(b) Seronegative cases observed for the last time in this period.
(c) Seropositive cases observed for the last time in this period.
(d) Patients who were determined to be treatment failures or reinfections during the period.

Four-week Summary of Communicable Disease Incidence

May 23–June 19, 1948

The accompanying table summarizes the incidence of nine important communicable diseases, based on weekly telegraphic reports from State health departments. The reports from each State for each week are published in PUBLIC HEALTH REPORTS under the section "Incidence of Disease." The table gives the number of cases of these diseases for the 4 weeks ended June 19, 1948, the number reported for the corresponding period in 1947, and the median number for the years 1943–47.

Diseases Above Median Incidence

Poliomyelitis.—The number of cases of poliomyelitis rose from 440 during the preceding 4 weeks to 759 during the 4 weeks ended June 19. Of the total cases, Texas reported 268, North Carolina 128, California 108, Iowa 36, Florida 16, New York, Nebraska, and Louisiana 13 each. No more than 10 cases were reported from any other State. For the 4 weeks under consideration the number of cases was 4.5 times the incidence in 1947 and 3.2 times the median for the preceding 5 years (237 cases). Since the beginning of the current year, however, the number of cases (1,706) has been only 1.6 times the number reported for the same period in 1947 and 1.2 times the incidence in 1946. An increase of this disease is expected at this season of the year, but the current increase apparently began earlier than in preceding years and was larger than has normally occurred. In each section of the country except the New England, Middle Atlantic, and East South Central sections the incidence was considerably above the median for the preceding 5 years. For the country as a whole the current incidence was the highest since 1934 when 911 cases were reported for the corresponding 4 weeks.

Measles.—The number of cases of measles dropped from 114,983 during the preceding 4 weeks to 96,060 for the 4 weeks ended June 19. However, the incidence was almost 3 times that for the corresponding period in 1947 and 1.6 times the median for the preceding 5 years. The incidence was higher than the median in all sections of the country except the West North Central, the increases ranging from 1.1 times the median in the New England section to 3.6 times the median in the West South Central section.

Diseases Below Median Incidence

Diphtheria.—For the 4 weeks ended June 19 there were 563 cases of diphtheria reported as compared with 655 for the corresponding 4 weeks in 1947 and a median of 703 cases for the preceding 5 years

(1943–47). The incidence was above the median in the New England, East South Central, and Mountain sections and lower than the median in the other 6 geographic sections. For the country as a whole the current incidence was the lowest reported during these same weeks in the 20 years for which data are available in this form.

Influenza.—The 2,869 cases of influenza reported for the current 4 weeks was 72 percent of the 1947 figure for these same weeks and about 80 percent of the median for the preceding 5 years. In the South Atlantic section the number of cases (1,092) was 1.3 times the seasonal expectancy and in the West North Central section the incidence was about normal, but in all other sections the numbers of cases were relatively low.

Meningococcus meningitis.—The incidence of meningococcus meningitis continued to decline. For the 4 weeks ended June 19 there were 231 cases reported. This figure was slightly below the 1947 incidence during the corresponding weeks and was only about 36 percent of the median for the preceding 5 years. However, the 1943–47 median includes 3 years of unusually high incidence of this disease, and a better comparison is made with the average incidence for nonepidemic and minor epidemic years, which is approximately 200 cases for the period corresponding to the 4 weeks under consideration.

Scarlet fever.—While the number of cases (6,194) of scarlet fever reported during the current 4 weeks was slightly above the low level of 1947, it was only about 60 percent of the median for the preceding 5 years (1943–47). The incidence was below the seasonal expectancy in all sections of the country. Although the increase over the 1947 figure was slight, it was the first time since the week ended November 3, 1945 that the number of cases for a current 4-week period was larger than the number for the corresponding period in the preceeding year.

Smallpox.—Not a single case of smallpox was reported during the 4 weeks ended June 19. During the corresponding period in 1947 there were 9 cases reported and the 1943–47 median was 25 cases. This is the first time in the 20 years for which data are available in this form, and probably the first time on record, that there has been a 4-week period without a case of this disease being reported.

Typhoid and paratyphoid fever.—For the 4 weeks ended June 19 there were 293 cases of these diseases reported, as compared with 310 during the corresponding 4 weeks in 1947 and a median of 323 cases for the same weeks in the preceding 5 years. The West South Central section alone reported an increase over the seasonal expectancy. Of the 94 cases occurring in that section, Texas reported 62, Louisiana 16, Arkansas 10, and Oklahoma 6 cases. For the country as a whole the current incidence was the lowest in the 20 years for which these data are available.

Whooping cough.—The number of cases (5,736) of whooping cough reported during the current 4-week period was less than 40 percent of the 1947 incidence and about 56 percent of the median for the corresponding period in the preceding 5 years. The West South Central section reported a few more cases than might normally be expected, but in all other sections the incidence was relatively low.

Mortality, All Causes

For the 4 weeks ended June 19 there were 34,981 deaths from all causes reported to the National Office of Vital Statistics by 93 large cities. The average number for the same weeks in the 3 preceding years was 34,911 deaths. For the first and third weeks the number of deaths was above the preceding 3-year average, but during the second and fourth weeks the numbers were lower than the 3-year average.

Reported cases of 9 communicable diseases in the United States during the 4-week period May 23–June 19, 1948, the number for the corresponding period in 1947, and the median number of cases reported for the corresponding period, 1943–47

Division	Current period	1947	5-year median	Current period	1947	5-year median	Current period	1947	5-year median
	Diphtheria			Influenza [1]			Measles		
United States	563	655	703	2,869	3,988	3,479	96,060	32,926	59,394
New England	34	45	21	4	6	11	6,930	6,301	6,301
Middle Atlantic	77	107	103	13	31	26	28,612	6,000	8,342
East North Central	65	81	125	51	167	148	19,951	8,726	11,186
West North Central	51	57	57	38	19	30	2,837	4,665	3,519
South Atlantic	89	90	108	1,092	1,624	871	7,695	2,685	4,621
East South Central	56	79	45	81	293	153	1,602	1,006	1,006
West South Central	79	104	143	1,354	1,445	1,532	7,165	1,402	1,990
Mountain	62	30	50	179	293	293	5,536	1,198	1,839
Pacific	50	62	97	57	110	110	15,732	943	6,293
	Meningococcus meningitis			Poliomyelitis			Scarlet fever		
United States	231	243	639	759	168	237	6,194	6,118	10,123
New England	12	9	36	0	4	5	1,016	568	1,415
Middle Atlantic	48	51	145	27	12	24	1,727	1,942	3,175
East North Central	40	52	142	25	10	13	2,042	1,790	2,639
West North Central	20	19	64	76	14	5	329	469	669
South Atlantic	23	29	88	166	19	43	289	335	690
East South Central	18	33	49	20	13	21	119	132	197
West South Central	39	22	56	298	23	62	134	114	188
Mountain	6	5	11	26	8	8	119	223	419
Pacific	25	23	48	121	65	55	419	545	757
	Smallpox			Typhoid and paratyphoid fever			Whooping cough		
United States	0	9	25	293	310	323	5,736	14,715	10,203
New England	0	0	0	18	6	23	303	878	878
Middle Atlantic	0	0	0	31	38	36	698	2,292	1,959
East North Central	0	2	5	21	47	35	564	2,481	1,687
West North Central	0	0	5	16	18	18	285	778	418
South Atlantic	0	1	1	57	48	61	1,148	2,174	1,792
East South Central	0	4	3	31	39	42	407	698	518
West South Central	0	2	2	94	74	74	1,504	3,651	1,252
Mountain	0	0	3	11	7	19	389	453	453
Pacific	0	0	1	14	33	26	438	1,310	1,310

[1] New York, North Carolina, and Pennsylvania excluded; New York City and Philadelphia included.

INCIDENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JULY 3, 1948

Summary

The reported incidence of poliomyelitis for the country as a whole increased from 309 cases last week to 362 for the current week, as compared with 78 for the same week last year, 273 for the corresponding week in 1946, and a 5-year median of 190 for the week. Of the current cases, 233, or 64 percent of the total, occurred in the 3 States which have been reporting the largest numbers of cases—North Carolina 92 (64 last week), California 74 (62 last week), and Texas 67 (78 last week). Only 3 other States reported 10 or more cases during the week, namely, Ohio 14 (5 last week), Florida 12 (2 last week), and Georgia 10 (6 last week). To July 3, North Carolina has reported 360 cases (21 same period last year, 149 in the epidemic in 1944), Texas 646 (69 last year 292 in 1946), California 355 (346 same period last year.)

The total to date this year is 2,367, as compared with 1,201 in 1947 (the 5-year median) and 1,854 in 1946 for the corresponding period.

One case of anthrax each was reported in New York, New Jersey, and Pennsylvania, bringing the total to date to 38, as compared with 28 for the same period last year. Of 29 cases of Rocky Mountain spotted fever, 23 cases occurred in the Eastern and Central States and 6 in the Mountain States, 1 each in Montana, Wyoming, Colorado, and Utah, and 2 in Idaho. For the sixth consecutive week no case of smallpox was reported in the United States.

During April, 2 cases of psittacosis were reported in Michigan, in husband and wife, in which the infection was presumably acquired from parakeets purchased from a dealer in the State.

A total of 8,922 deaths was reported in 93 large cities in the United States during the current week, as compared with 8,534 last week, and a 3-year median of 8,053 for the week. The total to date is 259,469, as compared with 258,693 for the same period in 1947.

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47
	July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947	
NEW ENGLAND												
Maine	0	2	1				76	42	101	2	0	0
New Hampshire	0	0	0				2	2	9	0	0	0
Vermont	0	0	0				11	100	100	0	0	0
Massachusetts	8	12	3				874	252	457	1	0	4
Rhode Island	0	0	0				16	58	58	0	0	0
Connecticut	2	1	1	2			126	365	190	0	1	2
MIDDLE ATLANTIC												
New York	9	21	10	[1] 3	[1] 2	[1] 3	1,933	538	609	8	9	17
New Jersey	2	1	2			1	1,569	537	537	1	1	3
Pennsylvania	6	7	7	[2]	[2]	[2]	898	87	390	1	2	8
EAST NORTH CENTRAL												
Ohio	1	2	9	3	2	2	410	360	327	2	1	6
Indiana	2	1	1	2		3	61	25	25	2	1	1
Illinois	3	2	3	1	21	3	209	216	254	6	1	6
Michigan [3]	1	2	6		1	1	1,088	83	259	3	2	11
Wisconsin	4	2	1			3	1,211	575	644	3	1	1
WEST NORTH CENTRAL												
Minnesota	0	7	2				37	310	67	1	1	3
Iowa	4	2	2				59	123	120	0	0	2
Missouri	0	1	1		1	1	10	69	46	1	3	3
North Dakota	0	0	0				30	39	13	2	0	0
South Dakota	0	0	0				13	35	15	0	0	0
Nebraska	0	0	0		1		54	12	20	1	0	1
Kansas	0	6	3	20		1	23	11	34	1	1	2
SOUTH ATLANTIC												
Delaware	0	0	0				11	1	2	1	0	0
Maryland [3]	1	5	5	1			636	8	42	0	1	5
District of Columbia	0	0	0				43	8	30	0	0	0
Virginia	3	5	5	74	125	70	154	231	134	2	2	5
West Virginia	1	5	2	2	5	2	14	44	44	2	1	1
North Carolina	2	1	4				33	30	115	0	3	3
South Carolina	3	0	6	92	128	104	51	65	65	0	1	2
Georgia	0	3	3	5	6	3	13	21	21	1	1	1
Florida	3	3	3	1	2	1	50	26	11	1	2	2
EAST SOUTH CENTRAL												
Kentucky	0	2	2				94	1	20	0	1	1
Tennessee	4	3	2	4	8	4	50	16	20	1	4	4
Alabama	3	2	2	7	1	6	18	90	62	0	1	3
Mississippi [3]	0	3	3	1	7		11	3		0	0	0
WEST SOUTH CENTRAL												
Arkansas	0	1	1	8		2	63	24	27	0	1	0
Louisiana	1	6	5	3	6	2	8	11	29	0	0	1
Oklahoma	0	3	1	2	3	6	32	11	14	1	1	1
Texas	7	16	24	198	196	249	552	97	208	3	2	4
MOUNTAIN												
Montana	0	0	0		7		14	37	37	0	0	0
Idaho	0	1	0	2	4		17	4	4	0	0	0
Wyoming	0	0	0		1		11	2	4	0	0	0
Colorado	1	3	5	3	19	12	36	28	30	0	0	1
New Mexico	1	0	2	5	5	1	2	16	12	0	0	0
Arizona	0	0	0	16	19	28	70	36	18	0	0	0
Utah [3]	0	0	1				254	8	50	0	0	1
Nevada	0	0	0				3		1	0	0	0
PACIFIC												
Washington	2	6	6				274	9	133	1	0	2
Oregon	0	1	2	3	3	1	278	19	48	1	0	0
California	12	11	16	5	10	12	986	95	654	1	3	9
Total	86	149	159	463	583	592	12,488	4,780	6,034	50	48	144
26 weeks	4,514	6,165	6,165	136,283	299,394	188,206	517,296	169,282	509,829	1,918	2,108	5,419
Seasonal low week [4]	(27th) July 5–11			(30th) July 26–Aug. 1			(35th) Aug. 30–Sept. 5			(37th) Sept. 13–19		
Total since low	10,872	13,731	15,149	179,841	332,369	332,369	552,242	192,169	547,842	2,700	3,080	7,871

[1] New York City only. [2] Philadelphia only. [3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever		
	Week ended—		Median 1943–47	Week ended		Median 1943–47	Week ended—		Median 1943–47	Week ended—		Median 1943–47
	July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947		July 3, 1948	June 28, 1947	
NEW ENGLAND												
Maine	0	0	0	4	8	10	0	0	0	0	0	1
New Hampshire	0	0	0	0	6	2	0	0	0	0	0	0
Vermont	0	0	0	2	0	3	0	0	0	0	0	0
Massachusetts	1	0	0	133	71	104	0	0	0	0	4	4
Rhode Island	0	0	0	3	4	2	0	0	0	0	0	1
Connecticut	0	1	1	15	21	21	0	0	0	1	0	0
MIDDLE ATLANTIC												
New York	7	6	14	[5] 116	148	176	0	0	0	[6] 7	3	3
New Jersey	3	0	2	31	42	42	0	0	0	0	1	1
Pennsylvania	5	2	1	46	57	96	0	0	0	6	2	3
EAST NORTH CENTRAL												
Ohio	14	4	5	105	110	110	0	0	0	3	4	4
Indiana	2	0	0	9	11	20	0	0	0	3	2	2
Illinois	6	4	2	43	36	59	0	0	0	[6] 5	1	2
Michigan [3]	1	0	0	72	86	74	0	0	0	4	4	4
Wisconsin	1	0	0	19	47	68	0	0	0	[6] 1	0	0
WEST NORTH CENTRAL												
Minnesota	0	0	1	13	27	27	0	0	0	0	1	0
Iowa	0	2	1	8	12	15	0	0	0	2	2	1
Missouri	1	2	2	3	13	12	0	0	0	1	2	2
North Dakota	0	0	0	3	6	6	0	0	0	[6] 1	0	0
South Dakota	0	0	0	0	2	2	0	0	0	0	0	0
Nebraska	8	2	0	4	13	9	0	0	0	0	0	0
Kansas	4	1	1	10	5	17	0	0	0	1	0	3
SOUTH ATLANTIC												
Delaware	4	0	0	1	2	1	0	0	0	0	0	0
Maryland [3]	0	1	1	10	9	21	0	0	0	0	0	0
District of Columbia	0	0	0	4	1	7	0	0	0	0	0	0
Virginia	2	1	1	5	9	16	0	0	0	[6] 5	1	6
West Virginia	1	1	1	6	7	11	0	0	0	0	1	2
North Carolina	[7] 92	1	3	7	3	9	0	0	0	1	4	4
South Carolina	4	0	1	0	1	2	0	0	0	1	1	5
Georgia	10	3	2	2	6	3	0	0	0	[6] 7	5	5
Florida	12	3	3	4	5	4	0	0	0	[6] 4	2	4
EAST SOUTH CENTRAL												
Kentucky	1	0	3	5	3	9	0	0	0	11	0	3
Tennessee	7	1	1	10	2	8	0	0	0	[6] 2	5	5
Alabama	3	1	1	9	4	4	0	0	0	2	0	4
Mississippi [3]	3	0	0	6	4	4	0	0	0	0	2	3
WEST SOUTH CENTRAL												
Arkansas	3	3	3	3	3	3	0	0	0	1	10	7
Louisiana	0	0	2	0	3	4	0	0	0	[6] 6	2	2
Oklahoma	3	0	3	1	11	5	0	0	0	1	7	1
Texas	67	3	52	11	19	28	0	0	0	11	22	17
MOUNTAIN												
Montana	0	0	0	3	2	3	0	0	0	0	0	0
Idaho	4	0	0	[5] 1	1	1	0	1	0	0	0	1
Wyoming	2	0	0	0	0	3	0	0	0	0	0	0
Colorado	2	2	2	3	13	23	0	0	0	0	0	0
New Mexico	1	0	0	1	3	3	0	0	0	0	2	1
Arizona	7	0	0	0	10	10	0	0	0	0	2	0
Utah [3]	2	0	0	0	12	12	0	0	0	0	0	0
Nevada	0	0	0	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington	4	1	1	7	0	21	0	0	0	3	0	1
Oregon	1	0	0	6	7	17	0	0	0	0	7	0
California	74	33	22	37	72	110	0	0	0	[6] 8	9	3
Total	362	78	190	781	937	1,223	0	1	5	98	108	136
26 weeks	[7] 2,367	1,201	1,201	52,961	58,958	92,168	45	140	256	1,470	1,447	1,742
Seasonal low week [4]	(11th) Mar. 15–21			(32nd) Aug. 9–15			(35th) Aug. 30–Sept. 5			(11th) Mar. 15–21		
Total since low	[7] 2,019	589	782	75,500	85,644	130,489	66	194	332	997	962	1,118

[3] Period ended earlier than Saturday.
[4] Dates between which the approximate low week ends. The specific date will vary from year to year.
[5] Including cases reported as streptococcal infections and septic sore throat.
[6] Including paratyphoid fever and salmonella infections reported separately, as follows: New York (salmonella infection) 3; Illinois 1; Wisconsin 1; North Dakota 1; Virginia 1; Georgia 1; Florida 1; Tennessee 1; Louisiana 2; California 4.
[7] Correction (deducted from cumulative totals): Poliomyelitis, North Carolina, week ended June 12, 38 cases (instead of 39); week ended June 19, 57 cases (instead of 58).

Telegraphic morbidity reports from State health officers for the week ended July 3, 1948, and comparison with corresponding week of 1947 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 3, 1948							
	Week ended—		Median 1943–47	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	July 3, 1948	June 28, 1947		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	5	48	19								
New Hampshire		7	5								
Vermont	7	5	11								
Massachusetts	21	83	83		3		1				
Rhode Island		4	25								
Connecticut	7	58	39	1			1				4
MIDDLE ATLANTIC											
New York	69	205	205	3				5			5
New Jersey	35	189	174					2			
Pennsylvania	44	233	214								4
EAST NORTH CENTRAL											
Ohio	45	193	193								
Indiana		29	30				1				1
Illinois	22	103	92				2	1			
Michigan [2]	29	206	126				1				8
Wisconsin	28	98	98								12
WEST NORTH CENTRAL											
Minnesota	1	58	9	1							1
Iowa	8	26	26					1			21
Missouri	4	40	29			1					4
North Dakota	1	3	3								
South Dakota	1	5	4								2
Nebraska		21	7	1							1
Kansas	26	66	52								12
SOUTH ATLANTIC											
Delaware	5	2	1								
Maryland [2]	14	97	83			3	2	3			
District of Columbia	1	21	21	1							
Virginia	92	126	67			37	1	2			1
West Virginia	6	48	48								
North Carolina	68	45	190					4		1	
South Carolina	72	131	96	1	15			1			1
Georgia	4	58	19					2	2	4	
Florida	9	55	36				1			2	
EAST SOUTH CENTRAL											
Kentucky	10	27	44					1			
Tennessee	25	59	30					1			1
Alabama	17	56	32							6	
Mississippi [2]		16			2						3
WEST SOUTH CENTRAL											
Arkansas	20	73	23	6		9			9		
Louisiana	5	7	3						1		
Oklahoma	9	60	16								
Texas	200	568	264	31	540	83			2	8	18
MOUNTAIN											
Montana	3	6	6					1			
Idaho	3	14	4					2			
Wyoming	1	3	3					1	2		
Colorado	5	34	28		12			1			2
New Mexico	15	25	8			1					
Arizona	37	8	11			45					2
Utah [2]	9	6	31					1	1		1
Nevada											
PACIFIC											
Washington	4	23	23								
Oregon	50	34	34	1		1					1
California	30	198	198	4	2					1	5
Total	1,067	3,480	2,673	50	574	180	10	29	17	22	110
Same week: 1947	3,480			130	384	150	4	21	27	67	157
Median, 1943–47	2,673			75	626	210	10	25	20	82	[3] 155
26 weeks: 1948	50,116			1,988	9,432	5,297	231	197	514	450	2,478
1947	77,663			1,426	7,958	5,325	168	175	778	970	2,847
Median, 1943–47	65,092			961	8,856	3,269	236	172	471	1,325	[3] 2,425

[2] Period ended earlier than Saturday.
[3] 3-year median 1945–47.
Anthrax: New York 1; New Jersey 1; Pennsylvania 1.
Leprosy: California 1.
Alaska: Chickenpox 4; influenza 2; measles 2; mumps 3; whooping cough 2; pneumonia 7; scarlet fever 1.
Territory of Hawaii: Rabies 0; leprosy 2; lobar pneumonia 1; whooping cough 11.

WEEKLY REPORTS FROM CITIES*

City reports for week ended June 26, 1948

This table lists the reports from 87 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
New Hampshire:												
Concord	0	0	------	0	21	0	0	0	0	0	0	------
Vermont:												
Barre	0	0	------	0	-------	0	0	0	0	0	0	------
Massachusetts:												
Boston	2	0	------	0	157	1	8	1	92	0	0	------
Fall River	0	0	------	0	65	0	0	0	1	0	0	------
Springfield	0	0	------	0	16	0	1	0	1	0	1	------
Worcester	0	0	------	0	59	0	3	0	2	0	0	1
Rhode Island:												
Providence	0	0	------	0	16	0	1	0	3	0	0	------
Connecticut:												
Bridgeport	0	0	------	0	-------	0	0	0	2	0	0	------
Hartford	0	0	------	0	8	0	3	0	0	0	0	------
New Haven	0	0	------	0	4	0	0	0	2	0	0	------
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0	------	0	81	0	5	0	7	0	0	2
New York	3	1	3	0	456	1	35	0	49	0	1	16
Rochester	0	0	------	0	-------	0	2	0	3	0	0	3
Syracuse	0	0	------	0	25	1	2	0	1	0	0	3
New Jersey:												
Camden	1	0	------	0	9	0	1	1	1	0	0	2
Newark	0	0	------	0	304	0	2	0	5	0	0	------
Trenton	0	0	------	0	5	0	1	0	1	0	0	------
Pennsylvania:												
Philadelphia	2	0	1	1	339	0	11	0	7	0	0	7
Pittsburgh	0	0	------	0	14	0	5	1	32	0	1	5
Reading	0	0	------	0	5	0	1	0	2	0	0	------
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0	------	0	34	1	10	0	11	0	0	2
Cleveland	0	0	------	0	26	0	5	1	17	0	0	2
Columbus	0	0	------	0	8	0	1	0	5	0	0	------
Indiana:												
Indianapolis	2	0	------	------	35	0	------	0	0	0	0	------
South Bend	0	0	------	0	3	0	0	0	0	0	0	------
Terre Haute	0	0	------	0	-------	0	0	0	0	0	0	------
Illinois:												
Chicago	0	0	1	1	103	3	18	0	30	0	1	13
Springfield	0	0	------	0	-------	0	2	0	0	0	0	------
Michigan:												
Detroit	1	6	------	------	490	0	------	0	55	0	2	2
Flint	0	0	------	0	24	0	4	1	0	0	1	------
Grand Rapids	0	0	------	0	5	1	1	0	4	0	0	2
Wisconsin:												
Kenosha	0	0	------	0	22	0	0	0	0	0	0	------
Milwaukee	0	0	------	0	307	0	2	0	13	0	0	2
Racine	0	0	------	0	45	0	0	0	0	0	0	------
Superior	0	0	------	0	10	0	0	0	0	0	0	------
WEST NORTH CENTRAL												
Minnesota:												
Duluth	0	0	------	0	17	0	1	0	1	0	0	------
Minneapolis	0	0	------	0	-------	0	3	0	3	0	0	1
St. Paul	0	0	------	0	10	1	1	0	1	0	0	1
Missouri:												
Kansas City	0	0	------	0	8	0	3	0	2	0	0	2
St. Joseph	0	0	------	0	3	0	0	0	4	0	0	------
St. Louis	1	0	------	0	15	2	5	0	2	0	0	------

* In some instances the figures include nonresident cases.

City reports for week ended June 26, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet-fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	0	0		0	3	0	1	2	1	0	0	
Kansas:												
Topeka	0	0		0	3	0	0	0	0	0	0	1
Wichita	0	0		0	2	0	5	1	2	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0		0	2	0	2	0	1	0	0	
Maryland:												
Baltimore	3	0		0	670	0	4	0	2	0	0	10
Cumberland	2	0		0		0	0	0	0	0	0	
Frederick	0	0		0		0	0	0	0	0	0	
District of Columbia:												
Washington	0	0		0	53	0	5	0	2	0	0	
Virginia:												
Lynchburg	0	0		0	1	0	1	0	0	0	0	
Richmond	0	0		0	2	1	1	0	0	0	0	
Roanoke	0	0		0	1	0	0	0	1	0	0	
West Virginia:												
Charleston	0	0		0		0	4	0	0	0	0	
Wheeling	0	0		0		0	0	0	0	0	0	
North Carolina:												
Raleigh	0	0		0	6	0	1	0	0	0	0	
Wilmington	1	0		0		0	0	0	1	0	0	9
Winston-Salem	0	0		0		0	0	3	0	0	0	4
South Carolina:												
Charleston	0	1	2	0		0	1	0	0	0	0	1
Georgia:												
Atlanta	0	0		0	1	0	0	1	1	0	0	
Brunswick	0	0		0		0	0	0	0	0	0	
Savannah	0	0		0	1	0	0	0	0	0	0	
Florida:												
Tampa	2	0		0	1	0	2	0	0	0	0	4
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0		0	9	0	4	0	0	0	0	2
Nashville	1	0		0	3	0	4	0	0	0	0	
Alabama:												
Birmingham	0	0	1		1	0		1	0	0	0	1
Mobile	0	0		0		0	2	1	3	0	0	
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0		0		0	0	1	1	0	0	
Louisiana:												
New Orleans	0	0		0		2	5	2	0	0	0	
Shreveport	0	0		0		0	3	0	0	0	0	
Oklahoma:												
Oklahoma City	0	0		0	3	0	3	1	0	0	0	2
Texas:												
Dallas	0	0		0	11	0	0	1	2	0	0	5
Galveston	0	0		0	3	0	2	6	1	0	0	
Houston	0	0		1		0	3	9	1	0	1	
San Antonio	1	0		0	5	0	3	1	0	0	0	
MOUNTAIN												
Montana:												
Billings	0	0		0		0	5	0	0	0	0	
Great Falls	0	0			3	0		0	0	0	0	
Helena	0	0		0	1	0	0	0	0	0	0	
Missoula	0	0		0	5	0	0	0	0	0	0	
Colorado:												
Denver	1	0	1	0	15	0	2	1	2	0	0	5
Pueblo	0	0		0	112	0	1	0	1	0	0	1
Utah:												
Salt Lake City	0	0		0	80	0	1	0	1	0	0	1

City reports for week ended June 26, 1948—Continued

Division, State, and City	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	0	0	------	0	114	0	5	1	3	0	1	4
Spokane	0	0	------	0	14	0	1	1	0	0	0	------
Tacoma	0	0	------	------	9	0	------	0	1	0	0	------
California:												
Los Angeles	1	0	------	0	262	0	2	7	14	0	0	6
Sacramento	0	0	------	0	18	1	0	0	1	0	0	1
San Francisco	0	0	------	0	43	0	4	0	11	0	0	2
Total	24	8	9	3	4,206	14	214	45	412	0	9	132
Corresponding week, 1947[1]	40	------	29	9	1,685	------	201	------	385	0	14	962
Average 1943–47[1]	50	------	25	[2] 9	[3] 1,922	------	[2] 234	------	577	0	15	747

[1] Exclusive of Oklahoma City.
[2] 3-year average, 1945–47.
[3] 5-year median, 1943–47.

Rates (annual basis) per 100,000 population, by geographic groups, for the 87 cities in the preceding table (latest available estimated population, 34,384,100)

	Diphtheria case rates	Encephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Poliomyelitis case rates	Scarlet fever case rates	Smallpox case rates	Typhoid and paratyphoid fever case rates	Whooping cough case rates
			Case rates	Death rates								
New England	5.4	0.0	0.0	0.0	941	2.7	43.5	2.7	280	0.0	2.7	3
Middle Atlantic	2.8	0.5	1.9	0.5	573	0.5	30.1	0.9	50	0.0	0.9	18
East North Central	1.8	3.7	0.6	[1]	685	3.1	[1]	1.2	83	0.0	2.5	14
West North Central	2.0	0.0	0.0	0.0	123	6.0	38.2	6.0	32	0.0	0.0	24
South Atlantic	13.1	1.6	3.3	0.0	1,206	1.6	34.3	6.5	13	0.0	0.0	46
East South Central	5.9	0.0	5.9	[1]	77	0.0	[1]	11.8	18	0.0	0.0	18
West South Central	2.5	0.0	0.0	2.5	56	5.1	48.3	53.3	13	0.0	2.5	18
Mountain	8.3	0.0	8.3	[1]	1,784	0.0	[1]	8.3	33	0.0	0.0	58
Pacific	1.6	0.0	0.0	[1]	727	1.6	[1]	14.2	47	0.0	1.6	21
Total	3.6	1.2	1.4	[1]	640	2.1	[1]	6.8	63	0.0	1.4	20

[1] Rate not computed as mortality data were incomplete.

Dysentery, amebic.—cases: New Haven 1; New York 6; Flint 1; Memphis 9.
Dysentery, bacillary.—Cases: Worcester 1; New York 12; Los Angeles 3.
Dysentery, unspecified.—Cases: San Antonio 50.
Leprosy.—Cases: New York 1.
Rocky Mountain spotted fever.—Cases: Cincinnati 1; Oklahoma City 1.
Typhus fever, endemic.—Cases: Mobile 1; San Antonio 1.

PLAGUE INFECTION IN KANSAS, NEW MEXICO AND OREGON

Under date of June 28 plague infection was reported proved in specimens collected in Kansas, New Mexico, and Oregon as follows:

KANSAS

Scott County.—A pool of 6 fleas from 4 grasshopper mice, *Onychomys leucogaster*, taken June 8, 12 miles west of Scott City on Highway No. 96, thence 7 miles north on dirt road; and a pool of 57 lice from 6 cotton rats, *Sigmodon hispidus*, taken June 9, 12 miles west of Scott City and 5 miles north on county road. (These localities are in the same area in which plague infection was found in Scott County in 1946, and the farthest east that infection in wild rodents has been reported to date in Western United States. See PUBLIC HEALTH REPORTS for Aug. 30, 1946, p. 1287, and Sept. 20, 1946, p. 1394.)

NEW MEXICO

Rio Arriba County.—A pool of 8 fleas from 11 prairie dogs, *Cynomys gunnisoni gunnisoni*, taken June 4, 1 mile south on dirt road from a point 1½ miles south of Chama and 1 mile west on U. S. Highway No. 84.

OREGON

Lake County.—A pool of 7 fleas from 8 ground squirrels, *Citellus beldingi oregonus*, taken June 9 in an area 22 to 27 miles long on Drake Flats, northwest of Lakeview.

DEATHS DURING WEEK ENDED JUNE 26, 1948

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

	Week ended June 26, 1948	Corresponding week 1947
Data for 93 large cities of the United States:		
Total deaths	8,534	8,637
Median for 3 prior years	8,637	
Total deaths, first 26 weeks of year	250,544	250,640
Deaths under 1 year of age	606	665
Median for 3 prior years	623	
Deaths under 1 year of age, first 26 weeks of year	17,617	20,003
Data from industrial insurance companies:		
Policies in force	71,043,978	67,273,660
Number of death claims	12,346	11,757
Death claims per 1,000 policies in force, annual rate	9.1	9.1
Death claims per 1,000 policies, first 26 weeks of year, annual rate	9.8	9.8

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 12, 1948.—During the week ended June 12, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Price Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		38		142	417	84	6	80	106	873
Diphtheria				4						4
Dysentery, bacillary				3						3
German measles				84	15			3	4	106
Influenza		14			10	3	1			28
Measles		1	9	380	1,018	47	3	67	46	1,571
Meningitis, meningococcus				1			2		1	4
Mumps		24		158	129	46	40	31	14	442
Poliomyelitis					6		1		1	8
Scarlet fever		8	6	69	53	6		1	4	147
Tuberculosis (all forms)		8	2	86	29	39	6	4	35	209
Typhoid and paratyphoid fever				2				3		5
Undulant fever				1	1	1			8	11
Venereal diseases:										
Gonorrhea	1	8		120	77	29	19	33	53	340
Syphilis		6	3	83	56	7	4	8	14	181
Whooping cough		20		49	10	3	3	26	1	112

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

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

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

Cholera

India—Calcutta.—During the week ended June 19, 1948, 162 cases of cholera were reported in Calcutta, India.

Plague

Argentina.—For the period January 1–April 30, 1948, 12 cases of plague with 4 deaths were reported in Argentina.

Belgian Congo—Costermansville Province.—For the week ended June 26, 1948, 4 fatal cases of plague were reported in Costermansville Province, Belgian Congo.

Ecuador—Loja Province.—During the month of May 1948, 10 cases of plague were reported in Loja Province, Ecuador, as follows: 7 cases in Sabiango, 1 case in Sozoranga, Macará Canton, and 2 cases in Cumbi, Loja Canton.

Peru.—For the period January 1–April 30, 1948, 19 cases of plague with 4 deaths were reported in Peru.

Smallpox

China—Shantung Province—Tsingtao.—During the period May 21–31, 1948, 29 cases of smallpox were reported in Tsingtao, Shantung Province, China.

Ecuador.—During the month of May 1948, 285 cases of smallpox with 15 deaths were reported in Ecuador, including 17 cases (alastrim) in Guayaquil, 11 cases with 1 death in Quito, and 4 cases in Manta.

Portugal.—Smallpox has been reported in Portugal as follows: For the month of January 1948, 7 cases; for the month of February, 1 case.

Sudan (Anglo-Egyptian).—Smallpox has been reported in the Anglo-Egyptian Sudan as follows: For the week ended June 5, 1948, 83 cases with 12 deaths, including 73 cases, 10 deaths in Kordofan Province; for the week ended June 12, 129 cases (including 4 alastrim) with 35 deaths, of which 107 cases and the 35 deaths were reported in Kordofan Province.

Typhus Fever

Ecuador.—For the month of May 1948, 56 cases of typhus fever with 4 deaths were reported in Ecuador, including 4 cases (murine type) reported from Guayaquil, 4 from Manta, and 1 from Quito.

Japan—Osaka.—For the week ended April 17, 1948, 99 cases of typhus fever with 6 deaths were reported in Osaka, Japan.

Manchuria—Mukden.—For the period February 11–May 20, 1948, 31 cases of typhus fever with 2 deaths were reported in Mukden, Manchuria.

Portugal—Madeira Islands.—During the month of February 1948, one fatal case of typhus fever was reported in Funchal, Madeira Islands. This is the first case of typhus fever reported from these Islands in 1948, and no cases were reported from the Madeira Islands or the Azores during 1947.

Yellow Fever

Bolivia.—A delayed report has been received of the occurrence of five cases of yellow fever in Bolivia during April and May 1947, distributed as follows: Santa Cruz Department—Nuflo de Chavez one, Conception one, Cercado one; La Paz Department—Province of Sud Yungas, Chulumani one; Province of Nor Yungas, Coroico one.

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