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BIRTH STATISTICS AS AN INDEX OF INTERDEPENDENCE OF COUNTIES WITH REGARD TO MEDICAL SERVICES [1]

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INTRODUCTION

Data are presented in this paper to illustrate how birth statistics may be employed to describe quantitatively the pattern of the dependence of some counties upon the medical facilities of other counties. It is well known that city, county, or even State lines do not constitute barriers to the movement of persons seeking medical care. As a result, it becomes difficult to measure accurately the medical resources of a specified locality, and the ratios of physicians, hospital beds, nurses, or other facilities relative to the number of persons in the population often become meaningless. One may find that, relative to population size, a locality has many physicians, hospital beds, or other facilities; and yet these resources are barely sufficient because they serve also the populations of adjoining places. Conversely, one may find that in a community with relatively few medical resources the demands of the population for medical care are satisfied because use is made of the facilities of nearby places.

To obtain a correct picture of the medical resources available to a community, certain adjustments must be made in the statistics of both the population and the medical facilities of the community. If the facilities of a community are utilized by persons in surrounding places, the population and facilities of these localities should be grouped with those of the original community before ratios of facilities to population are computed. In essence this means that, for the purposes of comparative analysis, political boundaries should be disregarded and localities regrouped into "medical trade" areas (*1*).

For these operations knowledge is required about the pattern of the supply and demand for medical care. This knowledge should be based on quantitative information about the number of persons who receive medical care in an area and the number who go outside the area for medical care.

[1] From the Division of Public Health Methods.

Data of this kind are not generally available and can be obtained only through special surveys. For example, from questionnaires sent to all physicians and to all general hospitals in Washington, D. C., in 1942, it was found that 15 percent of the patients seen by physicians of that city were residents of surrounding counties of Maryland and Virginia, and 25 percent of the general hospital admissions also came from these counties (*2*). It was thus possible to estimate that the population served by the physicians of Washington was 975,000 persons and not the city's population of 820,000. The use of this type of survey to determine quantitatively the intercommunity movement of patients is costly and time-consuming. It becomes impractical when the maintenance of current records for the study of trends and changes in the intercommunity movement is desired.

While there are no Nation-wide data on the intercommunity movement of persons seeking all kinds of medical care, birth and death statistics are available. Birth and death certificates include the usual place of residence of the individuals as well as the place of occurrence of the event. From analysis of these certificates one can derive information on the number of persons in a community who go to another locality to have babies or to receive care for a serious illness, and also the changes which take place from year to year in such movements.

The main objective of the intercommunity movement relative to births and deaths is to take advantage of medical facilities, such as hospitals and specialists, lacking in the place of residence but available elsewhere. It is reasonable to assume then that the size and direction of the movement will furnish an index of the degree of dependence of one locality upon the medical facilities of another. The determination of this index and of some of the variables associated with it forms the substance of this paper.

MATERIAL AND METHOD

Data on the frequency with which births and deaths of residents of a stated locality occur in the place of residence or elsewhere were published by the Bureau of the Census for the years 1937 to 1939 by State, county, and city (*3*). These data do not indicate the place where the births or deaths actually took place outside of the place of residence. They do not provide, therefore, information on the direction of the movement of persons obtaining medical care outside of their own county. However, from these published figures it can be learned that there is a high correlation between the proportions of births and deaths occurring outside the county of residence. For example, in 1939 the correlation between the percentage of births occurring outside the resident county and the corresponding percent-

age of deaths is measured by a correlation coefficient $r=0.79\pm0.08$ for the counties of Maryland and $r=0.54\pm0.08$ for the counties of Ohio. Because there is high correlation it would seem that one or the other of the two kinds of data could be used. Because there are more births than deaths it was decided to limit this study to an analysis of birth statistics.

To obtain information on the specific place where the births to residents took place, when they occurred outside the county of residence, special tabulations were requested from the Bureau of the Census. It was decided to limit the study to 1942, the most recent year for which the Bureau of the Census had the required information available for analysis. Because of the limitations of time and personnel only 8 States were used: Georgia, Kansas, Maryland, Massachusetts, Ohio, Oregon, Tennessee, and Virginia. These States include at least 1 from each of the 4 principal geographic areas of the country. According to the 1940 Census, they include 19 percent of the total population, 20 percent of the urban population, 18 percent of the white population, and 13 percent of the land area of the country. They also accounted for 19 percent of the effective buying income [2] of the country in 1942. Eighteen percent of the non-Federal general hospital beds were situated in these States in 1943. Their average birth rate in 1942 was 21.6 per 1,000 persons as compared with 21.3 for the country as a whole. It is evident then that except for density of population these 8 States together are fairly representative of the 48 States.

In the above States there were recorded for 1942, 533,363 births to residents, of which 60,695 occurred outside the county of residence. As expected, the hospitalization rate for births occurring outside the county of residence was high, 94 percent. In these same States the percentage of all births hospitalized equalled only 68 percent.

Two ratios are used in this paper to describe the pattern of the movement of persons from one county to another with reference to confinement. The first will be called the in-residence birth ratio and abbreviated as the I. R. ratio. The I. R. ratio for a county is obtained by dividing the number of births to residents which occurred within the county by the total births occurring to residents. The second ratio will be called the specific out-residence birth ratio and abbreviated as the O. R. ratio. Each O. R. ratio for a county is obtained by dividing the number of births to residents which occurred in a specific outside county by the total births occurring to residents.

The I. R. and the O. R. ratios are both expressed as the number of such births per 100 resident births. The sum of the specific O. R. ratios based on the resident births of a county is the complement of the

[2] Effective buying income is defined by Sales Management as income from all sources plus an estimated nonmoney income of farmers and small-town residents (4).

I. R. ratio of that county. For example, the I. R. ratio for Carroll County, Md., is 53. The specific O. R. ratios for Carroll are: to Baltimore City 18, to Frederick County 6, to York County, Pa., 16, and to other places 5. The sum of these specific O. R. ratios is 47, the complement of the I. R. ratio.

DISTRIBUTION OF COUNTIES BY I. R. RATIOS

In table 1 is shown the proportion of counties having stated I. R. ratios in the 8 States studied. When all the States are taken together it appears that 30 percent of the 621 counties had an I. R. ratio of 95 or higher. That is, in only 30 percent of the counties did 95 percent or more of the births to residents take place within the county of residence. These findings indicate how extensive is the movement across county boundaries for purposes of obtaining care for childbirth. In the remaining 70 percent of the counties 5 percent or more of the births to residents occurred outside the county of residence, and in 31 percent of the counties over 15 percent of the births took place outside the county of residence.

TABLE 1.—*Distribution of counties in eight States by in-residence birth (I. R.) ratio*

I. R. ratio	Total 8 States	State							
		Georgia	Kansas	Maryland	Massachusetts	Ohio	Oregon	Tennessee	Virginia
Number of counties [1]	621	159	105	24	14	88	36	95	100
		Percent distribution							
Total	100	100	100	100	100	100	100	100	100
95 or higher	30	46	16	25	21	18	17	38	25
85–94	39	40	20	17	43	39	41	60	40
75–84	14	11	23	25	15	22	11	2	16
50–74	12	3	26	21	21	18	17	0	14
less than 50	5	0	15	12	0	3	14	0	5

[1] The independent city of Baltimore is counted as a separate county. The 24 independent cities of Virginia have been combined with the counties in which they are located.

There is considerable variation among the eight States with regard to the value of the I. R. ratio in the constituent counties. The counties of Georgia and Tennessee, for example, have comparatively high I. R. ratios, and the variation is small. On the other hand, there is wide variation in the I. R. ratios of the counties of Kansas and many of the ratios are comparatively low. On the whole, the data would appear to indicate marked intercounty movement of patients in the latter State and comparatively little movement in the former two States.

Among the factors associated with the variation of the I. R. ratios of counties there are two which will be examined: the medical facilities of the counties, as measured by the number of general hospital beds relative to population (*5*), and their economic level as measured

by the annual per capita effective buying income (*4*). The mean I. R. ratio of the counties is found to increase from 80.3 for counties with no general hospital beds to 92.9 for counties with 3 or more hospital beds per 1,000 persons. Thus, the greater the hospital facilities the larger is the percentage of persons who stay in their counties of residence to have babies.

The relationship of the I. R. ratio to economic level as measured by per capita income brings out another aspect of the phenomenon.

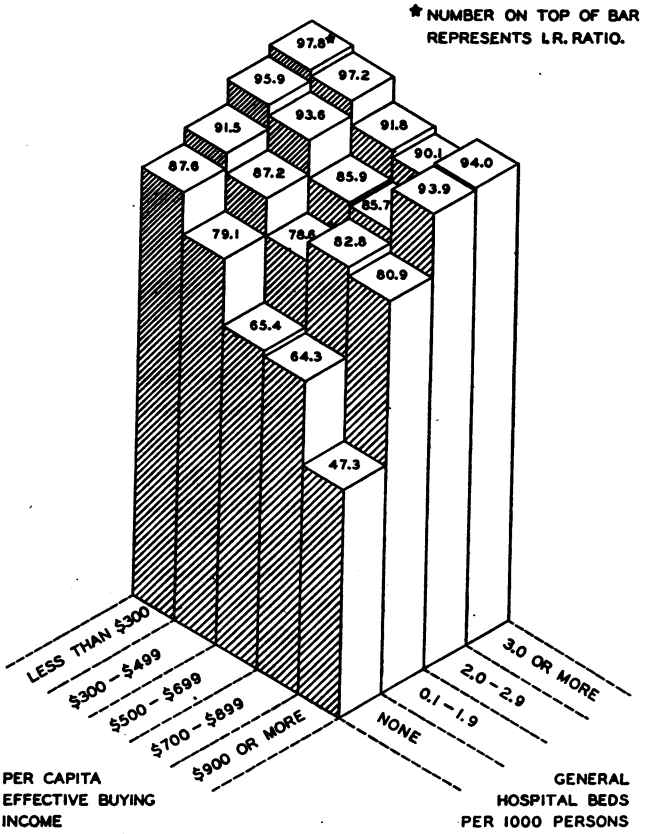

FIGURE 1.—Average in-residence birth (I. R.) ratios of counties in 8 States grouped by per capita effective buying income and general hospital beds per 1,000 persons, 1942.

For counties with low income, under $300 per capita, the mean I. R. ratio equals 88.9. It decreases to 84.1 for counties with $300 to $499 income, and to 76.0 for the $500 to $699 group. Then it begins to increase consistently and reaches 90.4 for the group of counties with an average per capita income of $900 or more. Therefore, higher I. R. ratios are found in the wealthiest and the poorest counties.

A more illuminating picture of the relationship of the I. R. ratio to the economic level and the medical facilities of the counties is shown in figure 1 where all three variables have been diagrammed.

Figure 1 illustrates that, for each income level, the I. R. ratio increases rather regularly with increase in the number of general hospital beds per 1,000 persons. However, the rate of increase in the I. R. ratio for the counties in the lowest income group is very small.

The results presented in figure 1 show that only for the group of counties with no general hospitals is there consistent increase in I. R. ratios as the income level decreases. On the basis of these findings one can generalize that a low I. R. ratio is associated with a comparatively high income and no medical facilities; a high I. R. ratio, on the other hand, may be found in counties that have medical facilities and also in counties where the income level of the population is low. In other words, people stay in their own county to have babies either when they are too poor to go elsewhere or when there are hospital facilities available; they go outside their counties when the income level is high and there are few hospital facilities in the county.

DIRECTION AND DISTANCE OF INTERCOUNTY MOVEMENTS

The I. R. ratio or its complement, the sum of the specific O. R. ratios, is a measure of the amount of out-movement of patients, but in order to measure the direction of the movement the specific O. R. ratios will have to be examined. Of the 439 counties that have an I. R. ratio of less than 95, 296 have at least one specific O. R. ratio of 5 or more. That is, in 67 percent of the counties which show substantial out-movement, at least 5 percent of the resident births occur in one or more specific counties. In the remaining 143 counties the out-movement is diffused, and less than 5 percent of the resident births occur in a particular outside county.

The movement from the 296 counties with specific O. R. ratios of 5 or more is frequently in the direction of more than one county. These 296 counties accounted for 376 specific O. R. ratios. This finding emphasizes again how extensive is the interdependence of counties with respect to medical services and the importance of arriving at a clear notion of its magnitude. This interdependence is not limited by State lines. Of the 376 specific O. R. ratios, 122 are from counties bordering on other States. Thirty-eight of these movements (31 percent) are across State lines. In addition, 5 inter-State movements originated in counties which do not border on other States.

Adequate data to measure the distances involved in the intercounty movements are not available since the specific place of residence was indicated very infrequently. This is understandable because in general a movement is from the rural portions of a county. An estimate of the variations in the amount of travel taking place in these movements may be obtained by measuring the distances from

the place of occurrence to either the nearest or farthest border of the county of residence. The former will give the minimum and the latter the maximum distance involved. The true distance lies somewhere between the two and probably closer to the minimum value than to the maximum. Therefore, in this study, an index of the distance involved in the movement was determined by the distance between the place of occurrence and the nearest border of the county of residence. When more than one community in a county was designated as the place of occurrence the distance was measured from the one nearest the proximate border of the county of residence.

TABLE 2.—*Distribution of intercounty movements by distance from place of occurrence to county of residence*

	Total	Distance in miles						
		Under 7.5	7.5–12.4	12.5–17.4	17.5–22.4	22.5–27.4	27.5–32.4	32.5 and over
Number of intercounty movements	309	90	89	60	26	18	5	21
Percent distribution	100	29	29	19	8	6	2	7

Table 2 shows the distribution of these estimates for the 309 intercounty movements for which the exact place of occurrence was known. It will be seen that there is considerable variation in the estimated distances. Thus, in 29 percent of the movements the minimum distance involved was 7.4 miles or less, but in 7 percent it was greater than 32.5 miles. For 15 percent of the movements the minimum distance travelled amounted to 22.5 miles or more. The distances for the individual States are not shown in the table but appear to vary from State to State depending upon size of counties and density of population. For example, in Oregon, for approximately half of the movements the distance involved was 22.5 miles or more, while in Massachusetts the estimated distance in any movement did not exceed 7.5 miles.

DETERMINATION OF CENTERS OF MEDICAL SERVICE

There are two purposes in studying the intercounty movement of patients. The first is to obtain a measure of the interdependence of counties with regard to medical services. The second is to identify the counties which are centers for dispensing medical services and the counties which are dependent upon these centers. With regard to births the I. R. and specific O. R. ratios serve both as a measure of interdependence and as a means of identification of centers. The map shown in figure 2 illustrates this for the counties of Maryland.

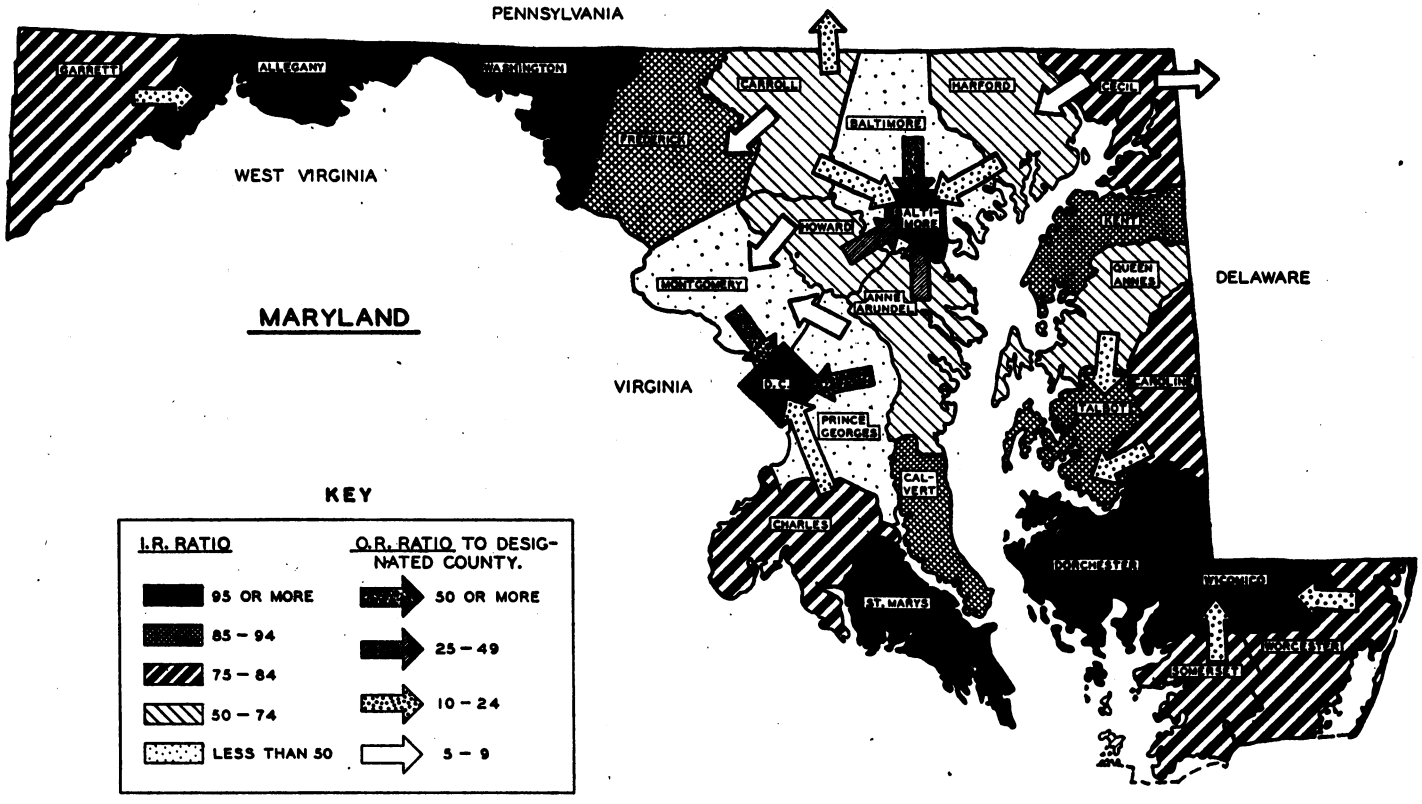

FIGURE 2.—Counties of Maryland showing percent of births to residents occurring within the resident county (I. R. ratio) and the direction and magnitude of the movement to other counties (O. R. ratio).

The data shown in figure 2 indicate that, so far as the other counties of the State are concerned, Dorchester, St. Marys, and Washington exhibit little in- or out-movement. Allegany, Frederick, Talbot, and Wicomico counties and Baltimore City show only in-movement. Harford and Montgomery show both in- and out-movement. Although Calvert and Kent counties have I. R. ratios of less than 95, they do not have any specific O. R. ratios of 5 or more. The remaining 12 counties have I. R. ratios of less than 95 and show only out-movement.

In terms of interdependence of counties, the four counties and Baltimore City which show only in-movement are localities on which other counties depend in varying degree for their medical care. These localities may be considered as "centers." Baltimore City is a center on which depend Ann Arundel, Baltimore, part of Carroll, Harford, and Howard counties. Allegany is a center for Garrett, Frederick for part of Carroll, Talbot for Queen Annes and Caroline, Wicomico for Somerset and Worcester. Although Washington, D. C., is not being discussed here it should be noted that it is a center for three Maryland counties: Montgomery, Prince Georges, and Charles.

The counties which show only out-movement may be regarded as "dependent." The residents of a dependent county sometimes utilize the medical facilities of more than one center. For example, Carroll County sends patients to Pennsylvania as well as to Baltimore City and Frederick County.

The counties which have I. R. ratios of 95 or more and show no in-movement are here called "independent." So far as these data show, the independent counties are neither dependent upon another county nor serve as a source of medical care for other counties. It will be noted, recalling figure 1, that an independent county may have sufficient resources of its own, or have few resources and a population which does not go beyond the county borders for medical care. The three counties mentioned illustrate both situations.

Two counties, Calvert and Kent, have I. R. ratios of less than 95 and yet the out-movement of patients does not seem to be directed toward any one county. We shall call these "nonspecific dependent" counties.

Harford and Montgomery counties depend upon other counties for a good proportion of the medical care relative to births, but at the same time they extend medical care to other counties to some degree. These counties which show both in- and out-movement will be differentiated from other dependent counties by the term "partially dependent."

From the findings illustrated in figure 2 a number of pertinent considerations are in order. In the first place, it is seen again that the interdependence of counties is not limited by State lines. Secondly, even within counties part of the population may go toward one

center and part toward another. Furthermore, in counties whose medical resources serve other counties one finds that the resident population sometimes seeks medical care elsewhere. If in delineating areas dependent upon a center it is necessary to retain county lines it is well to recognize the possibility of error introduced. It is obvious, however, that such an error is unimportant in comparison to the more realistic evaluation of the medical resources available to the population which results from delineation of areas according to the above determination of the centers and their dependent counties.

Among the 621 counties of the 8 States studied there are 114 (18 percent) that can be classified as centers according to the above definition, and 101 (16 percent) that can be classified as independent. That leaves 406, or about two-thirds of the counties of this sample, that are dependent to some degree or manner on other counties. There is considerable variation from State to State in the proportion of counties which are centers, independents, or dependents. In Tennessee and Virginia only 14 percent of the counties are centers while in Kansas 24 percent fall into this category. Independent counties account for only 3 percent of the counties in Kansas and Ohio and for 31 percent of the counties in Georgia. The proportion of counties which are dependent upon other counties for medical services to some degree or manner varies from 53 percent in Georgia to 75 percent in Oregon.

It is expected that the dependency status of a county is related to the economic level of the county and the amount of its medical facilities. This is borne out by the data presented in tables 3 and 4. The centers are wealthier than the other counties and contain more facilities. Amost half the independent counties are in the lowest income group. Two-fifths of them have no general hospitals. These two facts point to a means of identifying counties the populations of which neither possess adequate medical facilities nor have the means to seek them elsewhere.

TABLE 3.—*Distribution of different types of counties by per capita effective buying income*

Per capita effective buying income	Type of county				
	Centers	Independent	Dependent	Non-specific dependent	Partially dependent
Number of counties	114	101	[1] 254	110	41
	Percent distribution				
Total	100	100	100	100	100
Less than $300	11	49	36	39	0
$300-$499	14	34	26	27	22
$500-$699	16	4	26	13	39
$700-$899	26	10	10	10	34
$900 and over	33	3	2	11	5

[1] Baltimore County income data not available.

TABLE 4.—*Distribution of different types of counties by number of general hospital beds per 1,000 persons*

General hospital beds per 1,000 persons	Type of county				
	Centers	Independent	Dependent	Nonspecific dependent	Partially dependent
Number of counties	114	101	255	110	41
	Percent distribution				
Total	100	100	100	100	100
None	4	41	77	55	15
0.1-1.9	14	26	17	19	34
2.0-2.9	27	17	4	13	31
3.0 or more	55	16	2	13	20

Another characteristic of the data presented in tables 3 and 4 is the variability of each type of county in terms of per capita income and hospital beds. Not all the centers are wealthy and have more resources than all of the other kinds of counties. Being a center or any other type county is related to the facilities available in surrounding counties. A county with 1 hospital bed per 1,000 surrounded by counties that have none will probably be a center. A county with 3 beds per 1,000 may be dependent on an adjoining county if the latter possesses 6 beds per 1,000.

There are some centers shown in table 4 as having no general hospital beds. Several factors, including the presence of unregistered or Federal hospitals,[3] explain this movement of people seeking medical facilities into counties which apparently have no general hospitals.

MEDICAL SERVICE AND TRADE CENTERS

In view of the economic characteristics of the medical service centers described above it seems worth while to inquire in what manner they coincide with commercial trade centers. For this purpose use has been made of the counties containing the marketing and business centers identified on the Rand-McNally Trading Area Map of the United States.

The relationship between the two types of centers is shown in table 5, from which it appears that all of the 14 "major trade centers" are also medical service centers. Of the 55 "basic trade centers," 39 are also medical service centers, and 5 are independent. Thus only 20 percent of the basic trade centers are not medical service centers or independent counties. On the other hand, 61 of the 114 counties defined here as centers, and 96 of 101 independent counties are included among

[3] In Georgia, 567 births to residents of Muscogee County were hospitalized in Chattahoochee County. Although this county has no registered non-Federal general hospital it has a large station hospital at Fort Benning.

"other" counties. This latter group of counties is the Rand-McNally equivalent of dependent counties as defined in this paper.

TABLE 5.—*Comparison of Rand-McNally trade centers and centers of medical service relative to births*

Rand-McNally classification	Type of county (relative to births)				
	Total	Centers	Independent	Dependent	Other
	Number of counties				
Major trade centers	14	14	0	0	0
Basic trade centers	55	39	5	2	9
Other counties	552	61	96	253	142
	Percent distribution				
Major trade centers	100	100	0	0	0
Basic trade centers	100	71	9	4	16
Other counties	100	11	17	46	26

From these findings it appears that there is association between trade centers and medical service centers. However, this correlation is not exact. In seeking medical care a population follows established commercial trade routes but areas around a trade center are much more extensive than those around a medical service center. This inference is supported by computing the number of counties dependent upon medical service centers and upon trade centers. The 14 major trade centers have 458 dependent counties, or an average of 32.7 dependent counties per center. These same 14 counties as medical service centers have an average of 4.8 dependent counties each. Similarly, the 39 basic centers have 217 dependent counties or an average of 5.6 counties each. These same 39 counties have an average of 2.5 dependent medical service counties. Thus, the trade area concept may be used to determine broadly the areas of medical service, but the use of the I. R. and O. R. ratios allows a finer determination of the pattern of intercounty movement of persons seeking medical care with reference to births.

SUMMARY

Data on the place of occurrence of births have been used as indices (a) to measure the amount and direction of the movement of persons across county lines for purposes of obtaining medical care for childbirth, and (b) for identifying counties which are centers of such medical services and those which are dependent upon these centers. Statistics of births which occurred in 1942 to residents of eight States that together are fairly representative of the whole country have been analyzed.

From this analysis the main findings are:

1. The average income of the population and the relative number of general hospital beds are closely associated with the intercounty movement of population relative to births. There is very little movement either when the income and amount of hospital facilities are high or when they are both low. With few or no hospital facilities the movement increases markedly with increase in the average income of the population.

2. Over one-half of the intercounty movements involve a minimum distance of 12.4 miles or less. These movements appear to follow established trade routes but within smaller areas.

3. About 18 percent of the counties are centers of medical services for 66 percent of the counties. There remain 16 percent of the counties which are neither centers nor dependent counties. Of these approximately one-half belong to the lowest income group and have few or no hospital facilities.

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SECOND REPORT ON THE CONTROL OF *ANOPHELES QUADRIMACULATUS* SAY IN THE WATER-CHESTNUT AREAS OF THE POTOMAC RIVER, 1944 [1]

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During 1943 the Office of Malaria Control in War Areas of the United States Public Health Service, in cooperation with the health departments of Maryland, Virginia, and the District of Columbia, successfully controlled *Anopheles quadrimaculatus* Say in the vicinity of six military establishments along the Potomac River by airplane dusting the adjacent mosquito breeding areas (*1*). Similar control

[1] From the Office of Malaria Control in War Areas, States Relations Division. The authors wish to acknowledge the advice and assistance of Senior Sanitary Engineer (R) John M. Henderson, Senior Entomologist (R) George H. Bradley, and Passed Assistant Sanitarian (R) Herbert Knutson, U. S. Public Health Service. Acknowledgment is also made for the fullest cooperation received at all times from post commanders, and from medical and sanitary officers of the Army, Navy, and U. S. Public Health Service District 2, and health department officials of Maryland, Virginia, and the District of Columbia. The authors wish to express special appreciation to Lt. Col. Owen Ross, operations officer, at Turner Field, Marine Corps Air Station, Quantico, Va., for numerous courtesies extended.

measures were undertaken during 1944. However, the amount of airplane dusting necessary in 1944 was greatly reduced as a result of the water-chestnut cutting program of the United States Engineer Department, funds for which were furnished, in part, by the Office of Malaria Control in War Areas. This cutting program was begun by the United States Engineers in 1940 and has clearly demonstrated that water chestnut can be eliminated from the Potomac River by cutting the plants sufficiently early in the year to prevent reseeding for growth the following year.

A number of the military personnel stationed at Fort Belvoir and the Quantico Marine Barracks in 1944 had returned to the United States from highly malarious theaters of war, and since some were carriers of malaria the possibilities of transmission were greater during 1944 than in 1943. Recognition of this increased potential hazard was evident in the expressed concern of the authorities at both military posts and by the high priority given the dusting program on their schedules.

The operational aspects of the 1944 program were under the direction of the senior author while the entomological phases were under the direction of the junior author.

OPERATIONS

In general, the operational procedures for airplane dusting of the water chestnut in 1944 were similar to those followed in 1943 (*1*). On May 22 the United States Engineers began extensive cutting of the water chestnut, using 12 Hockney-type underwater cutters and 3 weed-saw cutters. This equipment was supplemented by 5 other Hockney-type cutters, 3 of which were used by the Naval Powder Factory at Indian Head, Md., and 2 by the Army at Fort Belvoir, Va. This total of 20 cutters was twice the number used in 1943.

At the start of airplane dusting operations in 1944, 620 acres of water chestnut were treated as compared with 3,759 acres in 1943, a reduction of approximately 85 percent. This reduction was due to cutting (fig. 1) which eliminated the need for dusting at all posts covered during 1943 with the exception of Fort Belvoir and the Quantico Marine Barracks, Va. The maximum acreage of water chestnut and swamps dusted was as follows:

	Acres	
	Chestnut	*Swamp*
Fort Belvoir:		
Pohick Bay	125	----
Accotink Bay		70
Quantico Marine Barracks:		
Quantico Creek	465	----
Chopawamsic Island	30	45
Chopawamsic Creek		255
	620	370

The planes used for the work by a commercial dusting company in 1944 were Piper Cruiser monoplanes. In these planes the plywood hopper, having a capacity of about 400 pounds of dust, was located behind the pilot. The mechanical arrangements for distribution of the dust were essentially the same as on the Stearman biplanes used in 1943 (*1*). Turner Field at the Marine Corps Air Station, Quantico, Va., again was used as a base for dusting operations.

The efficiency of the season's operations was greatly increased by the fact that during the previous winter months a large quantity of paris green dust mixture was prepared. Each batch was mixed in the proportion of 60 pounds of paris green to 200 pounds of soapstone (23 percent paris green) and bagged in 70-pound lots ready for use.

A summary of the season's operations, showing the total acreage dusted, amounts of paris green and soapstone applied, dusting time, and rates of application, is given in table 1. Dusting was done at 7-day intervals for 12 weeks between July 7 and September 22. The area dusted varied from a maximum of 990 acres on July 14 to a minimum of 440 acres on September 22. The total acreage dusted, including swamp areas, was 7,610 acres. This required a total of 8,791 pounds of paris green and a total flying time of 62 hours and 32 minutes. The average application per acre per treatment for the season was 4.62 pounds of larvicidal mixture containing 1.16 pounds of paris green. The average cost per acre per application was $1.35 compared to only $1.20 in 1943. The increased unit cost during 1944 is attributable to the smaller acreage dusted, which entailed an increase unit cost in overhead expense.

TABLE 1.—*Summary of dusting operations of water-chestnut areas, Potomac River, 1944*

Area	Acreage	Paris green		Diluent soapstone (pounds)	Dusting time	
		Pounds	Pounds per acre		Hours	Minutes
Fort Belvoir	1,560	2,295	1.50	6,875	27	16
Quantico	6,050	6,496	1.07	19,474	35	16
Total	7,610	8,791	1.16	26,349	62	32

ENTOMOLOGICAL SERVICES

The entomological services on the program in 1944 were conducted essentially in the same manner as in 1943 (*1*). However, during 1944 inspection work was concentrated at Fort Belvoir and the Quantico Marine Barracks in Virginia, since only these two areas were dusted by airplane. All other zones were kept under surveillance and were

dusted from boats only when the need was indicated by a rise in either larval or adult densities. Most of the necessity for inspection on the

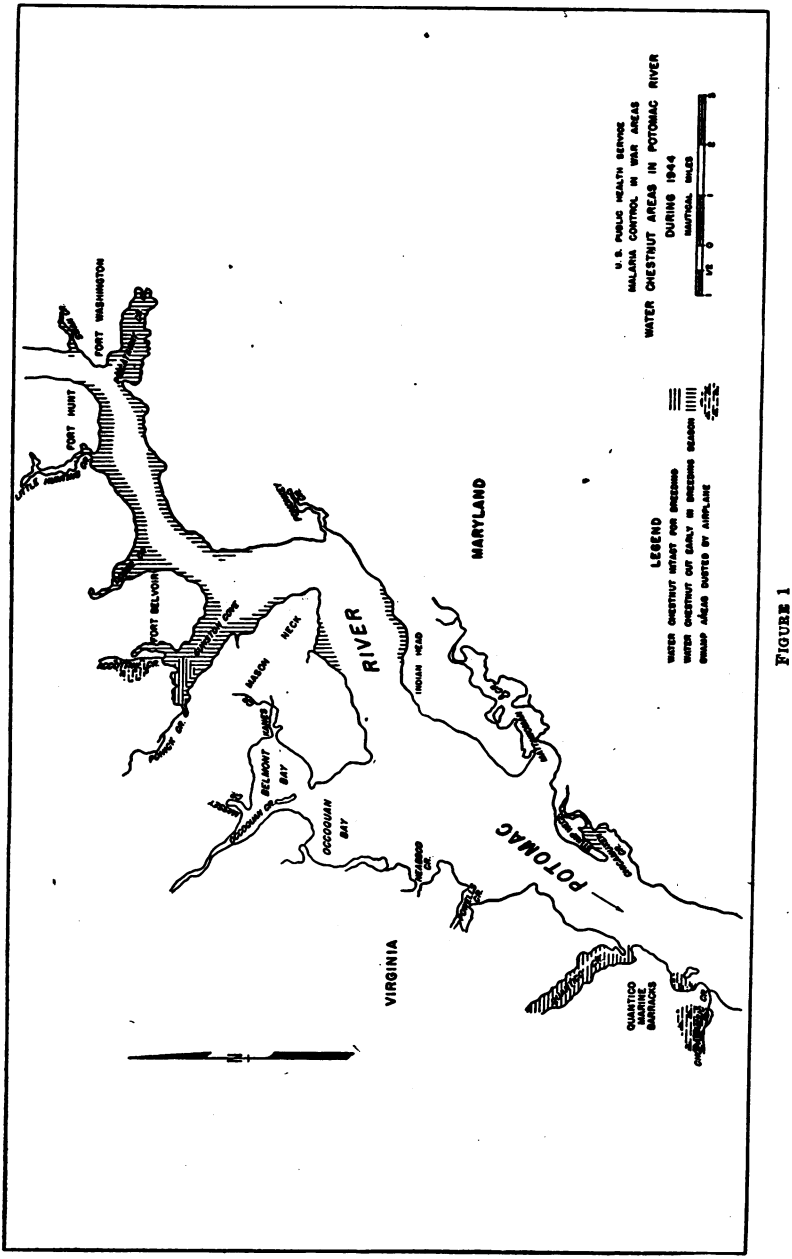


FIGURE 1

Maryland side of the river was eliminated by early cutting of the water chestnut.

Within the control zones virtually the same adult resting and larval stations were used to determine *A. quadrimaculatus* densities as in 1943. However, as cutting operations had eliminated the water chestnut outside the control limits early in the season, "check" stations could not be established.

During 1944 the first small rosettes of water chestnut were observed on the water surface on May 12 and by the end of May the plants were fairly large and numerous and covered most of Quantico Creek, Piscataway Creek, Gunston Cove, and Dogue Creek (fig. 1). The plants were in full bloom by June 12 and mature nuts were found early in July. The growth above Mount Vernon in the Fort Hunt area was much less dense in 1944 than in 1943 and demonstrated the effectiveness of early cutting. In Piscataway Creek where cutting was done in August 1943, after the seeds had matured, the density of the plants in 1944 was little reduced. Growth in Swan Creek, at Indian Head, and in Chicamuxen Creek was sparse.

TABLE 2.—*Approximate acreage and dates of cutting the water chestnut within the control areas adjacent to six military establishments on the Potomac River during 1944*

Area	Date cutting began	Date cutting completed	Approximate acreage cut
Stump Neck [1]		June 2	120
Fort Belvoir	May 22	June 13 [2]	1,300
Fort Washington	June 6	June 20	800
Indian Head [1]		June 26	30
Fort Hunt	June 23	June 29 [3]	200
Quantico	July 25	Aug. 10	500

[1] Cutting done by Naval Powder Factory personnel.
[2] Except for Pohick Bay.
[3] Except for upper portion of Little Hunting Creek.

The cutting of the water chestnut during 1944 reduced the entomological problem to a considerable extent. Cutting operations (table 2) began on May 22 in Dogue Creek at Fort Belvoir and were continued at various places along the river until the last plants were cut at Quantico Creek on August 10. While the cutting over of an area does not immediately eliminate it as a potential breeding site, it does reduce to a large degree the water-chestnut-breeding acreage. Once cut, the freed plants tend to aggregate into floating mats which shift their position with each change of wind direction and tide. Such rafts offer an excellent habitat for both *A. quadrimaculatus* and other mosquito larvae. Disintegration of the plants after cutting is slow and their eventual disappearance from a well-protected cove depends largely on the plants either being washed up on shore or swept out into the river. The cutting of the chestnut in Piscataway Creek (table 2) was practically completed by June 20, yet on July 22 some breeding still was present in scattered mats of flotage along the shore and in rafts drifting about in the open water.

Entomological records show that satisfactory control of *A. quadrimaculatus* was obtained during the entire season (table 4). The number of adult females recorded for any resting station observation remained below 10 throughout the summer, except for a single case on July 17, when the count reached 25 at Fort Washington. In those areas which were airplane dusted the number of adult females in a resting place on any given date remained below 5, with one exception. This occurred on August 21, when 6 specimens were found in a station at Fort Belvoir. In the adult resting stations males often outnumbered the females as was true in 1943. Only 60 adult females were taken throughout the entire summer from index stations within one-half mile of the protected areas. Brief notes on mosquito conditions at the several Army and Navy posts along the Potomac are contained in the following paragraphs.

Fort Belvoir.—In the vicinity of Fort Belvoir the chestnut was cut by the middle of June with the exception of about 125 acres in Pohick Bay. The swamp area above Accotink Bay and the chestnut in Pohick Bay were dusted weekly by plane from July 7 to September 22. All other water chestnut within the control area was dusted by boat. Inspections were begun on June 20 and continued until September 25. The larval records show a consistently low population of large larvae, the number being less than 1 per 100 dips on any day throughout the season. For any date the adult count did not reach 10 at any station within the control area. The monthly average light-trap collection per night (table 3) for 1944 indicates a lower *A. quadrimaculatus* population in 1944 than in 1943, except during the month of July. In both years, however, the density was exceedingly low.

TABLE 3.—*Light-trap catches of* Anopheles quadrimaculatus *per night per trap for 3 years at Fort Belvoir on the Potomac River*

	June		July		August		September	
	Males	Females	Males	Females	Males	Females	Males	Females
1942 [1]					4.40	69.40	0.50	20.40
1943 [1]	0	0.07	0	0.16	0	.31	0	.34
1944	0	.06	0	.21	0	.21	0	.17

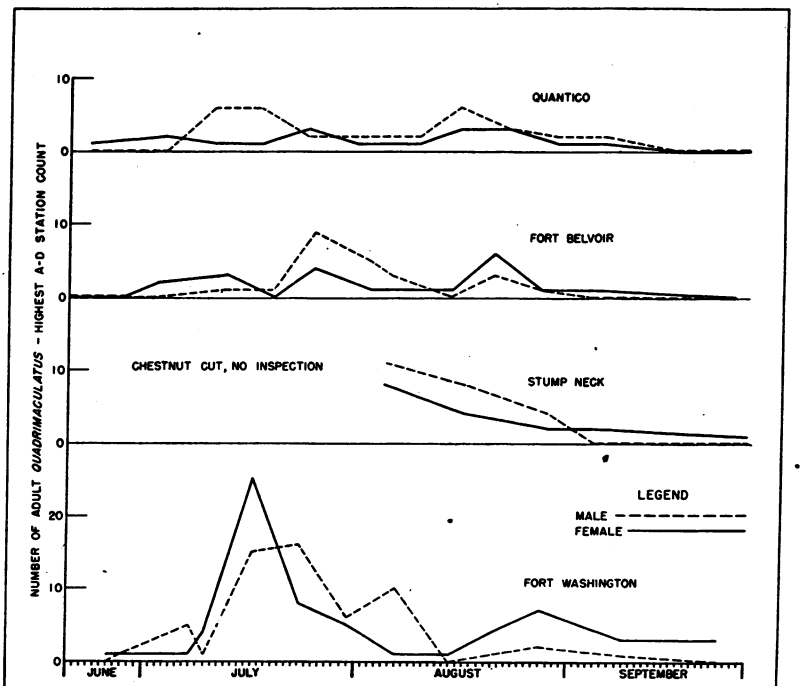
[1] From Murray and Knutson, 1944 (*1*).

Quantico.—The chestnut in Quantico Creek was not cut until late in the season and thus presented the principal control problem of the *Anopheles* breeding season. Cutting began late in July, at which time mature nuts were already abundant. Larval and adult populations were low throughout the summer and demonstrate the effectiveness of the airplane dusting operations. The largest number of adult females taken at any station on a single date was 3; however, the maximum male count reached 9 on one occasion, which indicates emergence nearby (fig. 2). In light-trap collections over the summer only 1 male and 1 female *A. quadrimaculatus* were taken. The number of large larvae per 100 dips per date was maintained below 1.

Fort Washington.—The first larvae from water-chestnut-covered areas (1 large and 1 small) were taken at Fort Washington 18 days earlier than in 1943. Breed-

ing was light, however, throughout the summer, the number of large larvae per date remaining well below 1 per 100 dips. The early cutting of the chestnut in Piscataway Creek reduced the acreage of breeding surface to such an extent that dusting by airplane was not necessary. On July 17 and 28 some breeding was occurring in floating mats of chestnut, but was controlled by dusting from boats. In Swan Creek the chestnut was eliminated early in June before anopheline breeding commenced.

The highest number of *A. quadrimaculatus* females in any resting place along the Potomac River during the season occurred at Fort Washington on July 17. In this instance 25 specimens were taken under the porch of a cottage about three-



HIGHEST NUMBERS OF ADULT MALE AND FEMALE *ANOPHELES QUADRIMACULATUS* TAKEN IN RESTING STATIONS (A-D) ON VARIOUS DATES AT FOUR MILITARY ESTABLISHMENTS ALONG THE POTOMAC RIVER, 1944

FIGURE 2

fourths of a mile from the protected area. The following week only 10 were found and the number remained low for the rest of the summer (fig. 2). The two factors, dusting from boats and the eventual disappearance of the mats through wind and tidal action, were evidently effective in lowering the *A. quadrimaculatus* population.

Stump Neck.—All of the water chestnut at Stump Neck was cut by June 2 and thus there was no need for larval inspections during the early part of the season. As in 1943 (*1*) the water-chestnut plants did not all come to the surface in Chicamuxen Creek as early in the season as in other areas. Consequently early cutting did not accomplish the same degree of elimination as in other situations. Regrowth gradually occurred and by August 1 was sufficiently dense to provide good breeding conditions and dusting was done from boats. The

adult *A. quadrimaculatus* indices remained relatively low and reached a maximum of 8 females and 11 males at one station about a mile from the protected area on August 5.

The number of large larvae per 100 dips seems high when compared, for example, with the Fort Washington figures (table 4), where similar control measures were carried out. However, the actual amount of breeding surface was so much smaller at Stump Neck that the adult population index (fig. 2) remained low.

Indian Head.—The chestnut at Indian Head was cut early in June and no larvae were found during inspections made that month. The river here was completely free of chestnut plants by the end of June. A very few adult *A. quadrimaculatus* were taken at Indian Head but it is believed that these came from inland breeding areas.

Fort Hunt.—The early cutting of the chestnut at Fort Hunt in 1943 reduced the density of the growth in 1944. By the end of June 1944 this area was entirely recut except for a few acres upstream in Little Hunting Creek where the water was too shallow for efficient operation of the cutting machines. The uncut area was dusted by boat. Only one adult female was taken in the resting stations and only one by light trap during the summer in spite of the fact that larval inspections revealed relatively high counts during August. This condition may be explained by the fact that only a relatively small area of chestnut was involved in production.

DISCUSSION

Water-chestnut-cutting operations during 1944 greatly reduced the amount of *A. quadrimaculatus* breeding surface on the Potomac River, and consequently were an important factor in the over-all anopheline control. The remaining water-chestnut surfaces in which there was a sufficient breeding potential to justify control were dusted by airplane or boat. Evaluation of the effectiveness of the 1944 dusting operations is difficult since comparative locations outside of the dusted areas were not available. Thus, results for 1944 can only be expressed in terms of the low populations within the control zones. For all 6 military establishments (table 4) the mean number of large larvae per 100 dips was 0.52, while the average number of adult females per resting station per observation was 0.6. Indices to *A. quadrimaculatus* populations at Fort Washington, Fort Hunt, Indian Head, and Stump Neck are given in table 4. These data show that the number of adult females per resting station ranged from 0.1 to 0.5 which is a similar condition to that prevailing in 1943 when a full-scale dusting program was operated. Since only a relatively small amount of dusting was done in 1944, it may be concluded that the low anopheline populations were due chiefly to the cutting operations.

TABLE 4.—*Control of* Anopheles quadrimaculatus *at 6 military establishments along the Potomac River during 1944*

	Number of larvae per 100 dips		Number of adults per resting station	
	Small	Large [1]	Males	Females
Uncontrolled areas in 1943 [2]	46.60	40.53	73.1	63.9
Controlled areas in 1944:				
Fort Washington	.54	.14	1.4	2.0
Stump Neck	5.00	2.00	.4	.4
Indian Head	0	0	1.1	.5
Fort Belvoir	.58	.17	.3	.3
Fort Hunt	1.04	.79	0	.1
Quantico	.09	.04	.8	.5
Mean	1.21	.52	.7	.6

[1] Pupae included.
[2] From Murray and Knutson, 1944 (*1*). No uncontrolled areas available for observation in 1944.
[3] Probably inland breeding only.

Quantico was the only large area in which cutting was not a controlling factor until late in the season (August). Even here the cutting was finished sufficiently early to aid in the reduction of the anopheline population which normally reaches a seasonal high during August. The efficiency of the airplane dusting in this area seems to be clearly demonstrated (table 4), for the average number of adult females per resting station was 0.5. At Fort Belvoir excellent results are indicated. The 1944 light-trap data (table 3) show that the *A. quadrimaculatus* population remained as low as in 1943 and considerably below that of 1942. The 1,485 acres of water chestnut dusted in 1943 had been reduced by cutting operations to only 125 acres and no larvae were found in this area during 1944. At Fort Hunt where all but a few acres of chestnut were cut and at Stump Neck, where a regrowth occurred, the larval rates rose abruptly in August. However, the adult populations did not reflect the high larval counts because of the relatively small size of the areas involved.

SUMMARY AND CONCLUSIONS

This paper presents a discussion of the control of *A. quadrimaculatus* by airplane dusting with paris green and by the cutting of water chestnut in the Potomac River in 1944. The airplane dusting program was conducted by the Office of Malaria Control in War Areas of the United States Public Health Service in cooperation with the States of Virginia and Maryland, and the District of Columbia. Cutting operations to eradicate the water chestnut were continued by the United States Engineers and this cutting is considered to be the predominant factor in the control of *A. quadrimaculatus* adjacent to six military establishments located along the river during 1944.

Cutting operations had eliminated the necessity for airplane dusting in the vicinity of four of the six military establishments pro-

tected by this method in 1943. Dusting by airplane during 1944 was necessary only at Fort Belvoir and the Quantico Marine Barracks, Va., where breeding of *A. quadrimaculatus* in uncut chestnut areas and swamps occurred. Paris green was applied by airplane in these places at weekly intervals throughout the anopheline breeding season. A total of 7,610 acres was dusted in 1944, using 8,791 pounds of paris green, as compared with a total of 32,536 acres dusted with 40,277 pounds of paris green in 1943. The average cost of the work in 1944, including all expenditures for supervision, labor, and materials, was $1.35 per acre per application as compared with $1.20 in 1943. The greater cost in 1944 resulted from the increased overhead expenditure due to the smaller acreage dusted.

Entomological records show that *A. quadrimaculatus* production was successfully controlled throughout the 1944 breeding season.

REFERENCE

(1) Murray, William C., and Knutson, Herbert: Airplane dusting with paris green for control of *Anopheles quadrimaculatus* Say in water-chestnut covered areas of the Potomac River during 1943. Pub. Health Rep., **59**: 573–583 (May 5, 1944).

DEATHS DURING WEEK ENDED JULY 28, 1945

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

	Week ended July 28, 1945	Corresponding week, 1944
Data for 93 large cities of the United States:		
Total deaths	8,344	7,971
Average for 3 prior years	7,977	
Total deaths, first 30 weeks of year	276,164	279,883
Deaths under 1 year of age	623	573
Average for 3 prior years	623	
Deaths under 1 year of age, first 30 weeks of year	18,242	18,564
Data from industrial insurance companies:		
Policies in force	67,384,931	66,672,880
Number of death claims	12,304	12,833
Death claims per 1,000 policies in force, annual rate	9.5	10.1
Death claims per 1,000 policies, first 30 weeks of year, annual rate	10.7	10.3

PREVALENCE OF DISEASE

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

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED AUGUST 4, 1945

Summary

The increase of 83 cases in the incidence of poliomyelitis during the current week is less than that for any of the past 3 weeks except last week (increase of 22). The increase for the corresponding week last year was 192. A total of 474 cases was reported currently, as compared with 391 last week, a 5-year median of 326, and 932 for the corresponding week last year.

Increases of more than 3 cases occurred in only 4 of the 13 States reporting more than 9 cases each, as follows (last week's figures in parentheses): *Increases*—Massachusetts 15 (13), New York 83 (72), New Jersey 82 (32), Pennsylvania 31 (16), Illinois 26 (3), Oklahoma 14 (12), Utah 12 (11), Washington 12 (9); *decreases*—Ohio 12 (14), Virginia 15 (22), Tennessee 23 (29), Texas 38 (40), California 18 (21).

During the 4-week period ended with the current week, an aggregate of 1,488 cases was reported, an increase of 320 cases during this period, as compared with 2,702 and an increase of 644 for the corresponding period last year. The total to date this year is 2,913, as compared with 3,992 for the same period in 1944 and a 5-year median of 1,852.

Of the total of 118 cases of meningococcus meningitis reported, only 3 States reported more than 7 cases each—New York (17), Texas and California (10 each). The total to date is 5,999, as compared with 12,786 for the corresponding period last year and a 5-year median of 2,307.

Of 648 cases of bacillary dysentery, 510 were reported in Texas, and of 751 cases of unspecified dysentery, 634 were reported in Virginia (292 for the preceding week and 235 for the next earlier week).

A total of 8,152 deaths was recorded for the week in 93 large cities of the United States, as compared with 8,346 last week, a 3-year (1942–44) average of 7,942, and 8,140 for the corresponding week last year. The total to date is 284,318, as compared with 288,023 for the same period last year.

Telegraphic morbidity reports from State health officers for the week ended August 4, 1945, and comparison with corresponding week of 1944 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 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944	
NEW ENGLAND												
Maine	0	0	0	-------	1	-------	1	5	37	0	0	0
New Hampshire	0	0	0	-------	-------	-------	0	4	3	1	0	0
Vermont	0	0	0	-------	-------	-------	9	7	17	0	0	0
Massachusetts	3	3	2	-------	-------	-------	95	87	113	3	12	8
Rhode Island	0	1	1	-------	-------	-------	0	0	11	2	1	0
Connecticut	0	0	0	-------	1	1	8	6	18	1	3	2
MIDDLE ATLANTIC												
New York	8	6	6	(1)	(1)	[1] 1	36	94	202	17	24	16
New Jersey	1	0	1	-------	3	2	31	36	117	6	8	2
Pennsylvania	2	7	6	1	-------	-------	94	57	57	4	6	4
EAST NORTH CENTRAL												
Ohio	8	4	4	-------	1	3	15	12	46	5	6	0
Indiana	8	8	4	6	-------	2	7	5	10	0	4	1
Illinois	2	3	11	7	-------	4	89	20	50	3	9	2
Michigan [2]	8	10	3	-------	-------	-------	29	57	122	5	6	2
Wisconsin	5	0	1	6	5	5	43	101	188	5	3	1
WEST NORTH CENTRAL												
Minnesota	2	2	1	-------	-------	-------	2	9	13	0	5	1
Iowa	0	3	3	-------	-------	-------	8	13	20	1	0	1
Missouri	2	3	3	-------	-------	-------	17	18	11	4	5	3
North Dakota	3	3	1	-------	-------	-------	0	3	3	0	0	0
South Dakota	0	1	1	-------	-------	-------	6	1	3	0	0	0
Nebraska	2	1	0	-------	2	-------	2	2	3	2	0	0
Kansas	8	1	2	-------	-------	1	9	13	15	3	2	1
SOUTH ATLANTIC												
Delaware	0	0	0	-------	-------	-------	1	0	1	0	0	0
Maryland [2]	7	3	3	-------	1	1	2	4	31	2	4	4
District of Columbia	0	0	1	-------	-------	-------	0	7	7	1	1	0
Virginia	4	10	7	30	35	35	7	10	43	2	8	2
West Virginia	12	0	2	20	-------	-------	0	13	9	1	5	1
North Carolina	18	5	9	-------	1	-------	2	16	16	2	5	1
South Carolina	8	7	3	57	94	94	10	17	19	1	2	2
Georgia	5	5	9	2	6	6	2	5	11	1	3	1
Florida	5	3	3	-------	1	4	5	5	6	1	2	0
EAST SOUTH CENTRAL												
Kentucky	2	2	2	-------	44	1	6	12	12	1	4	2
Tennessee	4	5	2	6	6	6	4	3	9	7	2	2
Alabama	7	7	8	31	8	8	0	1	10	2	5	1
Mississippi [2]	7	10	3	-------	-------	-------	-------	0	-------	2	2	2
WEST SOUTH CENTRAL												
Arkansas	4	2	2	8	13	3	13	3	7	3	0	0
Louisiana	12	5	3	4	23	2	6	8	2	1	3	0
Oklahoma	2	4	2	12	6	6	3	3	4	4	0	0
Texas	47	31	19	360	166	166	52	120	70	10	10	1
MOUNTAIN												
Montana	1	2	1	5	3	-------	2	2	17	0	0	0
Idaho	0	0	0	3	-------	-------	17	1	4	1	0	0
Wyoming	0	0	0	1	-------	2	2	1	3	0	0	0
Colorado	4	9	7	9	1	7	4	12	13	0	1	0
New Mexico	6	3	0	1	-------	-------	3	1	4	0	0	0
Arizona	1	3	1	25	14	14	4	10	13	0	0	0
Utah [2]	0	0	0	-------	-------	-------	78	21	21	0	1	0
Nevada	0	0	0	-------	5	-------	0	14	11	0	0	0
PACIFIC												
Washington	3	5	4	-------	1	-------	65	46	15	2	3	0
Oregon	4	2	2	1	-------	-------	15	18	18	2	1	1
California	28	11	10	5	4	20	234	335	151	10	21	6
Total	253	190	164	600	445	445	1,038	1,238	2,246	118	177	65
31 weeks	7,818	6,385	7,084	69,496	337,734	168,338	99,643	589,042	533,745	5,999	12,786	2,307

[1] New York City only.

[2] Period ended earlier than Saturday.

Telegraphic morbidity reports from State health officers for the week ended August 4, 1945, and comparison with corresponding week of 1944 and 5-year median

Division and State	Poliomyelitis			Scarlet fever			Smallpox			Typhoid and paratyphoid fever[3]		
	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44	Week ended—		Median 1940–44
	Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944		Aug. 4, 1945	Aug. 5, 1944	
NEW ENGLAND												
Maine	2	1	1	5	10	8	0	0	0	0	1	1
New Hampshire	1	1	0	1	2	1	0	0	0	0	0	0
Vermont	5	1	0	3	8	2	0	0	0	0	0	0
Massachusetts	15	23	1	40	54	53	0	0	0	1	8	4
Rhode Island	0	0	0	1	0	2	0	0	0	0	2	0
Connecticut	9	10	6	6	12	11	0	0	0	0	0	2
MIDDLE ATLANTIC												
New York	83	311	12	101	83	79	0	0	0	8	4	9
New Jersey	82	16	5	32	24	24	0	0	0	6	2	3
Pennsylvania	31	86	3	44	59	48	0	0	0	11	3	10
EAST NORTH CENTRAL												
Ohio	12	48	13	57	58	55	0	0	0	3	7	8
Indiana	5	36	5	18	19	9	0	0	0	1	6	1
Illinois	26	14	14	53	38	41	0	0	0	1	8	8
Michigan[2]	5	40	8	45	42	42	0	0	0	2	9	4
Wisconsin	3	5	1	30	62	37	0	0	0	1	0	1
WEST NORTH CENTRAL												
Minnesota	1	14	3	13	18	11	0	0	0	0	0	0
Iowa	5	1	1	13	16	16	0	0	0	0	1	1
Missouri	4	4	4	18	11	14	0	0	0	4	2	10
North Dakota	0	0	0	10	1	1	0	0	0	0	0	0
South Dakota	0	0	1	0	5	5	0	0	0	0	1	0
Nebraska	0	4	3	8	6	3	0	0	0	1	0	0
Kansas	5	5	5	15	11	10	0	0	0	0	4	5
SOUTH ATLANTIC												
Delaware	2	3	0	1	3	1	0	0	0	1	0	0
Maryland[2]	6	27	0	18	12	12	0	0	0	1	2	4
District of Columbia	3	9	0	7	4	4	0	0	0	0	0	0
Virginia	15	63	2	13	19	6	0	0	0	7	3	7
West Virginia	0	7	5	11	21	13	0	0	0	3	8	6
North Carolina	5	40	2	20	21	17	0	0	0	4	7	10
South Carolina	8	4	2	6	3	2	0	0	0	3	3	8
Georgia	5	7	1	5	9	10	0	0	0	10	8	13
Florida	1	7	1	2	2	2	0	0	0	1	1	2
EAST SOUTH CENTRAL												
Kentucky	0	65	8	16	10	12	0	0	0	20	8	13
Tennessee	23	4	4	17	14	14	0	0	0	11	6	7
Alabama	4	5	2	14	7	11	0	0	0	0	6	6
Mississippi[2]	1	10	2	7	1	3	0	0	0	3	13	13
WEST SOUTH CENTRAL												
Arkansas	2	0	1	2	2	3	1	0	0	1	5	8
Louisiana	4	21	5	18	5	5	0	0	0	21	6	9
Oklahoma	14	1	1	4	2	4	0	0	0	7	8	8
Texas	38	5	5	19	19	15	0	0	0	29	18	28
MOUNTAIN												
Montana	0	0	0	1	14	3	0	0	0	0	0	0
Idaho	0	0	0	5	1	1	0	1	0	4	1	0
Wyoming	0	0	0	1	2	2	0	0	0	0	0	0
Colorado	5	0	1	13	17	8	0	0	0	1	3	1
New Mexico	1	2	2	5	6	1	0	0	0	3	3	3
Arizona	0	1	1	1	2	2	0	0	0	0	0	1
Utah[2]	12	1	1	3	14	3	0	0	0	0	0	2
Nevada	0	0	0	0	0	0	0	0	0	0	1	0
PACIFIC												
Washington	12	5	5	11	22	22	0	0	0	2	2	2
Oregon	1	16	3	14	6	6	1	0	0	8	4	2
California	18	9	9	89	66	43	0	0	0	3	5	7
Total	474	932	326	839	843	705	2	1	2	182	179	233
31 weeks	2,913	3,992	1,852	133,004	146,231	96,206	261	288	604	2,481	2,926	3,595

[2] Period ended earlier than Saturday.
[3] Including paratyphoid fever reported separately as follows: New York 1; Ohio 1; Virginia 1; Georgia 3; Florida 1; Texas 2; California 1.

Telegraphic morbidity reports from State health officers for the week ended August 4, 1945, and comparison with corresponding week of 1944 and 5-year median—Con.

Division and State	Whooping cough			Week ended Aug. 4, 1945							
	Week ended—		Median 1940–44	Dysentery			Encephalitis, infectious	Rocky Mt. spotted fever	Tularemia	Typhus fever, endemic	Undulant fever
	Aug. 4, 1945	Aug. 5, 1944		Amebic	Bacillary	Unspecified					
NEW ENGLAND											
Maine	75	15	19	0	0	0	0	0	0	0	0
New Hampshire	0	0	2	0	0	0	0	0	0	0	0
Vermont	28	25	25	0	0	0	0	0	0	0	1
Massachusetts	141	58	108	1	1	0	0	0	0	0	0
Rhode Island	4	2	15	0	0	0	0	0	0	0	0
Connecticut	13	45	46	0	1	0	0	0	0	0	3
MIDDLE ATLANTIC											
New York	356	160	249	5	7	0	3	0	0	0	7
New Jersey	237	79	99	1	0	0	0	3	0	0	2
Pennsylvania	233	91	229	0	1	0	1	0	0	0	1
EAST NORTH CENTRAL											
Ohio	280	166	260	0	1	0	0	0	0	0	1
Indiana	55	24	24	0	0	1	1	2	0	0	2
Illinois	118	109	181	2	40	0	1	3	2	0	11
Michigan [3]	74	99	257	0	3	0	0	0	0	0	4
Wisconsin	87	151	225	0	0	0	0	0	0	0	15
WEST NORTH CENTRAL											
Minnesota	10	15	53	0	0	4	0	0	0	0	6
Iowa	10	8	36	0	0	0	1	0	0	0	5
Missouri	23	19	36	0	0	0	0	0	2	0	0
North Dakota	0	3	11	0	0	0	0	0	0	0	0
South Dakota	1	22	6	0	0	0	0	0	0	0	2
Nebraska	0	9	7	0	0	0	1	0	0	0	1
Kansas	24	23	57	0	0	0	1	1	0	0	4
SOUTH ATLANTIC											
Delaware	1	1	2	0	0	0	0	1	0	0	0
Maryland [3]	54	112	112	0	0	2	0	3	0	[*] 1	1
District of Columbia	16	0	20	0	0	0	0	1	0	0	0
Virginia	71	70	56	2	0	634	0	12	0	0	0
West Virginia	52	41	27	0	0	0	0	0	0	0	0
North Carolina	163	203	199	0	1	0	0	7	1	1	1
South Carolina	71	84	84	2	38	0	0	1	0	9	0
Georgia	21	20	20	0	6	0	0	1	0	21	3
Florida	11	5	8	0	0	0	0	0	1	11	0
EAST SOUTH CENTRAL											
Kentucky	54	106	71	0	0	0	0	2	0	0	2
Tennessee	73	28	44	0	0	13	0	4	0	0	1
Alabama	18	22	22	3	0	0	0	0	0	23	1
Mississippi [3]	----	----	----	0	0	0	0	0	1	8	3
WEST SOUTH CENTRAL											
Arkansas	27	10	10	11	1	0	0	0	1	0	0
Louisiana	39	2	5	2	31	0	0	0	3	24	2
Oklahoma	16	3	7	3	2	0	0	2	0	0	1
Texas	161	178	178	12	510	76	0	0	1	73	10
MOUNTAIN											
Montana	2	35	29	0	1	0	0	0	1	0	0
Idaho	6	2	7	0	0	0	0	0	0	0	0
Wyoming	5	14	6	0	0	0	0	1	0	0	0
Colorado	49	21	30	0	0	0	0	1	0	0	1
New Mexico	6	3	12	0	0	1	0	0	0	0	2
Arizona	10	14	15	0	0	14	0	0	0	0	1
Utah [3]	33	63	63	0	0	0	0	1	0	0	2
Nevada	0	1	0	0	0	0	0	0	0	0	0
PACIFIC											
Washington	37	22	59	0	0	0	0	1	0	0	3
Oregon	19	12	19	0	0	6	0	0	0	0	1
California	216	75	185	3	4	0	5	0	0	2	3
Total	3,000	2,270	3,643	47	648	751	14	47	13	173	103
Same week, 1944	2,270	----	----	46	644	321	19	39	12	222	102
Average, 1942–44	3,109	----	----	39	490	368	18	[4] 21	17	[4] 115	----
31 weeks, 1945	79,405	----	----	1,124	14,956	4,970	242	306	492	2,310	2,947
1944	58,834	----	----	1,000	12,724	4,585	350	323	367	2,301	2,179
Average, 1942–44	100,210	----	[4] 116,280	974	8,969	4,072	335	[4] 323	515	[4] 1,506	----

[*] Tsutsugamushi (scrub typhus). [3] Period ended earlier than Saturday. [4] 5-year, median 1940–44.

Leprosy: Louisiana, 2 cases.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 28, 1945

This table lists the reports from 86 cities of more than 10,000 population distributed throughout the United States, and represents a cross section of the current urban incidence of the diseases included in the table.

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
NEW ENGLAND												
Maine:												
Portland	0	0		0	1	0	1	0	2	0	0	0
New Hampshire:												
Concord	0	0		0	0	0	0	0	2	0	0	0
Massachusetts:												
Boston	2	0		0	21	4	8	8	8	0	0	40
Fall River	0	0		0	0	0	1	0	0	0	0	4
Springfield	0	0		0	1	0	0	0	3	0	0	5
Worcester	0	0		0	32	0	6	0	1	0	0	7
Rhode Island:												
Providence	0	2		0	0	1	3	0	0	0	0	0
Connecticut:												
Bridgeport	0	0		0	1	0	0	1	1	0	0	0
Hartford	0	0		0	2	0	2	0	1	0	0	1
New Haven	0	0		0	1	0	1	1	0	0	0	20
MIDDLE ATLANTIC												
New York:												
Buffalo	0	0		0	0	0	7	3	3	0	0	10
New York	4	2	2	0	27	8	25	25	19	0	4	165
Rochester	0	0		0	0	0	2	2	2	0	0	10
Syracuse	0	0		0	0	0	3	1	1	0	0	46
New Jersey:												
Camden	0	0		0	1	0	2	0	1	0	0	2
Newark	0	0		0	1	0	2	2	1	0	0	24
Trenton	0	0		0	0	0	0	9	0	0	0	2
Pennsylvania:												
Philadelphia	1	0		0	68	4	19	6	11	0	3	96
Pittsburgh	1	0		0	3	1	4	2	2	0	0	23
Reading	0	0		0	0	0	1	0	0	0	0	2
EAST NORTH CENTRAL												
Ohio:												
Cincinnati	0	0		0	4	2	3	1	4	0	0	21
Cleveland	0	0	1	0	0	3	4	3	6	0	0	59
Columbus	1	0		0	0	0	2	0	3	0	0	10
Indiana:												
Fort Wayne	0	0		0	0	0	2	0	1	0	0	0
Indianapolis	0	0		0	4	1	6	0	3	0	0	9
South Bend	1	0		0	0	0	0	0	0	0	0	0
Terre Haute	0	0		0	0	0	0	0	0	0	0	1
Illinois:												
Chicago	2	0		0	87	7	24	3	15	0	0	89
Springfield	0	0		0	0	0	2	0	4	0	0	0
Michigan:												
Detroit	8	0		0	40	0	6	6	7	0	0	56
Flint	0	0		0	3	0	2	0	5	0	0	0
Grand Rapids	0	0		0	1	0	0	0	1	0	0	1
Wisconsin:												
Kenosha	0	0		0	0	0	0	0	0	0	0	0
Milwaukee	0	0		0	15	2	0	0	8	0	1	1
Racine	0	0		0	1	0	0	0	2	0	0	1
Superior	0	0		0	1	0	0	0	0	0	0	6
WEST NORTH CENTRAL												
Minnesota:												
Duluth	2	0		0	1	0	2	0	2	0	0	2
Minneapolis	2	0		0	1	1	4	0	9	0	0	2
St. Paul	0	0		0	2	1	1	0	1	0	0	6
Missouri:												
Kansas City	0	0		0	8	0	4	0	1	0	1	1
St. Joseph	0	0		0	1	0	0	0	2	0	0	0
St. Louis	0	0		0	7	3	16	1	5	0	3	38

City reports for week ended July 28, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL—continued												
Nebraska:												
Omaha	1	0	------	0	0	1	3	0	3	0	0	3
Kansas:												
Topeka	0	0	------	0	0	0	0	0	3	0	0	2
Wichita	0	1	------	0	1	0	1	2	2	0	0	6
SOUTH ATLANTIC												
Delaware:												
Wilmington	0	0	------	0	0	0	1	0	0	0	0	7
Maryland:												
Baltimore	9	0	------	0	2	0	3	0	4	0	0	57
Cumberland	0	0	------	0	0	0	0	0	0	0	0	0
Frederick	0	0	------	0	0	1	0	2	0	0	0	0
District of Columbia:												
Washington	0	0	------	0	0	1	9	5	5	0	1	10
Virginia:												
Lynchburg	0	0	------	0	1	0	0	0	0	0	0	0
Richmond	0	0	------	0	0	1	1	25	0	0	0	22
Roanoke	1	0	------	0	0	0	0	0	0	0	0	0
West Virginia:												
Wheeling	0	0	------	0	1	0	0	0	1	0	0	1
North Carolina:												
Raleigh	0	0	------	0	0	0	0	0	1	0	0	1
Wilmington	0	0	------	0	0	0	1	0	2	0	0	8
Winston-Salem	0	0	------	0	1	0	0	0	2	0	0	22
South Carolina:												
Charleston	1	0	1	0	0	0	0	1	2	0	0	0
Georgia:												
Atlanta	0	0	------	0	0	0	2	0	0	0	0	2
Brunswick	0	0	------	0	0	0	0	0	0	0	0	0
Savannah	0	0	1	1	0	0	2	0	0	0	0	0
EAST SOUTH CENTRAL												
Tennessee:												
Memphis	0	0	------	0	2	1	7	0	0	0	0	13
Nashville	0	0	------	0	0	0	4	2	0	0	0	4
Alabama:												
Birmingham	0	0	------	0	0	0	2	7	0	0	0	1
Mobile	2	0	------	0	0	1	0	0	1	0	0	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock	0	0	------	0	0	0	1	0	1	0	0	0
Louisiana:												
New Orleans	3	0	1	0	2	4	4	4	3	0	1	1
Shreveport	0	0	------	0	0	0	0	4	0	0	1	0
Texas:												
Dallas	0	0	------	0	2	0	5	2	3	0	0	7
Galveston	0	0	------	0	0	0	2	0	0	0	0	2
Houston	2	0	------	0	1	0	3	7	3	0	2	0
San Antonio	2	0	------	0	0	0	2	0	0	0	0	2
MOUNTAIN												
Montana:												
Billings	0	0	------	0	0	0	0	0	0	0	1	0
Great Falls	0	0	------	0	0	0	0	0	0	0	0	0
Helena	0	0	------	0	0	0	0	0	1	0	0	0
Missoula	0	0	------	0	0	0	1	0	0	0	0	0
Idaho:												
Boise	0	0	------	0	0	0	0	0	0	0	0	0
Colorado:												
Denver	3	0	2	0	3	0	7	1	7	0	0	23
Pueblo	1	0	------	0	1	0	0	0	0	0	0	0
Utah:												
Salt Lake City	0	0	------	0	19	0	4	4	2	0	0	11

City reports for week ended July 28, 1945—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Poliomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
PACIFIC												
Washington:												
Seattle	2	0	------	1	26	1	2	0	4	0	1	7
Spokane	0	0	1	1	2	0	1	0	2	0	0	6
Tacoma	1	0	------	0	17	0	0	0	0	0	0	3
California:												
Los Angeles	0	0	1	0	16	1	1	1	26	0	0	41
Sacramento	2	0	------	0	7	0	2	0	2	0	0	1
San Francisco	1	0	------	0	65	1	4	2	7	0	0	3
Total	55	5	10	3	504	51	240	143	224	0	19	1,026
Corresponding week, 1944	43	------	14	3	379	------	195	------	231	0	17	621
Average, 1940–44	39	------	25	[1] 6	[2] 753	------	[1] 237	------	231	0	34	1,111

[1] 3-year average.
[2] 5-year median, 1940–44.

Dysentery, amebic.—Cases: New York, 2; Spokane, 1; Los Angeles, 2.
Dysentery, bacillary.—Cases: New York, 4; Cleveland, 1; Detroit, 3.
Dysentery, unspecified.—Cases: Richmond, 2; San Antonio, 8.
Leprosy.—Cases: New Orleans, 1.
Rocky Mountain spotted fever.—Cases: Richmond, 1.
Tularemia.—Cases: St. Louis, 1.
Typhus fever, endemic.—Cases: New York, 1; Raleigh, 1; Charleston, S. C., 1; Atlanta, 2; Brunswick, 1; Birmingham, 2; Mobile, 2, New Orleans, 1; Shreveport, 1; Houston, 2; San Antonio, 2; Savannah, 3.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1943, 34,162,500)

	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 rates
			Case rates	Death rates								
New England	5.3	5.3	0.0	0.0	155	13.1	57.8	26.3	47	0.0	0.0	202
Middle Atlantic	2.8	0.9	0.9	0.0	46	6.0	30.1	23.1	19	0.0	3.2	176
East North Central	7.3	0.0	0.6	0.0	95	9.1	31.0	7.9	36	0.0	0.6	154
West North Central	10.1	2.0	0.0	0.0	42	12.1	62.3	6.0	56	0.0	8.0	121
South Atlantic	19.1	0.0	3.5	1.7	9	5.2	33.1	57.4	30	0.0	1.7	226
East South Central	11.8	0.0	0.0	0.0	12	11.8	76.7	53.1	6	0.0	0.0	106
West South Central	20.1	0.0	2.9	0.0	14	11.5	48.8	48.8	29	0.0	11.5	34
Mountain	31.8	0.0	15.9	0.0	183	0.0	95.3	39.7	79	0.0	7.9	270
Pacific	9.5	0.0	3.2	3.2	210	4.7	15.8	4.7	65	0.0	1.6	96
Total	8.4	0.8	1.5	0.5	77	7.8	36.7	21.9	34	0.0	2.9	157

PLAGUE INFECTION IN SAN BENITO COUNTY, CALIF.

Under date of July 18, 1945, plague infection was reported proved on July 13 in 5 specimens of tissue and fleas from ground squirrels, *C. beecheyi*, shot in San Benito County, Calif., at locations east and southeast of Tres Pinos, as follows: In a pool of 750 fleas from 27 ground squirrels and in tissue from 5 ground squirrels, 7 miles east and 5 miles south; in a pool of 1,650 fleas from 41 ground squirrels (under date of July 30, proved July 25, in a pool of 150 fleas from the same 41 ground squirrels) and in tissue from 5 ground squirrels,

8 miles east and 5 miles south; in a pool of 150 fleas from 47 ground squirrels, 7 miles east of Tres Pinos. Under date of July 25, plague infection was reported proved on July 17 in tissue from 5 ground squirrels, *C. beecheyi*, shot at the latter location, and in a pool of 150 fleas from 35 ground squirrels, same species, shot in the same location.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Honolulu—Influenza.[1]—For the period June 3 to July 14, 1945, 4,113 cases of influenza were reported in Honolulu, Hawaii Territory.

Panama Canal Zone

Notifiable diseases—June 1945.—During the month of June 1945, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Panama		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	6		1		3		1		11	
Diphtheria	3						2		5	
Dysentery:										
Amebic	1						5		6	
Bacillary	1		1						2	
Malaria [1]	8		9		76		65	2	158	2
Measles			2		1				3	
Meningitis, meningococcus	1						1		2	
Mumps			1		4				5	
Paratyphoid fever	1		1						2	
Pneumonia		12		7	42			5	[2] 42	24
Tuberculosis		11		9	5	2		5	[2] 5	27
Typhoid fever			2				1		3	
Typhus fever							2		2	
Whooping cough					3				[2] 3	

[1] 30 recurrent cases.
[2] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases—4 weeks ended July 14, 1945.—During the 4 weeks ended July 14, 1945, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Bilharziasis	2	Poliomyelitis	1
Chickenpox	53	Puerperal fever	3
Diphtheria	43	Syphilis	252
Dysentery, unspecified	7	Tetanus	11
Filariasis	2	Tetanus, infantile	1
Gonorrhea	219	Tuberculosis (all forms)	455
Influenza	33	Typhoid and paratyphoid fever	38
Leprosy	1	Typhus fever (murine)	39
Malaria	289	Undulant fever	1
Measles	145	Whooping cough	107
Ophthalmia neonatorum	2		

[1] See also page 817 of the PUBLIC HEALTH REPORTS of July 13, 1945.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended July 14, 1945.—During the week ended July 14, 1945, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		56	12	38	172	24	8	55	69	434
Diphtheria		6	2	41	6	4	1			60
Dysentery, bacillary									9	9
German measles		44		11	25		3	13	4	100
Influenza		22			30	1			3	56
Measles		4	1	30	58	8	13	21	50	185
Meningitis, meningococcus				2	2					4
Mumps				46	52	14	17	37	10	176
Poliomyelitis					3					3
Scarlet fever		4	6	24	52	8	3	17	10	124
Tuberculosis (all forms)		1	1	91	31	22	33	25	36	240
Typhoid and paratyphoid fever		9	1	9	1			2	1	23
Undulant fever					13					13
Venereal diseases:										
Gonorrhea		17	33	64	181	48	33	34	78	488
Syphilis		10	12	105	77	10	10	11	34	269
Whooping cough		16	3	124	18	1	2	10	6	180

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 the current year. 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.

Plague

Canada—Alberta Province.—Under date of July 23, 1945, plague infection was reported in 5 pools of fleas collected from squirrels near Cereal, and in a pool of fleas collected south of Hanna, Alberta Province, Canada.

Egypt.—For the week ended June 30, 1945, 16 cases of plague with 4 deaths were reported in Egypt. For the week ended July 21, 1945, 5 cases of plague were reported in Ismailiya, Egypt.

Great Britain—Malta.—For the week ended July 21, 1945, 4 cases of plague, including 2 suspected cases, with 3 deaths were reported in Malta, Great Britain.

Morocco (French).—For the period July 11–20, 1945, 63 cases of plague were reported in French Morocco. On July 25, 1945, 1 case of plague was reported in Casablanca, French Morocco.

Smallpox

Morocco (French).—For the period July 11–20, 1945, 147 cases of smallpox were reported in French Morocco.

Nigeria.—For the week ended June 2, 1945, 114 cases of smallpox with 23 deaths were reported in Nigeria, including 2 cases of smallpox with 5 deaths reported in Lagos.

Sudan (French).—Smallpox has been reported in French Sudan as follows: July 1–10, 1945, 166 cases; July 11–20, 1945, 29 cases.

Typhus Fever

Chile.—For the period May 20 to June 16, 1945, 38 cases of typhus fever with 2 deaths were reported in Chile, including 5 cases in Antofagasta, 8 cases in Iquique, 5 cases with 1 death in Santiago, 3 cases in Talcahuano, and 6 cases in Valparaiso.

Egypt.—For the week ended June 30, 1945, 314 cases of typhus fever with 41 deaths were reported in all of Egypt. For the week ended May 26, 1945, 10 fatal cases of typhus fever were reported in Alexandria, 87 cases with 17 deaths were reported in Cairo, 1 case in Damietta, 6 cases in Ismailiya, 6 cases in Port Said, and 2 cases with 1 death were reported in Suez, Egypt.

Morocco (French).—For the period July 11–20, 1945, 693 cases of typhus fever were reported in French Morocco, including 26 cases reported in Casablanca, and 1 case in Rabat.

Yellow Fever

Venezuela.—Information dated July 3, 1945, stated that cases of yellow fever had been reported in the villages of Morotuto, La Tiendida, San Simon, and Hernandez in the District of Jauregui, Tachira State, Venezuela. During the month of June more than 35 deaths occurred. Information dated July 27, 1945, reports 2 cases of yellow fever at Machiques, Zulia State, about 150 miles south of Maracaibo, Venezuela.

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