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EXTENT OF IMMUNIZATION AND CASE HISTORIES FOR DIPHTHERIA, SMALLPOX, SCARLET FEVER, AND TYPHOID FEVER IN 200,000 SURVEYED FAMILIES IN 28 LARGE CITIES¹

By SELWYN D. COLLINS, *Head Statistician*, and CLARA COUNCELL, *Associate Statistician*, United States Public Health Service

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The use of all available measures to prevent the spread of infectious disease is an obligation of peace that is increased during war. The increase of sickness during such emergencies has in the past been widespread and has appeared to be inevitable. It is only within the present century that attempts at prevention and control show encouraging evidence that morbidity and mortality among soldiers and civilians can be curbed by the application of increasing knowledge about sanitation, personal hygiene, and immunization.

For only a few of the many infectious diseases is active artificial immunization available and commonly used (3, 5, 26, 27, 34). Venereal diseases and tuberculosis, which are among the greatest wartime problems, are at present entirely outside of the purview of immunization. The control of meningitis, poliomyelitis, encephalitis, and influenza with its complicating pneumonia, now rests largely upon therapeutics. Mumps and chickenpox which are of low fatality but high incidence are subject only to quarantine and isolation. The prevention of malaria is almost entirely a matter of environmental sanitation.

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tion; and that of dysentery and epidemic typhus are also based mostly upon sanitation and personal hygiene, with immunization as a possible adjunct. There is evidence that protection against the jungle type of yellow fever, Rocky Mountain spotted fever, plague, cholera, tetanus, and typhoid and paratyphoid fever can be attained by the use of combined measures including immunization of persons likely to be exposed. It is only within the past two decades that a limited suppression of scarlet fever, whooping cough, and measles appeared possible by the use of immunization and related procedures. The use of vaccination as the most effective means of control is best illustrated in smallpox and diphtheria.

I. RECENT IMMUNIZATION AND DISEASE TRENDS

Diphtheria, smallpox, scarlet and typhoid fevers were selected for study with respect to the extent of immunization and case history because active immunization against these infections has been available for a considerable period. Aside from epidemic waves and sporadic outbreaks, the mortality from all four of these diseases has decreased consistently since 1900 or earlier. The case incidence of diphtheria, smallpox, and typhoid fever has also declined sharply, but the available evidence indicates that the decline in scarlet fever mortality has been due largely to decreasing case fatality rather than lessened incidence (9, 31, 39, p. 377).

A comparison of rates for smallpox and typhoid fever in the United States Army during the last three wars shows impressive declines:

	Annual rates per 1,000 strength (55)			
	Smallpox		Typhoid fever	
	Cases	Deaths	Cases	Deaths
Civil War, 1861-1866.....	8.0	2.8	29.9	11.0
Spanish-American War, 1898-1901.....	1.8	.58	141.6	14.8
World War, 1917-1919.....	.21	.003	.37	.05

In spite of generally favorable trends, sizable epidemics of these diseases still occur. In the winter of 1940-41 a simultaneous outbreak of gravis diphtheria, scarlet fever, and meningococcus meningitis occurred in Nova Scotia. An unusually high incidence in the older ages was noted for diphtheria and scarlet fever. Of 588 cases of diphtheria among civilians in this epidemic, 46 percent were under 15 years of age; 40 percent 15 to 29 years; and 14 percent 30 years old or over (28). The percentage of Schick positives among adults was so high as to arouse some question as to methods used and the potency of the toxin, but Campbell (8) has indicated that all readings

were made or supervised by trained public health officers of experience and the toxin prepared by a reliable laboratory.

Groups tested in Nova Scotia, 1940-41	Number tested	Percent Schick positive (%)
Royal Canadian Air Force (after outbreak):		
Group A	465	47
Group B	250	55
Dalhousie University students	405	59
Trainees at camp	—	71
Normal-school students	243	80
Civil servants	250	80
Adults taken at random from town of 3,600 population	558	87

These proportions indicate the large amount of susceptible material for epidemics in at least some places. The acceptance by the general public of diphtheria immunization as a protection against attack was evidenced by the more than 14,000 persons who passed through the immunization clinic during an intensive campaign.

A striking illustration of public confidence in the protection afforded against smallpox was evident in the large number of vaccinations which followed the local outbreak of 63 cases and no deaths which occurred in Pennsylvania in December 1942 and January 1943. Over 70,000 persons were vaccinated in Philadelphia and many thousands in other parts of Pennsylvania and nearby States. The Pennsylvania Railroad ordered the vaccination of its 160,000 employees in 14 States and a campaign among industrial workers was initiated in Baltimore. Hospitals, schools, municipal and State agencies, and fire departments carried out mass vaccination of employees.

Sporadic outbreaks of typhoid fever still appear occasionally. Fifty cases occurred in Honolulu early in 1942, all in one public school. Subsequently mass inoculations against typhoid fever and smallpox were started and extended throughout the islands in a campaign to immunize the entire population.

Immunizations in the armed forces.—Protection against infection may be divided into two main classes—immunization that is routine for all or a large part of the armed forces, and the use of vaccines in the event of known or anticipated exposure. The program of 1942 in the armed forces of the United States required smallpox, typhoid, paratyphoid, and tetanus inoculations. Protective agents were available for susceptibles exposed to outbreaks of such diseases as diphtheria and scarlet fever. Yellow fever, plague, cholera, and typhus vaccines were restricted to those bound for areas in which there was a threat of exposure, or times when definite outbreaks occurred.

In the British Army in 1940 emphasis was placed upon immunization against smallpox, typhoid fever, and tetanus. All procedures were voluntary but a high proportion of the troops were inoculated.

Cholera, plague, typhus, and yellow fever vaccines were available when there was likelihood of exposure to these infections. As a result of outbreaks of diphtheria and scarlet fever during the winter and spring of 1940-41, the Royal Canadian Air Force initiated Schick and Dick testing of all personnel either in or entering the Service, with injections for all positive reactors (33).

Immunization of civilians.—It was to be expected that intensive control measures would be introduced among civilians in theaters of war unless there was a breakdown of health services. In discussing the importance of prophylactic measures in England in 1941, White (38) noted that while the Ministry of Health recommended immunization against the enteric group, a combination of anti-typhoid-paratyphoid vaccine and tetanus toxoid (T. A. B. T.) was being used in large quantities for the immunization of factory workers.

The consensus of opinion has been that inoculation of the total population of England against the enteric fevers would not be advised. Where epidemics existed or threatened, mass inoculations could well be used, and the protection of groups running special risks of infection was considered advisable. Volunteers for this type of immunization have steadily increased in England (5), and a large part of the population has been inoculated.

At least one-third of the children in England and Wales are estimated to have been immunized against diphtheria (22). In 1941-42 a survey covering 7,596 children of 3,930 mothers in 25 localities was conducted in an attempt to determine why there had not been better response to the recent campaign. It was found that 9 out of 10 mothers were aware of the immunization scheme and that schools and welfare centers were on the whole the most satisfactory means of reaching children for both frequency and effectiveness. Haphazard sources, such as posters, films, radio, and newspapers, seemed least effective. Improved organization of school and child welfare services for immunization of preschool children was recommended (16).

The Horder Committee (British) recommended diphtheria immunization, and more extensive use of whooping cough vaccine has also been advocated (38). Active immunization for scarlet fever was not considered particularly necessary in view of the general mildness of the disease and the satisfactory use of antitoxin after the disease is contracted.

The use of a triple vaccine for diphtheria, tetanus, and typhoid and paratyphoid fevers was considered for all French civilians between 6 and 30 years of age. At a meeting of the French Academy of Medicine in September 1940 it was recommended that the law regarding diphtheria inoculation be enforced and that mixed diphtheria and tetanus vaccine be employed (18). The use of triple vaccine was advised wherever there was the threat of an outbreak of typhoid or

paratyphoid fever. The importance of the prompt and complete reporting of communicable diseases was emphasized.

The United States Children's Bureau has recommended that all children of 9 months or older should be immunized against diphtheria unless they are already protected (36). Vaccination against smallpox was urged, preferably between the ages of 3 and 12 months. City, State, and Federal health organizations have taken an active part in campaigns for the extension of diphtheria and smallpox vaccination. The promotion of immunization among young children was considered so important that in 1942 a proclamation was issued by the President of the United States requesting that each community exert every effort that all children over 9 months of age be immunized against diphtheria and smallpox.

An analysis of State smallpox vaccination laws in the United States in 1939 and 1940 indicates great variation. Thirteen States² including the District of Columbia had laws requiring vaccination as a prerequisite to school attendance, regardless of the presence or absence of smallpox in the community; in six other States² the statutes gave the local authorities power to require vaccination as a prerequisite to school attendance (19). However, some of the laws for compulsory vaccination applied only to public schools or to schools in large cities, and in one State the local authorities were empowered to suspend the law under certain circumstances. Many of the States had permissive vaccination provisions in their laws which could not be evaluated. A few States had statutes which prohibited the local authorities from requiring vaccination as a prerequisite to school entrance, and one State forbade making any form of vaccination or inoculation a condition precedent for admission to any public or private school or college or for the exercise of any right, the performance of any duty, or the enjoyment of any privilege.

Statutes or regulations pertaining to diphtheria immunization existed in nine States by the end of 1941 (20). North Carolina was the only State which required general immunization of children; in West Virginia it was required and in New Jersey it could be required by local authorities as a prerequisite to school attendance. In Kansas nonimmunized pupils could be excluded from school by local authorities when diphtheria was present in the community. Illinois, Kentucky, and New York required immunization of specified persons in certain institutions. In Virginia, local boards of health were authorized to provide for the administration of toxoid if, in their opinion, it appeared necessary to prevent an epidemic.

² The 13 States whose statutes required vaccination as a prerequisite to school entrance were: Arkansas, District of Columbia, Kentucky, Maryland, Massachusetts, New Hampshire, New Mexico, New York, Pennsylvania, Rhode Island, South Carolina, Virginia, West Virginia. The 6 States whose statutes gave the local authorities power to require vaccination as a prerequisite to school entrance were: Connecticut, Georgia, Maine, New Jersey, Ohio, Oregon.

II. SCOPE AND METHOD OF IMMUNIZATION SURVEY

The survey of immunizations here reported upon was made in 1936 in a group of large cities scattered throughout the country. The evidence available indicates that the general level of diphtheria immunization has increased considerably since that time, but there are no indications that the level of smallpox vaccination has changed materially in recent years.³ Immunization against scarlet and typhoid fevers (except typhoid in the South) seems to be practiced on such a small scale that it is impracticable to measure changes. The findings of the present survey are here recorded by geographic section, family income, and nativity and color of the family head. It seems probable that relative variations as between these groups are reasonably characteristic of the present even though the actual level of immunization may have changed.

The survey covered by house-to-house canvass a total of 213,931 families in 28 cities of 100,000 population or more, located in 19 States. These cities were generally representative of the geographic distribution of the 93 cities of 100,000 or more population in 1930.⁴ Within each city the areas that were canvassed consisted of census enumeration districts of 1930, selected from the total of these districts in a way to obtain a representative sample of the entire city. The details about sampling procedures were set forth in a preceding paper and need not be repeated here (10). The same paper gives considerable data on the distribution of the canvassed population according to age, color, nativity of parents, and geographic section, in comparison with 1930 census data for the 28 surveyed cities and the 93 cities of 100,000 or more population in 1930.

Enumerators visited all residences within the selected districts of each city. All data were recorded during this single visit to the household. Refusals to give information were negligible and the percentage of informants who were not entirely cooperative was also small. Data were recorded for each person under 25 years of age on the history of an attack of or immunization against diphtheria, smallpox, scarlet fever, and typhoid fever at any time since birth.⁵ Other information included a roster of the family, with age, sex, color, relationship to household head, and other pertinent data for each member.

³ Data on the number of smallpox and diphtheria immunizations done each year, as reported by State health authorities to the U. S. Children's Bureau (57), are available for the years 1937-41. However, it is not possible to estimate from them the proportions of children of specific ages who have been immunized, and no data by income, nativity, or color are included. A later section of this paper considers the above reports in more detail.

⁴ The 28 cities sampled and the total numbers of canvassed families were: Atlanta 5,563, Baltimore 13,796, Birmingham 4,767, Boston 14,739, Buffalo 13,210, Chicago 16,143, Cleveland 15,717, Columbus 5,219, Dallas 5,607, Detroit 9,953, Fall River 4,356, Flint 2,500, Grand Rapids 2,563, Houston 5,301, New Orleans 6,931, Newark 6,867, Oakland 4,489, Philadelphia 11,341, Pittsburgh 10,131, Portland, Oreg., 6,309, Richmond 5,671, St. Louis 12,757, St. Paul 5,345, Salt Lake City 4,392, Seattle 5,097, Spokane 4,580, Syracuse 5,895, Trenton 4,692.

⁵ History of attack by nine other diseases was recorded and is the subject of other reports (10).

The survey was made early in 1936; the canvassing was done between the middle of March and the middle of June, 90 percent of the schedules being taken in the approximately 2 months from April 7 to June 3, and 50 percent within the 4 weeks from April 22 to May 20. Some additional information was obtained about cases and immunizations that took place within 12 months of the date of the canvass; the data as presented in this paper represent histories of immunizations prior to that "study year," which means histories as of the spring of 1935. Ages of the children as stated in this paper are corrected to correspond to the time to which the history applies, that is, they are one year less than the age at the time of the survey in 1936. A later paper will consider immunizations that occurred during the 12 months ending on the day of the canvass.

There was a total of 761,968 persons of all ages in the families canvassed. This represented 2 percent of the aggregate population of the 93 cities of 100,000 or more inhabitants, and 5 percent of the total population of the 28 surveyed cities. The proportion of the population covered varied with size of city from 2 percent in Chicago to 16 percent in Fall River. Although the sampling ratios were small for the largest cities, those with 800,000 or more population contributed 38 percent of the canvassed population but made up 58 percent of the total population of the 28 surveyed cities and 48 percent of the population of the 93 cities of 100,000 or more in 1930 (table 1).

The canvassed sample includes a total of 182,640 children under 15 years of age at the time of the survey in 1936. Immunizations for the diseases considered in this paper are most frequent in this age group and accurate histories cannot be obtained for the older adults by house-to-house canvass. Because of these facts this paper is confined largely to the ages under 15 years, but a few data are shown for children up to 20 years.

TABLE 1.—*Distribution according to size of city of residence of the canvassed population, the total population of the 28 canvassed cities, and the total population of the 93 cities over 100,000 in 1930*

Size of city	Percentage of the population that resided in each size of city			Number of cities	
	Canvassed in 28 cities	Total in 28 cities	Total in 93 cities	28 cities	93 cities
All sizes.....	100.0	100.0	100.0	28	93
100,000 but under 400,000.....	36.7	23.6	36.3	17	75
400,000 but under 800,000.....	25.0	18.1	15.3	5	10
800,000 or over.....	38.3	58.3	48.4	6	8
Total population.....	761,968	16,156,756	36,325,836	-----	-----

III. DATA FOR ALL SURVEYED CITIES ⁶

Of the four diseases covered in this paper, immunization against three of them had been known and used on human beings for at least 20 years and the other (scarlet fever) for about 12 years prior to the study. However, as seen in figure 1 and table 2, the numbers of immunizations ⁷ against scarlet and typhoid fevers are almost negligible as compared with smallpox and diphtheria. From birth through the fourth year of age more children in this surveyed group had been immunized against diphtheria than had been vaccinated against smallpox. However, at 5 years when children enter kindergarten there is a rapid rise in the percentage who had been vaccinated, and after this age smallpox vaccinations are much more frequent than diphtheria immunizations. By 8 years 85 percent of the children had been vaccinated against smallpox as compared with 61 percent immunized against diphtheria. By 14 years 90 percent had been vaccinated against smallpox, but the percentage immunized against

⁶ In a preceding paper (10) on the common communicable diseases of childhood, most of the rates were based on children of the family head because it appeared that reporting on that group was more complete than on other children living in the household. In the percentages immunized, some differences between the two groups were found but it seemed entirely possible that they represented real differences in the frequency of immunization. However, the differences in percentages immunized in the two groups were not large, the relative age curves of percentages immunized were nearly identical, and the numbers of children other than those of the head were small, so that the percentages for all children were practically the same as or children of the head. The following table shows the two groups separately:

History of immunization against four communicable diseases at any time since birth among children of the household head and other children living in the household—censused while families in 28 large cities in 19 States, 1935

Relationship to household head	Age last birthday									
	All under 15	Under 5	5-9	10-14	15-19	All under 15	Under 5	5-9	10-14	15-19
Percentage with history of immunization but no case										
	Diphtheria					Smallpox				
All children.....	48.0	29.4	55.8	55.4	43.5	62.7	14.6	75.2	88.4	89.7
Children of head.....	48.4	29.7	56.1	55.7	44.4	62.9	14.7	75.3	88.5	90.6
Other children.....	38.1	21.3	46.5	46.8	36.1	57.6	12.4	72.9	86.8	83.3
	Scarlet fever					Typhoid fever				
All children.....	1.93	.83	2.14	2.58	2.30	1.67	.57	1.78	2.42	2.90
Children of head.....	1.93	.82	2.15	2.59	2.29	1.66	.57	1.77	2.40	2.69
Other children.....	1.83	1.08	1.92	2.46	2.40	1.88	.54	1.90	3.11	4.47
	Children of head observed					Other children observed				
Number observed.....	160,017	45,820	54,340	59,857	52,906	5,476	1,852	1,665	1,959	6,956

Children of the household head include own, step, and adopted children.

⁷ "Immunization" is used in this paper to mean the injection of the usual number of doses of the material that is presumed to produce immunity to the specific disease; no data are available on tests following the injections to indicate whether the process actually produced immunity in the individual, except that 94 percent of all smallpox vaccinations done during the study year for children under 20 years of age were reported as "successful."

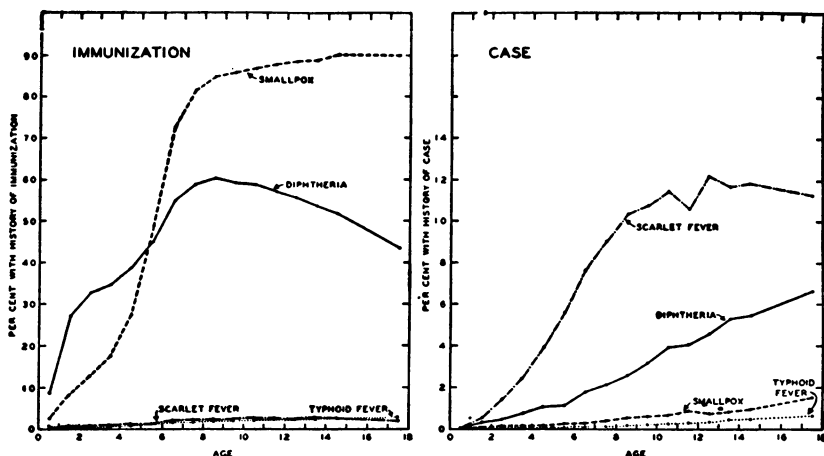


FIGURE 1.—History of immunization against and of attacks of four communicable diseases at any time since birth among children of specific ages at the time of the study—canvassed white families in 28 large cities in 19 States, 1935.

TABLE 2.—History of immunization against and of attacks of four communicable diseases at any time since birth—canvassed white families in 28 large cities in 19 States, 1935

Age last birth-day ¹	Percentage with history of—								Number of children observed ² (population)
	Immunization at any time but no case				Case at any time				
	Diphtheria	Small-pox	Scarlet fever	Typhoid fever	Diphtheria	Small-pox	Scarlet fever	Typhoid fever	
Under 1.....	8.8	2.5	0.22	0.07	0.05	0.01	0.1	0.01	7,687
1.....	27.2	8.5	.77	.42	.33	.02	.5	.03	9,768
2.....	32.6	12.8	.82	.47	.49	.04	1.4	.03	9,715
3.....	34.5	17.6	.87	.72	.79	.09	2.4	.03	9,924
4.....	38.6	27.6	1.29	1.01	1.10	.12	3.9	.04	10,578
5.....	44.9	48.8	1.40	1.27	1.16	.23	5.7	.09	10,551
6.....	54.6	72.7	2.19	1.67	1.80	.27	7.7	.10	10,885
7.....	58.7	81.5	2.32	1.76	2.14	.36	9.0	.10	11,470
8.....	60.5	84.9	2.39	2.04	2.58	.52	10.3	.13	11,395
9.....	59.3	85.7	2.34	2.10	3.17	.64	10.7	.19	11,704
10.....	58.9	86.9	2.64	2.23	3.90	.67	11.4	.24	11,979
11.....	57.1	87.7	2.65	2.27	4.09	.83	10.6	.25	12,723
12.....	55.7	88.5	2.36	2.20	4.53	.78	12.2	.30	12,139
13.....	53.6	88.9	2.65	2.62	5.26	.80	11.6	.45	12,768
14.....	51.8	90.0	2.61	2.78	5.41	.91	11.8	.43	12,207
15.....	48.9	89.6	2.27	2.52	6.00	1.07	11.7	.48	12,525
16.....	45.6	89.6	2.21	2.44	6.13	1.39	11.4	.48	11,661
17.....	43.9	90.4	2.30	2.53	6.70	1.37	10.9	.60	12,382
18.....	40.7	89.7	2.38	3.48	6.97	1.85	11.1	.67	11,763
19.....	37.7	89.4	2.35	3.56	7.60	1.94	11.0	.89	11,531
All under 20.....	46.8	69.9	2.03	2.00	3.71	.73	8.7	.29	225,355
All under 15.....	48.0	62.7	1.93	1.67	2.64	.45	7.8	.17	165,493
Under 5.....	29.4	14.6	.83	.57	.58	.06	1.8	.02	47,672
5-9.....	55.8	75.2	2.14	1.78	2.19	.40	8.8	.12	56,005
10-14.....	55.4	88.4	2.58	2.42	4.64	.80	11.5	.34	61,816
15-19.....	43.5	89.7	2.30	2.90	6.65	1.51	11.2	.62	59,862

¹ Ages in this and later tables are stated as of the beginning of the study year, which is the 12 months immediately preceding the date of the canvass; histories are set down as of this same time. The immunizations and cases during the study year are to be considered in more detail in a later paper.

² In this and all succeeding tables the numbers observed represent the numbers known as to whether ever immunized against diphtheria; for the other three diseases the numbers known as to immunization may be somewhat below or above the populations given in the tables, but in every case the percentages are based on the numbers known for the disease in question.

diphtheria declines after 8 years of age. These curves are cumulative in nature because the data for each age represent the percentage who had been immunized at any time since birth; however, few persons are immunized against diphtheria after they become 15 years of age, so that those who arrive at that age without being immunized are less likely to be immunized at a later age. When diphtheria immunization has been widely practiced for 20 or 30 years, the curve will presumably continue to rise with age.

Scarlet fever immunizations do not get above 3 percent for any age and typhoid exceeds this figure only at 18 and 19 years. This statement refers to the group of cities as a whole—in certain geographic sections immunizations for these diseases are more frequent.

The data on smallpox vaccinations were not tabulated in a way to show what percentages of the children of specific ages had been vaccinated within a given period—say 7 years. However, 59 percent of white children 15 and 16 years of age who were vaccinated during the study year represented first vaccinations, and 47 percent of those at 18 and 19 years were first vaccinations. Thus of the rather small percentages of these older children who received vaccinations during the study year roughly half were revaccinations. In a preceding study (11) it was found that 51 percent of the 15- and 16-year-old children who had ever been vaccinated had been vaccinated within 7 years; the corresponding figure for 18- and 19-year-olds was about 40 percent.

For typhoid fever there is still less evidence of reimmunization; 91 percent of all typhoid immunizations among white children under 20 years of age during the study year were first immunizations, and even at 15–19 years of age only 11 percent of the immunizations were reimmunizations.

The right half of figure 1 shows the percentage of children who had had a case of each of the four diseases. Scarlet fever has the highest proportion, reaching about 12 percent at 12 years of age, with diphtheria second, reaching 6.6 percent at 15–19 years and 7.5 percent at 19 years of age. It should be noted, however, that the diphtheria curve rises at an abnormally steep rate because the older children represented in this chart lived through a period when this disease was more prevalent than in any year since the birth of the children under 5 years of age. The same is true of typhoid fever, on a relative basis, but the prevalence of this disease has been quite low throughout the 20 years represented by the lives of even the oldest of these children. It is, of course, not intended to suggest that immunization is solely responsible for the low incidence of these diseases—obviously

in some of them the incidence has been greatly influenced by other factors.⁸

IV. GEOGRAPHIC VARIATION

Inasmuch as colored children are largely concentrated in one geographic section, it will be of interest to consider first the percentage of white children in each section who had been immunized. Figure 2 affords a comparison for large cities in 5 geographic sections of the percentage of white children of specific ages who had been immunized against the four diseases (tables 3 and 4). Similar data on the percentage of children who had suffered an attack of the same diseases are also included. The immunization situation may be considered as it exists at several different ages.

Diphtheria.—Considering diphtheria immunization (fig. 2 and table 3) the maximum proportion immunized, which occurs within the ages from 7 to 9 years in all sections, varies from 67 percent in the North Central region to 50 percent in the South. In every instance there is a decrease after those ages for reasons already noted, but in the Northeast with a maximum of 63 percent there is practically no decrease until 12 years of age.

Diphtheria immunization at early ages is important; for the ages of 2 and 3 years the Intermediate cities were the highest with 44 and 43 percent, respectively, as compared with 14 and 19 percent at those ages in the West. In these early preschool ages the South, which was lowest in most of the school ages, was higher than the Northeast and almost as high as the North Central, which were the two highest sections for practically all of the school ages.

In diphtheria case histories (fig. 2 and table 4) the South and Intermediate were at the top, in spite of a high immunization rate in the latter group for the preschool ages. However, these diphtheria case history curves also represent a cumulative process and many of the cases may have occurred prior to the time of extensive immunization. On the other hand, diphtheria case histories are low in the West in spite of low immunization rates in the preschool ages; in the school ages the West is moderately high in diphtheria immunizations.

The decline in diphtheria death rates in the South has also lagged behind other sections, so that the area of high mortality as well as that of high case incidence has moved in the past 30 years from the North to the South. According to a summary of diphtheria mortality in large cities in nine geographic regions, the three Southern sections have all had higher rates during the past decade than the three Northern sections (1, 17).

⁸ No data are shown by sex in this paper. Preceding studies (11, 12, 13, 14) indicated that differences between males and females in the percentages who had been immunized against the diseases included in this study were negligible except for typhoid fever, particularly in the ages representing men who had been in the armed forces.

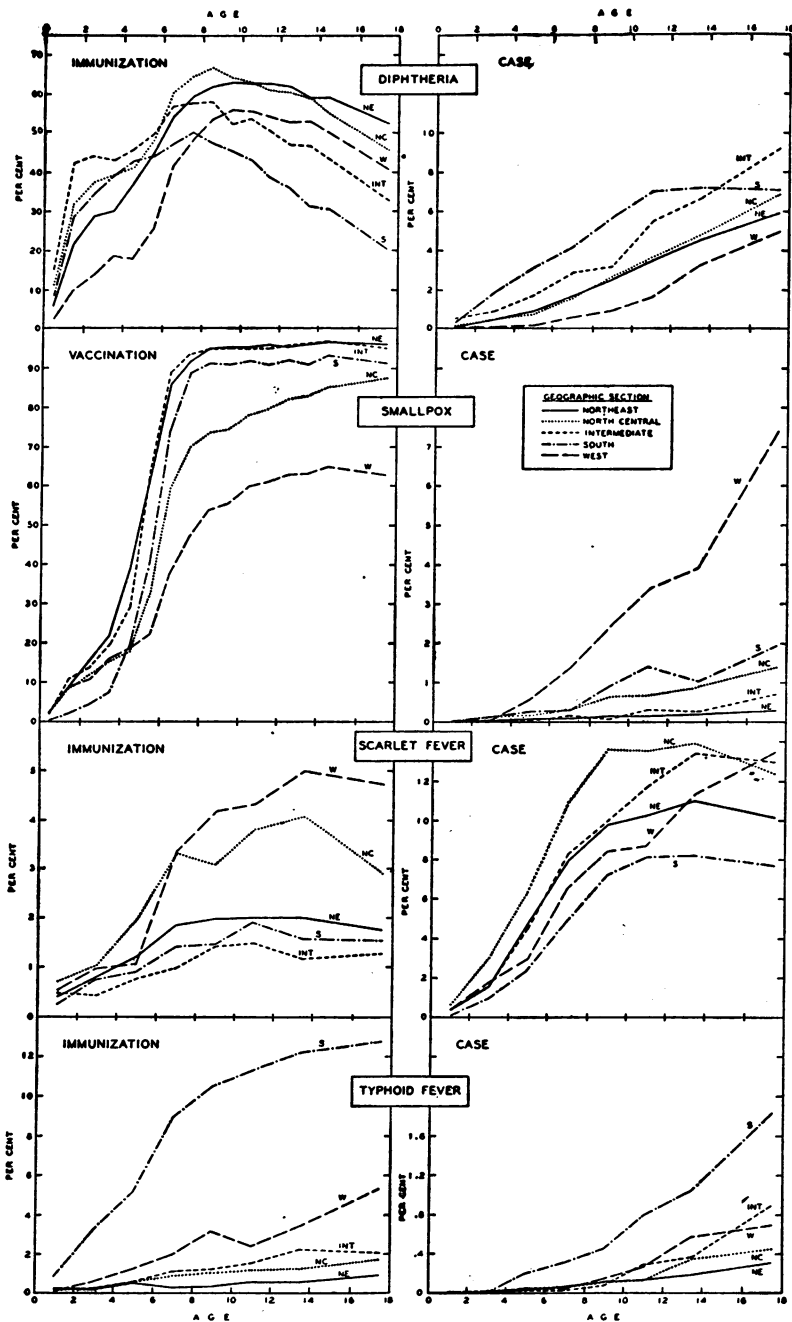


FIGURE 2.—History of immunization against and of attacks of four communicable diseases at any time since birth among children in five geographic sections—censused white families in 28 large cities in 19 States, 1935. (See footnote 1 to table 4 for definition of sections.)

TABLE 3.—History of immunization against diphtheria and smallpox at any time since birth among children in five geographic sections¹—cannassed white families in 28 large cities in 19 States, 1935

Geographic section ¹	Age last birthday														
	Under 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Percentage with history of immunization but no case															
Diphtheria:															
Northeast.....	5.7	22.0	28.7	30.1	37.3	44.8	54.4	59.4	62.1	62.9	62.9	62.6	61.7	59.1	59.0
North Central.....	11.5	32.0	37.5	39.5	41.2	48.2	60.4	64.6	66.7	64.2	63.0	61.1	60.3	59.1	54.9
Intermediate.....	15.8	42.5	44.2	43.1	45.8	49.7	56.9	57.8	58.1	52.3	53.8	50.8	47.1	46.6	43.3
South.....	8.9	28.6	34.5	39.3	43.1	44.4	47.4	60.3	47.6	45.5	43.5	38.5	35.9	31.3	30.6
West.....	2.9	10.0	13.7	18.8	18.1	25.6	41.6	48.4	53.7	56.0	55.7	54.2	52.6	52.9	50.1
Smallpox:															
Northeast.....	2.9	9.2	15.7	22.0	39.1	63.7	85.7	91.9	95.1	95.5	95.5	96.2	95.5	96.4	96.4
North Central.....	2.8	8.7	12.1	15.3	18.1	32.7	58.7	69.8	73.6	74.6	78.0	79.5	81.8	83.0	85.1
Intermediate.....	2.5	11.2	13.9	19.6	29.4	65.9	89.9	93.6	94.9	95.0	95.1	95.2	95.7	96.4	96.9
South.....	.4	2.4	4.6	7.7	19.4	40.7	74.3	83.7	91.3	91.0	91.9	91.0	92.1	91.1	93.3
West.....	2.6	8.8	11.2	16.1	18.4	22.3	37.5	47.2	54.0	55.9	60.0	61.1	63.0	63.2	64.8
Number of children observed															
Population:															
Northeast.....	2,785	3,727	3,709	3,741	3,921	3,978	3,923	4,303	4,256	4,466	4,545	4,860	4,647	4,805	4,673
North Central.....	2,363	2,709	2,739	2,771	3,082	3,155	3,192	3,302	3,254	3,366	3,346	3,541	3,410	3,538	3,380
Intermediate.....	960	1,338	1,327	1,361	1,447	1,414	1,582	1,599	1,596	1,629	1,659	1,779	1,753	1,740	1,674
South.....	756	1,088	1,052	1,119	1,193	1,153	1,227	1,250	1,293	1,287	1,325	1,409	1,279	1,467	1,321
West.....	843	906	888	932	935	851	961	1,016	996	956	1,104	1,134	1,050	1,196	1,179

¹ For surveyed cities included in each geographic section, see footnote 1 to table 4.

Smallpox.—In smallpox vaccinations (fig. 2 and table 3) the curves for the Northeast and Intermediate cities are quite similar with a maximum level of about 96 percent. The South is low for the early preschool ages but finally reaches a maximum level of about 92 percent. Although the North Central eventually reaches a maximum at 15–19 years of 87 percent vaccinated, it is much lower throughout the school ages than the sections mentioned above. The Western cities show by far the lowest percentages vaccinated, reaching a maximum at 14 years of only 65 percent with 63 percent at 15–19 years. At 8 years of age the Intermediate and Northeast show about 95 percent vaccinated, the South 91, the North Central 74, and the West only 54 percent.

In smallpox case histories the order of the sections is almost the opposite, as might be expected in a disease so completely controlled by vaccination. The Northeast and Intermediate regions are at the bottom but the South, in spite of slightly higher vaccination histories, is a little above the North Central. The West is far above any other region in the percentage of children with a history of smallpox.

Scarlet fever.—The percentages of children who had been immunized against scarlet fever (fig. 2 and table 4) were too small in every region to have much effect upon the prevalence of the disease. The percentages, therefore, represent the extent to which immunization

TABLE 4.—History of immunization against and of attacks of four communicable diseases at any time since birth among children in five geographic sections¹—censused while families in 28 large cities in 19 States, 1935

Disease and geographic section ¹	Age last birthday											
	All under 15	Under 2	2-3	4-5	6-7	8-9	10-11	12-14	Under 5	5-9	10-14	15-19
Percentage ² with history of immunization but no case												
Diphtheria:												
Northeast.....	49.6	15.1	29.4	41.1	57.0	62.5	62.8	60.9	25.9	57.0	61.0	52.3
North Central.....	52.4	22.5	38.5	44.7	62.5	65.5	62.0	58.2	33.2	60.9	59.7	45.5
Intermediate.....	48.2	31.4	43.6	47.7	57.4	58.2	52.2	45.7	39.7	55.1	48.3	32.9
South.....	38.7	20.5	37.0	43.7	48.9	46.5	40.9	32.5	32.5	47.1	35.9	20.3
West.....	38.6	6.6	16.3	21.7	45.1	54.8	55.0	51.9	12.9	45.6	53.1	40.8
Smallpox:												
Northeast.....	70.8	6.5	18.8	51.5	88.9	95.3	95.9	96.1	18.8	86.8	96.0	96.0
North Central.....	54.7	5.9	13.7	25.5	64.3	74.1	78.8	83.3	11.8	62.2	81.5	87.3
Intermediate.....	70.9	7.6	16.8	47.1	91.3	95.0	95.2	96.3	16.3	88.1	96.9	95.2
South.....	63.1	1.6	6.1	29.9	81.6	91.1	91.4	92.1	7.5	78.0	91.9	91.3
West.....	41.3	5.8	13.7	20.2	42.5	54.9	60.6	63.7	11.6	44.0	62.2	62.8
Scarlet fever:												
Northeast.....	1.59	.43	.81	1.22	1.87	2.00	2.02	2.03	.72	1.84	2.03	1.77
North Central.....	2.68	.75	1.07	1.99	3.32	3.10	3.81	4.06	1.16	2.98	3.61	2.91
Intermediate.....	1.03	.48	1.45	.77	1.00	1.42	1.50	1.18	.58	1.10	1.31	1.28
South.....	1.29	.27	.78	.94	1.45	1.47	1.93	1.59	.65	1.35	1.73	1.54
West.....	3.11	.57	.99	1.12	3.38	4.19	4.33	5.00	.82	3.34	4.74	4.75
Typhoid fever:												
Northeast.....	.44	.20	.19	.54	.32	.41	.61	.59	.25	.41	.60	.94
North Central.....	.85	.16	.27	.56	.89	1.07	1.21	1.25	.28	.91	1.23	1.67
Intermediate.....	1.22	.26	.26	.63	1.19	1.23	1.53	2.25	.33	1.12	1.97	2.07
South.....	8.27	.87	3.27	5.20	8.96	10.49	11.29	12.22	2.74	9.00	11.84	12.77
West.....	2.07	.17	.60	1.28	2.02	3.16	2.40	3.42	.53	2.40	3.02	5.31
Percentage ² with history of case												
Diphtheria:												
Northeast.....	2.29	.11	.46	.84	1.63	2.55	3.47	4.54	.39	1.88	4.11	5.92
North Central.....	2.33	.20	.47	.75	1.54	2.64	3.60	4.78	.44	1.83	4.31	6.86
Intermediate.....	3.54	.52	.89	1.71	2.89	3.19	5.44	6.64	.92	2.83	6.16	9.21
South.....	4.69	.38	1.84	3.11	4.20	5.70	6.99	7.18	1.69	4.56	7.10	7.07
West.....	1.22	.....	.11	.17	.61	.92	1.61	3.27	.04	.69	2.61	4.94
Smallpox:												
Northeast.....	.12	.02	.03	.11	.10	.16	.15	.19	.03	.14	.17	.31
North Central.....	.47	.04	.13	.18	.32	.65	.68	.89	.09	.44	.80	1.41
Intermediate.....	.14	.....	.04	.....	.16	.09	.29	.27	.02	.10	.27	.70
South.....	.66	.....	.09	.26	.32	.89	1.42	1.03	.10	.55	1.19	1.93
West.....	1.99	.....	.05	.61	1.41	2.46	3.39	3.92	.13	1.71	3.71	7.38
Scarlet fever:												
Northeast.....	7.29	.29	1.57	4.76	7.99	9.82	10.26	11.00	1.61	8.31	10.70	10.11
North Central.....	9.71	.59	3.02	6.41	10.88	13.64	13.55	13.91	2.66	11.33	13.77	12.35
Intermediate.....	8.15	.30	1.52	4.52	8.27	10.02	11.71	13.39	1.51	8.52	12.72	12.96
South.....	5.16	.05	.97	2.39	4.88	7.23	8.09	8.18	1.84	5.50	8.15	7.66
West.....	6.46	.34	1.70	2.96	6.56	8.39	8.66	11.34	1.38	6.72	10.29	13.41
Typhoid fever:												
Northeast.....	.10	.....	.03	.04	.08	.13	.14	.20	.02	.10	.17	.32
North Central.....	.14	.02	.05	.05	.09	.12	.14	.35	.04	.10	.27	.45
Intermediate.....	.16	.....	.04	.03	.03	.09	.29	.38	.02	.06	.34	.89
South.....	.49	.....	.....	.21	.32	.46	.80	1.05	.04	.37	.95	1.83
West.....	.21	.....	.....	.06	.05	.15	.27	.58	.....	.10	.46	.70

¹ Cities in each geographic section: *Northeast:* Boston, Fall River, Buffalo, Syracuse, Newark, Trenton, Philadelphia, Pittsburgh. *North Central:* Chicago, Cleveland, Columbus, Detroit, Flint, Grand Rapids, St. Paul. *Intermediate:* Baltimore, Richmond, St. Louis. *South:* Atlanta, Birmingham, Dallas, Houston, New Orleans. *West:* Oakland, Portland, Salt Lake City, Seattle, Spokane.

² See table 3 for numbers of children observed at each year of age under 15. Numbers 15-19 years were as follows: Northeast 22,820; North Central 17,441; Intermediate 7,917; South 5,995; West 5,689.

had been resorted to by individual families rather than any organized effort to control the disease by this method. In Northeast, Intermediate, and Southern cities the curves hardly get above 2 percent at any age, but in the North Central cities the curve reaches a maximum of 4.1 percent and in the West 5.0 percent.

In case histories the North Central stands somewhat above and the South somewhat below other regions.

Typhoid fever.—Typhoid immunizations in Southern cities are far in excess of those in any other region, but the West is rather high also. In the Northeast, North Central, and Intermediate regions the maxima hardly get above 2 percent; in the West and South the maxima at 15–19 years are 5 and 13 percent, respectively.

Percentages with a history of a case of typhoid fever are low in all sections, but the South stands well above the others. Immunization of 13 percent of the children would hardly be expected to affect greatly the total typhoid rate; the high immunization rate, therefore, appears to reflect the size of the problem rather than the effectiveness of the immunization procedure in controlling the disease. Typhoid fever death rates have declined to low levels in every geographic section, particularly in large cities. However, typhoid mortality rates in the Southern sections are about three times those in the Northern sections (2).

TABLE 5.—*History of immunization against four communicable diseases at any time since birth among children¹ of native and foreign-born household heads in five geographic sections²—canvassed white families in 28 large cities in 19 States, 1935*

Disease and geographic section ³	Age last birthday							
	All under 15		Under 5		5-9		10-14	
	Native	Foreign	Native	Foreign	Native	Foreign	Native	Foreign
Percentage with history of immunization but no case								
Diphtheria:								
Northeast.....	47.9	53.1	26.6	25.3	56.9	57.7	60.0	62.5
North Central.....	50.4	57.1	31.4	39.9	59.7	64.1	59.8	59.9
Intermediate.....	48.4	49.2	39.5	44.2	55.2	55.1	49.0	47.1
South.....	39.8	28.7	33.3	32.3	43.3	29.7	36.9	26.3
West.....	38.8	39.5	12.6	15.9	46.8	42.6	54.3	49.6
Smallpox:								
Northeast.....	65.6	79.4	16.6	24.4	85.0	89.7	95.2	97.0
North Central.....	47.7	68.6	9.7	18.7	57.4	72.0	76.3	88.7
Intermediate.....	69.8	81.3	14.9	32.4	87.6	92.6	95.9	95.9
South.....	62.8	70.8	7.4	14.7	77.9	80.9	91.8	90.7
West.....	40.0	43.2	11.1	14.9	43.6	47.7	61.7	66.0
Scarlet fever:								
Northeast.....	1.74	1.32	.72	.57	2.02	1.49	2.48	1.54
North Central.....	2.68	2.71	1.09	1.31	3.05	2.97	3.91	3.16
Intermediate.....	1.03	1.19	.60	.56	1.07	1.28	1.33	1.43
South.....	1.30	1.11	.65	1.26	1.36	1.27	1.75	.93
West.....	3.16	3.08	.79	1.12	3.32	3.61	5.06	3.75
Typhoid fever:								
Northeast.....	.45	.39	.27	.24	.43	.39	.67	.46
North Central.....	.93	.64	.27	.27	1.06	.58	1.46	.86
Intermediate.....	1.29	.44	.32	.19	1.16	.70	2.17	.36
South.....	8.64	2.65	2.85	1.27	9.43	2.54	12.42	3.39
West.....	2.19	1.82	.49	.64	2.53	2.11	3.34	2.24
Number of children observed								
Population:								
Northeast.....	86,991	23,568	12,295	4,946	12,549	7,849	12,147	10,763
North Central.....	30,100	15,738	9,914	3,235	10,559	5,299	9,627	7,164
Intermediate.....	19,532	2,497	5,641	534	6,714	855	7,177	1,108
South.....	16,528	717	4,757	156	5,660	236	6,111	323
West.....	11,735	2,621	3,666	624	3,317	802	4,232	1,195

¹ Own, step, and adopted children of the household head.

² For definition of geographic sections, see footnote 1 to table 4.

TABLE 6.—History of attack by four communicable diseases at any time since birth among children of native and foreign-born household heads in five geographic sections—canvassed white families in 28 large cities in 19 States, 1935

Geographic section ¹	Percentage ² of children under 15 years of age with history of a case							
	Diphtheria		Smallpox		Scarlet fever		Typhoid fever	
	Native	Foreign	Native	Foreign	Native	Foreign	Native	Foreign
Northeast.....	2.0	2.3	0.09	0.15	8.1	5.3	0.08	0.10
North Central.....	2.0	2.5	.44	.47	10.4	7.5	.16	.08
Intermediate.....	3.2	4.1	.13	.16	7.8	6.5	.15	.06
South.....	4.4	6.1	.60	.72	4.9	3.4	.49	-----
West.....	1.1	1.1	1.90	1.60	6.3	5.6	.18	.08

¹ For definition of geographic sections see footnote 1 to table 4.

² Percentages for children under 15 years of age in this table are simple averages of percentages for the three 5-year age groups under that age. See table 5 for numbers of children observed.

White children of native and foreign parents.—Tables 5 and 6 show geographic variation in immunization and case histories for the four diseases for children of native white and foreign-born white parents separately. In general these two nativity groups both show geographic differences that are similar to those already discussed for all white children.

Colored children.—Considerable numbers of colored children were included in the canvassed populations of the Intermediate and Southern cities. To obtain for comparison a sufficient Northern colored population, the Northeast and North Central cities have been combined into one section which is here designated as the North. In these three sections practically all of the colored population are Negroes; the small number of colored in the Western section are omitted as they are largely of non-Negro stocks. Figure 3 shows for colored children the percentage who had been immunized against diphtheria and smallpox in each of these three sections. Comparison with white children will be made in a later section—these charts relate to geographic variation in immunizations among the colored (tables 7 and 8).

Diphtheria immunizations are far more frequent among colored children in Northern and Intermediate cities than in the South. In the preschool ages the Intermediate is above the North but after 6 years of age the reverse is true. In the percentage of colored children who reported a history of a case of diphtheria, the South was lowest, the North next, and the Intermediate was highest.

In smallpox vaccinations also the Southern Negro has lower percentages than Negroes in the North and Intermediate sections. The Intermediate group is highest in the school ages, reaching a maximum level of about 97 percent, but in the preschool ages the percentages vaccinated are less than in the North. In the percentage of colored children who had had a case of smallpox, the South is highest and the Intermediate is lowest.

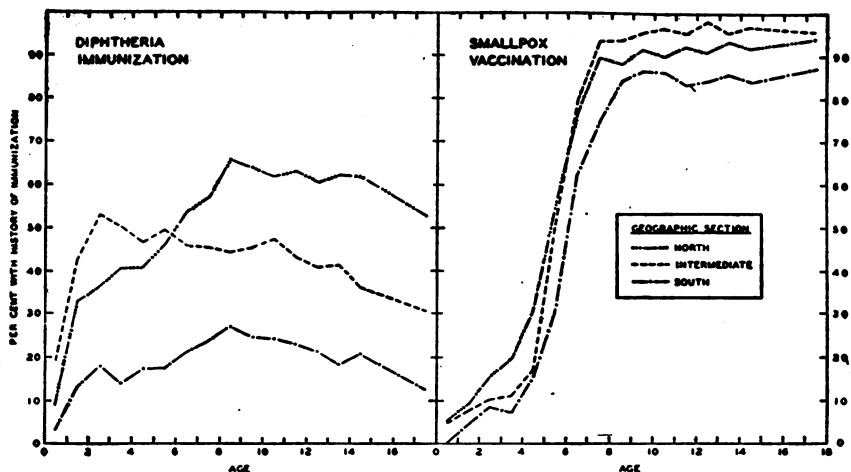


FIGURE 2.—History of immunization against diphtheria and smallpox at any time since birth among children of colored household heads in three geographic sections—censused families in 23 large cities in 15 States, 1935. (See footnote 1 to table 4 for definition of sections; North includes Northeast and North Central.)

TABLE 7.—History of immunization against four communicable diseases at any time since birth among children¹ of colored household heads in three geographic sections²—censused families in 23 large cities in 15 States, 1935

Age last birthday	Percentage with history of immunisation but no case						Number of children observed (population)		
	North	Inter-mediate	South	North	Inter-mediate	South	North	Inter-mediate	South
	Diphtheria			Smallpox					
Under 1.....	8.8	19.1	3.6	5.2	4.9	4.4	328	183	223
1.....	32.7	42.8	13.1	9.0	7.5	8.5	511	278	306
2.....	35.8	53.1	18.2	15.5	10.1	7.3	494	256	340
3.....	40.2	50.0	13.8	19.3	10.8	15.4	502	242	383
4.....	40.5	46.5	17.3	30.6	16.5	30.6	531	258	330
5.....	45.9	49.3	17.5	54.9	51.7	62.1	481	270	361
6.....	53.5	45.7	21.2	77.0	79.6	74.4	550	278	382
7.....	56.7	45.3	23.7	89.3	93.1	84.3	564	289	371
8.....	65.3	44.1	27.1	87.8	93.4	86.2	539	299	358
9.....	63.3	45.2	24.8	91.3	95.4	88.2	559	281	443
10.....	61.9	47.1	24.5	89.5	96.1	86.0	507	276	391
11.....	62.9	43.2	22.9	92.1	95.3	83.0	561	280	414
12.....	60.2	40.7	21.1	90.8	97.7	84.0	465	300	374
13.....	61.7	41.2	18.3	93.2	95.4	85.7	483	279	431
14.....	61.3	35.9	20.7	91.9	96.6	84.0	411	262	357
All under 15.....	51.2	43.7	19.7	64.3	65.7	56.1	7,446	4,081	5,523
Under 5.....	33.3	43.6	13.9	16.9	10.3	7.5	2,336	1,217	1,641
5-9.....	57.2	45.9	22.9	80.7	83.0	68.3	2,683	1,417	1,915
10-14.....	61.7	41.7	21.5	91.5	96.2	84.6	2,427	1,397	1,967
	Scarlet fever			Typhoid fever					
All under 15.....	2.29	1.09	0.42	0.86	0.86	3.19			
Under 5.....	1.20	.74	.18	.51	.16	.98			
5-9.....	2.84	1.12	.47	.97	1.05	3.15			
10-14.....	2.72	1.35	.56	1.06	1.28	5.57			

¹ Own, step, and adopted children of the household head.

² For definition of geographic sections, see footnote 1 to table 4; North as here used includes Northeast and North Central.

As among the white, scarlet fever immunizations among Negroes were more frequent in Northern than in Intermediate and particularly Southern cities. Percentages of Negroes who gave a history of an attack of the disease were smallest in the South and largest in the North.

In typhoid fever immunizations the Southern Negro was far above both the Intermediate and the Northern Negro; thus for the Negro also the South stands out as using typhoid fever immunization more than any other section. In the percentage of Negroes with a history of a typhoid case the South is highest and the North lowest.

TABLE 8.—History of attack by four communicable diseases at any time since birth among children of colored, native white, and foreign-born white household heads in three geographic sections¹—canned families in 23 large cities in 15 States, 1925

Color and nativity of household head	North			Inter-mediate			South			North			Inter-mediate			South								
	North	Inter-mediate	South	North	Inter-mediate	South	North	Inter-mediate	South	North	Inter-mediate	South	North	Inter-mediate	South	North	Inter-mediate	South						
	Diphtheria						Smallpox						Scarlet fever						Typhoid fever					
	Percentage ² of children under 15 years of age with history of a case																							
Colored.....	1.4	2.1	1.1	0.52	0.31	1.40	4.7	2.3	0.8	0.13	0.36	0.74	2.0	3.2	4.4	.25	.13	.60	9.2	7.8	4.9	.12	.15	.49
Native white...	2.4	4.1	6.1	.28	.16	.72	6.2	6.5	3.4	.09	.06	-----	2.4	4.1	6.1	.28	.16	.72	6.2	6.5	3.4	.09	.06	-----
Foreign white...	Number under 15 years with history of a case																							
Colored.....	103	87	63	39	13	82	360	95	49	10	15	38	1,340	667	766	165	28	106	6,126	1,630	371	80	31	88
Native white...	1,126	122	50	128	4	7	2,789	197	28	44	2	-----	1,126	122	50	128	4	7	2,789	197	28	44	2	-----
Foreign white...																								

¹ For definition of geographic sections, see footnote 1 to table 4; North as here used includes Northeast and North Central.

² Percentages for children under 15 years of age in this table are simple averages of percentages for the three 5-year age groups under that age. See tables 5 and 7 for numbers of children observed.

V. RACIAL VARIATION

Comparison of the extent of immunization among three racial groups will be made first in the North where most of the foreign white stock live, and in the South where most of the Negro stock live.

Diphtheria.—In diphtheria the percentages immunized in the North are nearly the same for native white, foreign white, and colored children of the same ages. Figure 4 shows the data in single years of age (table 9). In the preschool ages the colored are somewhat above both native and foreign white children. Numbers of foreign children in the South are insufficient for this detail but the data are shown in 5-year age groups for native and foreign white in table 5 and for colored in table 7. In the preschool ages in the South, percentages of native and foreign white children immunized against diphtheria are about equal but the colored are very much less. In the two groups from 5 to 15 years in the South, the foreign and particularly the colored children are considerably below native white in the percentages immunized

against diphtheria. In the Intermediate group, native and foreign show roughly the same percentage immunized against diphtheria; in the school ages fewer Negroes have been immunized than in either white group. The presence of large groups of poorly immunized colored children in the South and Intermediate cities may be a factor in keeping the attack rate on a higher level than in the North.

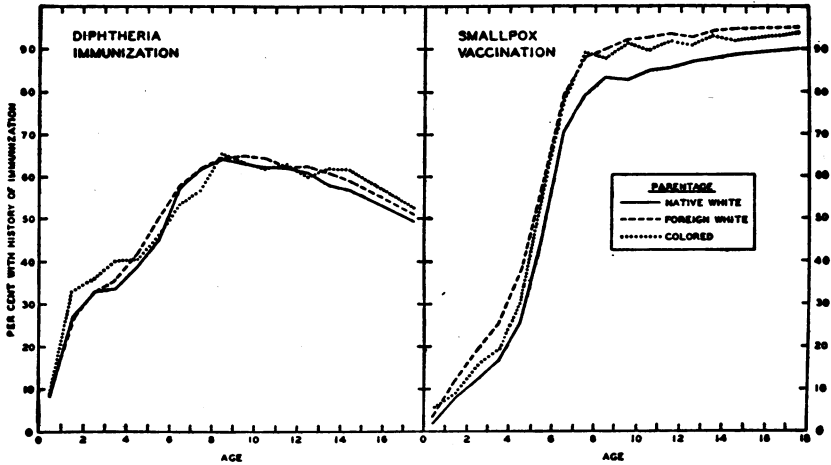


FIGURE 4.—History of immunization against diphtheria and smallpox at any time since birth among children of native white, foreign white, and colored household heads in the North—canvassed families in 15 large cities in 8 States, 1935. (North includes Northeast and North Central as defined in footnote 1 to table 4.)

TABLE 9.—History of immunization against diphtheria and smallpox at any time since birth among children¹ of native white, foreign-born white, and colored household heads in the North²—canvassed families in 15 large cities in 8 States, 1935

Age last birthday	Percentage with history of immunization but no case						Number of children observed (population)		
	Diphtheria			Smallpox			Native white	Foreign white	Colored
	Native white	Foreign white	Colored	Native white	Foreign white	Colored			
Under 1.....	8.2	9.8	8.8	2.3	4.2	6.2	3,708	1,185	328
1.....	26.7	26.1	32.7	7.9	12.1	9.0	4,725	1,465	511
2.....	32.6	32.8	35.3	12.1	19.4	15.5	4,548	1,684	404
3.....	33.8	35.6	40.2	16.6	25.6	19.3	4,505	1,819	502
4.....	38.5	41.5	40.5	26.2	38.6	30.6	4,723	2,078	531
5.....	44.8	50.1	45.9	46.6	57.2	54.9	4,697	2,261	481
6.....	57.1	57.8	53.5	70.4	79.5	77.0	4,506	2,427	550
7.....	61.8	61.8	56.7	79.2	88.1	89.3	4,789	2,627	554
8.....	64.4	64.3	65.3	83.3	90.0	87.8	4,520	2,797	539
9.....	63.0	64.7	63.3	82.8	92.2	91.3	4,596	3,036	559
10.....	62.1	64.4	61.9	84.8	92.9	89.5	4,482	3,217	507
11.....	62.0	62.1	62.9	85.7	93.5	92.1	4,584	3,622	561
12.....	60.9	62.1	60.2	87.2	92.8	90.8	4,277	3,590	465
13.....	57.7	60.6	61.7	87.7	94.3	93.2	4,405	3,732	483
14.....	56.5	58.5	61.3	88.9	94.9	91.9	4,026	3,756	411
All under 15....	49.0	54.7	51.2	57.6	75.0	64.3	67,091	39,296	7,446
Under 5.....	28.7	31.1	33.3	13.5	22.1	16.9	22,209	8,231	2,336
5-9.....	58.2	60.3	57.2	72.4	82.5	80.7	23,108	13,148	2,683
10-14.....	59.9	61.4	61.7	86.8	93.7	91.5	21,774	17,917	2,427

¹ Own, step, and adopted children of household head.

² North includes Northeast and North Central as defined in footnote 1 to table 4.

In all three regions the percentage of Negroes with a history of a case of diphtheria (table 8) is less than among either the native or foreign white in the same section. Diphtheria death rates are generally lower for colored than for white children (21) but there appears to be no difference in antitoxic immunity demonstrable by the Schick test (6). In all three regions native white children show somewhat smaller percentages with a history of a case than do the foreign white.

Smallpox.—In smallpox vaccinations in the North (fig. 4 and table 9), foreign white and colored show slightly larger percentages vaccinated than native white of the same ages; foreign white are slightly above colored in most of the ages. In the South, the foreign white are above native white in the groups under 10 years but roughly the same at 10–14 years. Colored are generally slightly below both white groups (tables 5 and 7).

In all three regions the percentage of Negroes with a history of a case of smallpox is larger than among either the native or foreign white in the same section. The differences between the native and foreign white are small in all three regions (table 8).

Scarlet fever.—In the South the Negroes show lower percentages immunized against scarlet fever than either white group, but in the Intermediate and Northern cities the differences are small (tables 5 and 7).

In all three regions the percentage of Negroes who reported a history of a case of scarlet fever is definitely less than among either the native or foreign white in the same section. The percentages for the native white are slightly larger than those for the foreign white in each section (table 8).

Typhoid fever.—In the South the native white show much higher percentages immunized against typhoid than either the foreign white or the Negroes (tables 5 and 7).

In typhoid case histories, the Negroes show higher percentages than either white group in the same region (table 8).

VI. VARIATION WITH FAMILY INCOME.

The only index of economic status available in this study is the family informant's estimate of family income during the year preceding the canvass. No attempt was made to get exact figures but the informant was asked to indicate in which of several broad groups the income fell; if the family was or had been on public relief during the study year, the question about income was not asked.

Income during the study year seems an inappropriate measure to set against the percentage who had been immunized during many years. In many instances the family income may have changed a great deal during the life of the child. However, in the absence of a better index of economic status, the children were classified by this

current family income. Figure 5 affords a comparison for different income levels of the percentages of white children of three age groups who had been immunized against the four diseases (table 10).

Diphtheria.—Among children under 5 years, families on relief showed less than half as many immunized against diphtheria as in families with annual incomes of \$3,000 or more. As income increases, the percentages immunized gradually increase. At the ages 5-9 and 10-14 the picture is the same except that: (a) relief families show slightly higher percentages of children immunized than nonrelief families with less than \$1,000 annual income, and (b) the relative differences between the percentages immunized in the lowest and highest income groups are considerably less than among preschool children.

Smallpox.—In smallpox vaccinations among children under 5 years, relief families and the two lowest nonrelief income groups had about the same percentages vaccinated, which was less than half of the percentage for children in families with \$3,000 or more annual income. In the 5-9 year group, there was a steady rise from relief to the highest income group, but the relative differences between percentages for the several income groups were small. Among children 10-14 years of age all income groups showed about the same percentages vaccinated. Figure 6 shows the data for diphtheria and smallpox in single years of age (table 11).

Scarlet fever.—Scarlet fever immunizations show rather large relative differences in the percentages immunized in the several income groups; percentages immunized in the highest income group were, in the three ages, from two and one-half to five times those in the lowest income group.

Typhoid fever.—The same large income differences appear for the percentages immunized against typhoid fever, the highest income group showing, in the three ages, percentages that are two and one-half to seven times those for the lowest income class.

Discussion of immunization differences.—Even in the highest income group less than 6 percent of the children had been immunized against typhoid and scarlet fevers. Thus, as already pointed out, immunizations against these diseases are largely a matter of individual initiative and ability to secure such service, rather than the result of any public program. In smallpox, particularly in the school ages, all economic levels get about the same percentage of vaccinations because the program is largely under public auspices. Diphtheria immunization in the school ages has some of the characteristics of both kinds of programs but tends to be, like smallpox vaccination, a matter of public service for all income groups. But even in smallpox and diphtheria the picture for children under 5 years is like that for scarlet and typhoid fevers where individual initiative and economic status are important factors in the percentages immunized.

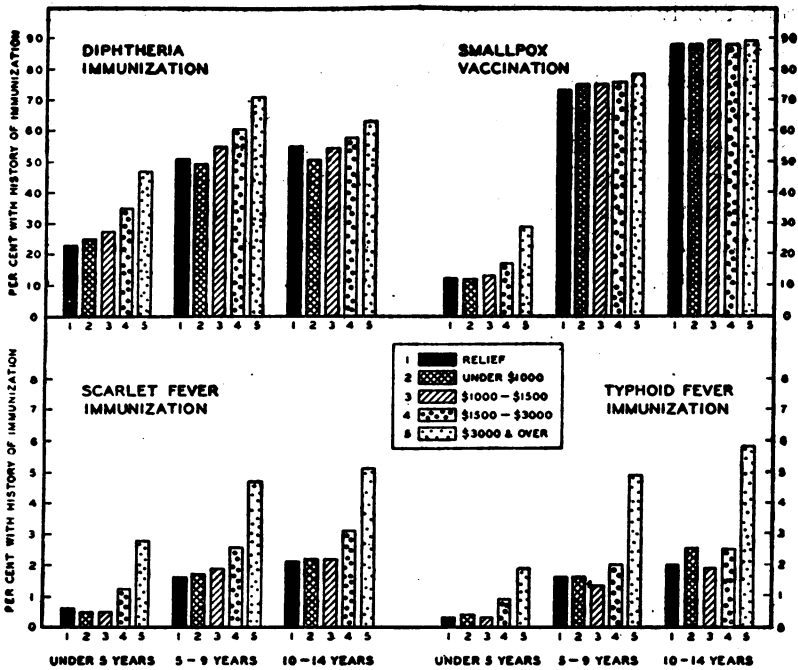


FIGURE 5.—History of immunization against four communicable diseases at any time since birth among children of certain age groups in families of different annual income levels at the time of the survey—canvassed white households in 28 large cities in 19 States, 1935.

TABLE 10.—History of immunization against four communicable diseases at any time since birth among children of certain age groups in families of different income levels at the time of the survey—canvassed white households in 28 large cities in 19 States, 1935

Annual family income	Age last birthday							
	All under 15	Under 5	5-9	10-14	All under 15	Under 5	5-9	10-14
Percentage ¹ with history of immunization but no case								
Diphtheria				Smallpox				
Relief.....	44.4	23.0	51.1	55.0	61.1	12.4	73.3	88.0
Nonrelief:								
Under \$1,000.....	42.7	25.0	49.7	50.6	61.1	12.1	74.6	88.0
\$1,000-\$1,499.....	46.3	27.6	54.7	54.5	61.3	12.9	75.3	89.2
\$1,500-\$2,999.....	52.7	35.4	60.8	57.9	64.7	17.2	76.0	88.1
\$3,000 and over.....	62.2	47.7	71.3	63.3	70.9	29.2	78.5	89.0
Scarlet fever				Typhoid fever				
Relief.....	1.49	.62	1.56	2.11	1.24	.27	1.58	1.96
Nonrelief:								
Under \$1,000.....	1.52	.50	1.66	2.22	1.62	.42	1.64	2.54
\$1,000-\$1,499.....	1.58	.55	1.87	2.18	1.23	.35	1.31	1.91
\$1,500-\$2,999.....	2.41	1.20	2.63	3.07	1.89	.86	1.98	2.55
\$3,000 and over.....	4.42	2.80	4.75	5.09	4.54	1.86	4.87	5.84

¹ See table 11 for number of children observed.

Although the data here presented are for all cities combined, percentages for the several geographic sections show approximately the same types of variation with income. The sections with lower immunization rates, such as smallpox vaccinations in the West and diphtheria immunizations in the South, show larger relative income differences in both the school and preschool ages than is true for sections with higher percentages immunized.

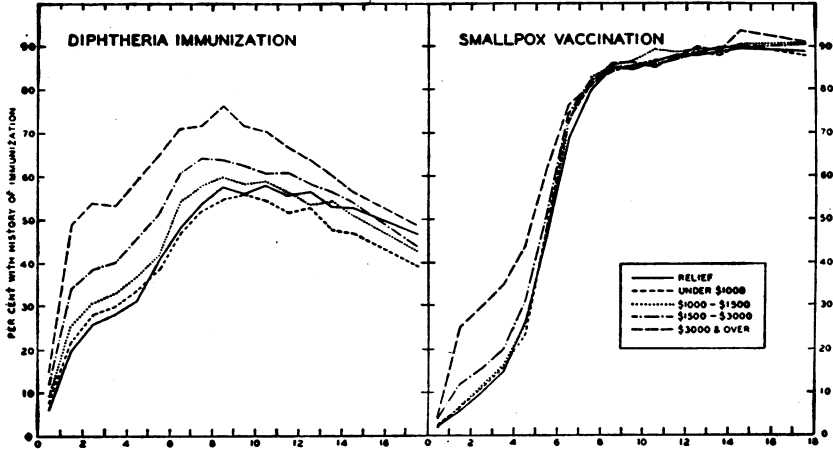


FIGURE 6.—History of immunization against diphtheria and smallpox at any time since birth among children of each age in families of different annual income levels at the time of the survey—canvassed white households in 28 large cities in 19 States, 1935.

TABLE 11.—History of immunization against diphtheria and smallpox at any time since birth among children of each age in families of different income levels at the time of the survey—canvassed white households in 28 large cities in 19 States, 1935

Annual family income	Age last birthday														
	Under 1	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Percentage with history of immunization but no case															
Diphtheria:															
Relief.....	5.9	19.8	25.8	28.1	31.0	40.3	47.6	53.5	57.5	55.6	57.8	55.5	56.2	52.7	52.6
Nonrelief:															
Under \$1,000.....	7.1	22.2	27.9	29.9	33.7	38.2	46.8	52.0	54.7	55.8	54.0	51.5	52.7	47.9	46.9
\$1,000-\$1,499.....	7.9	25.4	30.8	32.7	36.6	42.0	54.3	57.9	59.9	58.3	58.7	56.2	53.3	53.5	50.9
\$1,500-\$2,999.....	11.9	34.2	38.6	40.3	45.4	51.1	60.9	64.3	64.0	62.5	60.6	60.9	58.1	56.2	53.9
\$3,000 and over.....	14.8	48.7	54.0	53.1	59.0	65.2	71.2	72.0	76.3	71.7	70.2	66.7	63.9	60.4	56.3
Smallpox:															
Relief.....	2.1	5.8	9.9	14.7	26.4	45.9	68.7	79.7	85.1	84.6	86.5	87.7	87.7	88.7	89.4
Nonrelief:															
Under \$1,000.....	2.3	6.3	10.6	15.4	23.3	47.6	72.8	81.3	83.9	85.5	86.4	87.4	88.4	87.9	90.0
\$1,000-\$1,499.....	1.7	6.6	11.1	16.1	25.8	46.8	72.8	82.8	85.5	80.7	89.2	88.5	89.1	88.9	90.3
\$1,500-\$2,999.....	3.6	11.6	15.3	19.9	30.8	51.2	74.3	81.5	84.8	85.4	85.7	87.3	88.4	89.7	89.4
\$3,000 and over.....	4.3	25.0	29.8	34.7	43.7	61.9	76.5	81.0	85.5	86.2	85.1	87.3	89.5	88.7	93.7
Number of children observed															
Population:															
Relief.....	1,454	1,887	1,861	1,948	1,949	2,024	2,024	2,227	2,195	2,196	2,318	2,447	2,267	2,388	2,207
Nonrelief:															
Under \$1,000.....	1,328	1,688	1,634	1,641	1,771	1,734	1,751	1,798	1,904	1,847	1,990	2,115	1,979	2,104	1,934
\$1,000-\$1,499.....	2,401	3,032	3,007	2,950	3,246	3,052	3,263	3,298	3,243	3,332	3,367	3,565	3,373	3,439	3,450
\$1,500-\$2,999.....	2,208	2,802	2,838	2,967	3,159	3,244	3,318	3,610	3,536	3,766	3,722	3,930	3,920	4,168	3,949
\$3,000 and over.....	266	300	313	358	378	422	444	453	427	484	493	586	512	583	567

Case histories.—In the instance of diphtheria and smallpox, the proportion of children under 15 years with a history of a case decreases slightly but regularly as family income increases (table 12). Children under 15 years of age in families with \$3,000 or more annual income show 1.8 percent with a history of diphtheria, as compared with 2.7 percent for both relief and nonrelief families with less than \$1,000 income. The corresponding figures for smallpox are 0.23 percent for \$3,000 or over as compared with 0.58 percent for nonrelief under \$1,000 and 0.56 percent for relief families. In scarlet and typhoid fevers there was no regular trend with income in the percentage of children with a history of a case.

TABLE 12.—*History of attack by four communicable diseases at any time since birth among children in families of different income levels at the time of the survey—canned white households in 28 large cities in 19 States, 1935*

Income during survey year	Percentage ¹ of children under 15 years of age with history of a case				Number under 15 years with history of a case			
	Diphtheria	Smallpox	Scarlet fever	Typhoid fever	Diphtheria	Smallpox	Scarlet fever	Typhoid fever
Relief	2.7	.56	7.0	.17	894	192	2,317	58
Nonrelief:								
Under \$1,000	2.7	.58	6.6	.22	763	167	1,896	64
\$1,000-\$1,499	2.5	.38	7.0	.15	1,261	190	3,478	76
\$1,500-\$2,999	2.3	.32	8.3	.12	1,287	182	4,567	72
\$3,000 and over.....	1.8	.23	7.3	.24	137	18	536	18

¹ Percentages for children under 15 years of age in this table are simple averages of percentages for the three 5-year age groups under that age. See table 11 for numbers of children observed.

VII. COMPARISON WITH OTHER SURVEYS AND REPORTS

Special surveys.—Techniques, procedures, schedules, and personnel vary so much from one survey to another that it is seldom possible to make comparisons that can be interpreted as representing trend from the time of one survey to that of another. However, there are two preceding surveys that are rather similar in procedures, methods, and tabulations. The first, 1928-30, is based on surveys by the Committee on the Costs of Medical Care (11, 12, 13, 14, 15) and the second, 1931, is a report from the White House Conference on Child Health and Protection (29, 30). The Medical Care data are based on 6,404 persons under 20 years of age in 21 cities of 100,000 or more population. The White House report is based on 145,720 children under 6 years of age in 156 cities of 50,000 or more population. In comparing the results of the three surveys, it must be kept in mind that each study is based on a different sample which in no two cases includes the same group of cities although individual cities are included in all three studies. Nevertheless each survey represents a group of metropolitan areas and it seems feasible to make some rough comparison of percentages immunized at the three periods. The data for smallpox and diphtheria immunizations are shown in table 13 in rather detailed ages. Table 14 shows in broader age groups similar

TABLE 13.—History of immunization against diphtheria and smallpox at any time since birth among children¹ in large cities according to surveys² in 1928–30, 1931, and 1935–36

Midyear of survey	Age last birthday									
	Under 1	1	2	3	4	5	6–7	8–9	10–14	15–19
Percentage with history of immunization but no case										
Diphtheria:										
1929	4.5	11.0	14.3	15.4	24.3	29.2	36.2	34.8	29.2	10.5
1931	3.3	16.5	22.1	24.1	27.0	31.8				
1935	8.8	27.2	32.6	34.5	38.6	44.9	56.7	69.9	55.4	43.5
Smallpox:										
1929	4.8	11.3	19.3	18.5	30.4	42.8	74.6	80.9	84.0	84.9
1931	3.4	11.1	16.7	20.8	28.4	43.8				
1935	2.5	8.5	12.8	17.6	27.6	48.8	77.2	85.3	88.4	89.7
Number of children observed (population)										
Population:										
1929	333	344	333	364	375	383	838	772	1,577	1,035
1931	24,268	19,015	25,104	26,318	26,190	24,825				
1935	7,687	9,768	9,715	9,924	10,578	10,551	22,355	23,099	61,816	59,862

¹ The 1929 and 1935 data are for white children; the 1931 data are for white and colored combined.

² Data for 1929 are from survey by the Committee on the Costs of Medical Care (11, 15) (collected as of the beginning of the survey year) in 21 cities of more than 100,000 population distributed geographically as follows: *Northeast:* Lynn, Worcester, New Haven, New York, Yonkers; *North Central:* Chicago, Canton, Cleveland, Dayton, Detroit, Fort Wayne, Wichita; *South:* Washington, D. C., Richmond, Atlanta; *West:* Denver, Los Angeles, San Diego, San Francisco, Seattle, Tacoma.

Data for 1931 are from a White House Conference Report (29) on immunizations among preschool children in 156 cities (mostly over 50,000 population) in 45 States. The cities included in the survey are listed in the report.

Data for 1935 are from the present survey of 28 cities of more than 100,000 population. See note 1 to table 4 for geographic distribution of these cities.

TABLE 14.—History of immunization against certain communicable diseases at any time since birth among white children in four geographic sections according to surveys¹ of large cities in 1928–30 and 1935–36

Geographic section ¹ and midyear of survey	Age last birthday																			
	Under 5				5–9				10–14				15–19							
	Under 5	5–9	10–14	15–19	Under 5	5–9	10–14	15–19	Under 5	5–9	10–14	15–19	Under 5	5–9	10–14	15–19				
Percentage with history of immunization but no case												Number of children observed (population)								
	Diphtheria								Smallpox											
All sections:																				
1929	14.2	34.3	29.2	10.5	17.3	70.9	84.0	84.9	1,799	1,993	1,577	1,035	47,672	56,005	61,816	59,862				
1935	29.4	55.8	55.4	43.5	14.6	75.2	88.4	89.7												
Northeast:																				
1929	26.5	35.3	36.2	19.3	51.6	87.7	88.0	87.8	313	424	359	238	17,863	20,926	23,530	22,820				
1935	25.9	57.0	61.0	52.3	18.8	86.8	96.0	96.0												
North Central:																				
1929	11.6	35.0	28.7	7.8	7.4	66.1	86.3	88.3	893	947	724	436	13,664	16,269	17,215	17,441				
1935	33.2	60.9	59.7	45.5	11.8	62.2	81.5	87.3												
South:¹																				
1929	15.5	36.5	25.8	8.6	8.5	73.2	78.9	82.7	269	306	252	151	11,641	14,030	15,406	13,912				
1935	36.5	51.5	42.8	27.5	12.4	83.6	94.1	93.5												
West:																				
1929	8.4	28.8	23.6	7.2	18.6	60.7	76.4	76.1	324	316	242	210	4,504	4,780	5,665	5,689				
1935	12.9	45.6	53.1	40.8	11.6	44.0	62.5	62.8												
	Scarlet fever								Typhoid fever											
All sections:																				
1929	2.7	3.8	3.7	1.3	.2	1.2	2.9	6.2												
1935	.8	2.1	2.6	2.3	.6	1.8	2.4	2.9												

¹ For sources of the 1929 data and cities included in each geographic section, see note 2 to table 13. The 1935 data are from the present study and are classified geographically as indicated by note 1 to table 4, except that Intermediate and South are here combined into the one group designated as South

data for large cities in each of four broad geographic sections, together with data on scarlet and typhoid fever immunizations for all cities combined; the numbers involved in these latter categories are too small for comparisons by geographic section.

The proportion of children immunized against diphtheria appears to have increased rather markedly in practically every age group in every section. In 1929, about 36 percent of the 6- and 7-year-old and 35 percent of 8- and 9-year-old children had been immunized; but in 1935 these proportions were 57 and 60 percent for the respective age groups. The increase among 15- to 19-year-olds from 10 percent in 1929 to 43 percent in 1935 presumably represents largely the increasing age of children immunized when they were younger, rather than more immunizations done when the children were above 15 years of age.

The data on smallpox vaccinations for all sections combined indicate slight increases in 1935 over 1929 for children over 5 years, but the reverse for preschool children. Considered by sections, the results are not consistent and, with the small numbers of varying individual cities, it is not possible to say whether any real changes took place between the two surveys.

Scarlet fever immunizations were somewhat less frequent in 1935 than in 1929 in three of the four age groups. Apparently the level of scarlet fever immunization has not increased materially in recent years.

The few data on typhoid immunizations indicate little if any difference in the proportions immunized in the two periods. This is true of the South where most of the typhoid immunizations were found in both surveys, as well as for all sections combined.

A few results of recent surveys made by city health departments may be cited without any implication that other cities have done worse or better in promoting diphtheria immunization. In Detroit the proportion of children entering school (presumably 5- to 6-year-olds) who had already been immunized against diphtheria rose from 66 percent for 1936 to 70 percent for 1941 (23). Sample surveys of preschool children were made by the Cleveland Health Department in 1934 and 1939; during that period the proportion of 5-year-old children who had been immunized against diphtheria increased from 43 to 66 percent (24).

Baltimore Health Department reports show for each year the number of children of different ages who have been immunized at any time since its campaign first began. It also shows estimates, based on these data, of the percentage of children who have been immunized. Of all children under 5 years of age at the close of 1935, 45 percent were immunized against diphtheria, as compared with 80 percent at

the close of 1941; corresponding figures for ages 5-9 were 53 percent for 1935 and 95 percent for 1941(25).

If one neglects migration, the number of live births to resident mothers (minus infant deaths) gives a rough index of the new unimmunized children who are added to the population each year. If at the beginning of the year 50 percent of the children under 15 years of age had been immunized, then the number of immunizations during the year must equal about half of the births to maintain the 50 percent level; this statement assumes that practically all of the immunizations are done for children under 15 years of age and that 14-year-olds who become 15 are also roughly 50 percent immunized. Thus to accomplish the increase noted in Baltimore, 15,000 to 19,000 immunizations were done annually during the 6 years 1936-41, as compared with about 13,000 births annually.

Health department reports.—Data on the number of smallpox vaccinations reported since 1937 to the United States Children's Bureau (37) by State health departments throughout the country vary from a low of 1,097,000 in 1937 to highs of 1,687,000 in 1938 and 1,472,000 in 1939, back to 1,170,000 in 1940 and 1,243,000 in 1941. A considerable but unknown number of these vaccinations would be of adults with a rather large percentage representing revaccinations. Thus it is not practicable to say whether the level of vaccination was raised during this period.

Sample surveys in Detroit indicate that the proportion of children entering school (presumably 5- and 6-year-olds) who had already been vaccinated against smallpox rose from 41 percent in 1936 to 54 percent in 1941. Thus it appears that at least in Detroit vaccinations are being done at earlier ages. However, this does not necessarily mean a higher maximum level of smallpox vaccinations which in large cities reaches 90 percent or above at about 15 years of age.

The indications of more diphtheria immunizations in the 1936 survey than in that of 1929 and common knowledge of the immunization activities of health departments both suggest that more children are now immunized than at the time of this survey. However, the number of diphtheria immunizations reported to the United States Children's Bureau (37) by State health departments do not indicate large increases since 1937; the figure for 1941 was 1,075,000 as compared with 1,102,000 and 1,067,000 for 1940 and 1939, respectively. The number in 1938 of 1,177,000 was the highest and 897,000 in 1937 was the lowest reported in the 5 years of record. But the maintenance of a constant number of annual immunizations for a short period does not necessarily mean that the percentage of children immunized also remains constant. The annual number of immunizations may be sufficient to increase the percentage immunized, or it may be insuffi-

cient to maintain the level of the beginning of the period. According to the present study 48 percent of children under 15 years of age covered by the survey had been immunized in 1935. If one can assume that the reports to the Children's Bureau during the 5 years 1937-41 were reasonably complete and that they refer to children immunized and not to the number of injections of toxoid, the number of children immunized amounts to about half of the number of children born during that period who lived through the first year of life. Thus if the level of immunizations in the surveyed cities was roughly the same as in the country as a whole, the reported immunizations about maintained the level as found by the present survey. If, as seems probable, the level in small cities and rural areas was less than in the large surveyed cities, the reported immunizations raised the level of diphtheria immunizations since 1936.

For the group of white children under 15 years of age who were covered by the survey, the percentage who had been immunized against diphtheria varied in the 28 surveyed cities from 70 to 17 percent in 1935. In a few individual cities in different geographic sections, the numbers of immunizations and births may be compared, without any implication that the cities cited are representative of others in the section. A Northeastern city with 60 percent of the children under 15 years immunized against diphtheria in 1935 has about 2,900 births per year; during the 6 years 1935-40 an average of about 2,700 immunizations were done annually. If 60 percent as many children were immunized as came into the population by birth, or about 1,700, the 1935 level of immunizations would have been maintained, so the 2,700 per year would raise the level considerably. A Western city with 1,800 annual births did an average of 1,800 immunizations during the 7 years 1935-41. Since only 37 percent of children under 15 years in this city were immunized in 1935, the 1,800 per year would be between two and three times the number needed to maintain the 1935 level. A Southern city with about 2,900 births per year reported nearly 3,100 annual diphtheria immunizations during the 6 years 1936-41. Since only 57 percent of the children under 15 years had been immunized in 1935, this number of immunizations was about twice the number needed to maintain the 1935 level. Another Southern city with about 6,800 annual births reported an average of 2,600 annual diphtheria immunizations during the 7 years 1935-41. Since only 28 percent of the children under 15 years were immunized in 1935, these 2,600 immunizations were sufficient to raise the 1935 level.

These rough comparisons of the numbers of diphtheria immunizations and births indicate that most of the cities have raised the level of immunization since the survey, but in many cases it would

still be low; the survey results, therefore, represent minimal percentages immunized for diphtheria.

VIII. SUMMARY

This study of immunizations is based on a canvass of 213,931 households in 28 cities of 100,000 or more population selected as representative of cities of that size in different geographic sections. The data which were collected during the 3 months ended about the middle of June 1936, included histories for each person under 25 years of age for artificial immunization against or attack by diphtheria, smallpox, scarlet fever, and typhoid fever. A comparison of certain characteristics of the surveyed population with census data indicates that it is fairly representative of the population of cities with 100,000 or more inhabitants.

Immunizations against scarlet and typhoid fever are negligible in frequency as compared with those against diphtheria and smallpox. In the preschool ages diphtheria immunizations are more frequent than smallpox vaccinations, but after 5 years the reverse is true. At 8 years of age 61 percent of the children had been immunized against diphtheria and 85 percent had been vaccinated against smallpox at some time since birth.

There is considerable geographic variation in the extent of immunization against these diseases. These 28 large cities were divided into 5 geographic groups, Northeast, North Central, Intermediate, South, and West. In diphtheria immunizations the West is lowest from birth through 7 years but beyond that age the South is lowest; the Intermediate is highest from birth through 5 years, but after 6 years the Northeast and North Central are above the Intermediate. The South and Intermediate cities are highest in history of diphtheria cases.

In smallpox vaccinations the Northeast, Intermediate, and South all get above 90 percent by about 8 years of age, but the North Central and particularly the West are low, the latter reaching only about 60 percent. In history of smallpox cases the West is above any other section.

In scarlet fever immunizations the West and North Central are far above the other sections, but no region gets above about 5 percent. In scarlet fever cases the North Central and Intermediate are at the top. In typhoid immunizations the South is far above any other section, with the West second. The South shows the highest history of typhoid cases. The numbers of scarlet fever and typhoid immunizations are too few in any section to have any definite effect upon the course of these diseases; the immunized, therefore, represent protection for certain individuals only, and the highest immunization rates

show up where case rates are high enough to stimulate the use of the vaccine.

An examination of the geographic variation in immunizations among children of native and foreign-born white parents and among colored indicates that all three of these racial elements of the population show the same general type of geographic variation in the extent of immunizations.

In the North the percentages of native, foreign, and colored children of specific ages who have been immunized against diphtheria are approximately the same; in the South, a higher percentage of the native whites are immunized than is true of the foreign white or the colored.

The only index of economic status available was the income of the family during the year preceding the canvass and this would not necessarily represent income during the child's life. Nevertheless, when children were classified according to that income, it was found that in the preschool ages the percentages of children who had been immunized against diphtheria and smallpox increase definitely with income. The same was true for diphtheria immunizations during the school ages, but there was little difference in smallpox vaccinations as between high and low incomes. Scarlet and typhoid fever immunizations increase with income in each of the three age groups under 15 years, indicating that these immunizations are largely the result of individual initiative rather than public programs.

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DEATHS DURING WEEK ENDED JULY 10, 1943

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

	Week ended July 10, 1943	Correspond- ing week, 1942
Data from 88 large cities of the United States:		
Total deaths.....	7,775	7,554
Average for 3 prior years.....	7,775	-----
Total deaths, first 27 weeks of year.....	256,441	231,992
Deaths under 1 year of age.....	599	537
Average for 3 prior years.....	525	-----
Deaths under 1 year of age, first 27 weeks of year.....	17,790	14,949
Data from industrial insurance companies:		
Policies in force.....	65,598,856	65,388,272
Number of death claims.....	10,039	10,268
Death claims per 1,000 policies in force, annual rate.....	8.0	8.2
Death claims per 1,000 policies, first 27 weeks of year, annual rate.....	10.2	9.7

COURT DECISION ON PUBLIC HEALTH

Unwholesome food—sale.—(Massachusetts Supreme Judicial Court; *Commonwealth v. Economy Grocery Stores Corporation*, 46 N.E.2d 521; decided January 26, 1943.) A Massachusetts statute (Annotated Laws, chapter 94, section 150) prohibited the sale or offering for sale for food of “any diseased animal or product thereof or any tainted, diseased, corrupt, decayed or unwholesome carcass, meat, vegetable, produce, fruit or provisions of any kind, except when packed in such a container that upon reasonable inspection the condition of the contents thereof can not be ascertained, without making the condition of the thing sold or offered for sale fully known to the buyer.” Regarding this statute the Supreme Court of Massachusetts took the view that the intention was to punish the sale of unwholesome provisions, subject to the statutory exception, without regard to the question whether the seller knew the provisions to be unwholesome or not. The offense under the statute was one in which guilty knowledge did not need to be alleged or proved.

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 JULY 17, 1943

Summary

The rise in the incidence of poliomyelitis continued. A total of 297 cases was reported for the week, as compared with 245 for the preceding week and a 5-year (1938-42) median of 101. Of the current total, 231 cases, or 78 percent, were reported in the same 3 States which reported 85 percent of the cases last week, as follows (last week's figures in parentheses): Texas, 102 (90); California, 90 (75); Oklahoma, 39 (44). New York reported 11 cases (last week 5), and Kansas and Arkansas 7 each. For the first 28 weeks of the year 1,626 cases have been reported, as compared with 751 last year and 948 for the 5-year median. The cumulative figure to date this year is more than that for the corresponding period of any year since 1934, when 2,694 cases had been reported.

A total of 264 cases of meningococcus meningitis was reported, as compared with 267 for the preceding week and a 5-year median of 35. Slight increases over the preceding week's figures were recorded for five of the nine geographic sections, namely, Middle Atlantic, East North Central, West North Central, East South Central, and West South Central. The cumulative total to date this year is 12,542 cases, as compared with 2,143 in 1942 and a 5-year median of 1,276.

Increases occurred, as compared with reports for the preceding week, in the incidence of diphtheria, typhoid fever, and whooping cough, and decreases in influenza, measles, scarlet fever, and smallpox. Of the nine diseases mentioned above, the incidence of only three—scarlet fever, smallpox, and typhoid fever—was below the 5-year medians.

Totals for the week for the other diseases included in the table are as follows (figures for the corresponding week of last year in parentheses): Anthrax, 2 (6); dysentery, all forms, 1,089 (784); infectious encephalitis, 17 (13); leprosy, 1 (0); Rocky Mountain spotted fever, 19 (17); tularemia, 19 (27); endemic typhus fever, 123 (58).

Deaths registered in 88 large cities of the United States for the week aggregated 7,782, as compared with 7,593 for the preceding week and a 3-year (1940-42) average of 7,342. The cumulative total for the first 28 weeks of the year is 259,350, as compared with 235,281 for the corresponding period of 1942.

Telegraphic morbidity reports from State health officers for the week ended July 17, 1943, and comparison with corresponding week of 1942 and 5-year median

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

Division and State	Diphtheria			Influenza			Measles			Meningitis, meningococcus		
	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42	Week ended—		Median 1938-42
	July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942	
NEW ENGLAND												
Maine.....	1	0	1	-----	-----	-----	87	36	50	4	2	0
New Hampshire.....	0	0	0	-----	-----	-----	4	3	3	0	0	0
Vermont.....	1	0	0	-----	-----	-----	37	71	48	0	0	0
Massachusetts.....	1	8	4	-----	-----	-----	328	232	410	20	4	1
Rhode Island.....	0	2	1	-----	-----	-----	38	41	41	1	2	0
Connecticut.....	1	0	0	1	-----	1	66	75	75	5	2	0
MIDDLE ATLANTIC												
New York.....	6	9	15	14	13	13	951	368	840	33	9	2
New Jersey.....	3	5	7	1	2	2	760	170	170	8	2	0
Pennsylvania.....	10	12	12	-----	1	-----	211	121	245	21	6	3
EAST NORTH CENTRAL												
Ohio.....	7	4	6	2	12	6	154	64	77	17	0	1
Indiana.....	2	3	3	4	1	5	49	16	10	2	0	0
Illinois.....	7	14	17	6	9	6	342	51	91	10	1	1
Michigan ¹	3	2	4	2	1	1	653	42	370	8	1	1
Wisconsin.....	7	0	1	10	12	12	593	352	606	4	0	0
WEST NORTH CENTRAL												
Minnesota.....	1	0	1	1	1	1	180	54	29	3	0	0
Iowa.....	1	0	2	-----	-----	1	39	45	55	6	0	0
Missouri.....	1	0	1	-----	1	-----	37	31	15	8	7	1
North Dakota.....	3	1	1	-----	-----	-----	82	9	9	3	1	0
South Dakota.....	2	1	1	-----	-----	-----	24	8	7	0	0	0
Nebraska.....	1	2	1	-----	5	-----	12	55	13	0	0	0
Kansas.....	2	2	2	-----	3	1	55	33	33	4	0	0
SOUTH ATLANTIC												
Delaware.....	1	0	0	-----	-----	-----	6	1	1	1	0	0
Maryland.....	1	1	1	-----	1	1	64	40	27	9	2	1
Dist. of Col.....	1	2	5	-----	-----	-----	33	13	13	2	1	0
Virginia.....	1	5	5	42	76	26	74	24	65	8	2	2
West Virginia.....	3	2	2	-----	1	4	27	23	23	1	1	1
North Carolina.....	12	4	4	5	-----	-----	61	31	82	10	0	1
South Carolina.....	0	8	6	121	67	84	10	8	8	7	1	1
Georgia.....	3	4	4	16	7	7	23	20	15	4	1	0
Florida.....	4	2	2	18	4	4	13	34	16	5	1	1
EAST SOUTH CENTRAL												
Kentucky.....	6	0	1	3	-----	-----	10	8	15	6	3	2
Tennessee.....	5	2	2	4	4	13	38	15	22	2	0	1
Alabama.....	5	4	5	7	3	7	30	16	23	2	3	2
Mississippi ²	2	6	3	-----	-----	-----	-----	-----	-----	5	2	1
WEST SOUTH CENTRAL												
Arkansas.....	3	4	4	10	2	2	11	12	23	1	0	1
Louisiana.....	3	2	4	9	4	10	11	11	6	3	1	1
Oklahoma.....	5	3	3	7	10	10	10	2	20	0	0	0
Texas.....	23	13	13	300	106	91	118	52	80	11	3	1
MOUNTAIN												
Montana.....	0	0	0	-----	4	-----	45	31	29	0	0	0
Idaho.....	0	1	1	-----	-----	-----	3	2	3	0	0	0
Wyoming.....	0	0	0	4	13	-----	17	34	12	2	0	0
Colorado.....	4	1	5	-----	34	-----	33	40	30	0	1	0
New Mexico.....	0	0	0	1	1	-----	2	2	8	0	0	0
Arizona.....	3	0	0	42	9	18	15	42	37	1	0	0
Utah ³	0	0	0	-----	-----	-----	20	169	69	2	1	0
Nevada.....	0	0	-----	-----	-----	-----	26	5	-----	0	1	-----
PACIFIC												
Washington.....	8	0	0	-----	-----	-----	74	188	48	8	0	0
Oregon.....	10	2	1	4	6	6	58	43	35	4	0	0
California.....	19	10	12	19	28	17	324	512	397	13	2	1
Total.....	182	141	152	643	431	431	5,858	3,255	4,840	264	63	35
28 weeks.....	6,446	6,628	8,050	78,893	78,995	150,230	523,593	458,682	458,682	12,542	2,143	1,276

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 17, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Polio-myelitis			Scarlet fever			Smallpox			Typhoid and para-typhoid fever		
	Week ended—		Me-dian 1938-42	Week ended—		Me-dian 1938-42	Week ended—		Me-dian 1938-42	Week ended—		Me-dian 1938-42
	July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942		July 17, 1943	July 18, 1942	
NEW ENGLAND												
Maine.....	2	3	0	9	0	3	0	0	0	1	1	1
New Hampshire.....	0	0	0	3	4	1	0	0	0	0	0	0
Vermont.....	0	0	0	0	5	3	0	0	0	0	0	0
Massachusetts.....	0	2	1	92	85	66	0	0	0	5	2	2
Rhode Island.....	1	0	0	5	2	2	0	0	0	1	0	0
Connecticut.....	3	0	0	21	2	13	0	0	0	0	3	3
MIDDLE ATLANTIC												
New York.....	11	3	2	89	79	113	0	0	0	6	12	12
New Jersey.....	0	2	2	22	30	31	0	0	0	2	1	2
Pennsylvania.....	3	0	0	44	92	98	0	0	0	9	9	9
EAST NORTH CENTRAL												
Ohio.....	0	3	3	57	67	67	0	0	0	12	13	8
Indiana.....	0	3	1	17	10	18	0	1	1	7	0	7
Illinois.....	2	6	5	53	71	87	0	0	3	5	3	12
Michigan.....	2	4	4	33	37	85	0	1	1	5	2	2
Wisconsin.....	0	0	0	43	34	42	0	0	0	3	4	1
WEST NORTH CENTRAL												
Minnesota.....	2	0	1	16	27	24	0	1	1	0	1	1
Iowa.....	2	2	2	10	7	13	0	0	6	1	5	2
Missouri.....	4	6	1	11	13	13	0	0	1	7	6	6
North Dakota.....	0	0	0	2	3	3	0	0	2	0	1	1
South Dakota.....	0	0	0	5	4	4	0	2	4	0	1	0
Nebraska.....	0	0	0	2	7	5	0	1	1	1	0	0
Kansas.....	7	1	0	14	19	19	0	0	0	2	2	1
SOUTH ATLANTIC												
Delaware.....	0	0	0	1	3	3	0	0	0	0	0	1
Maryland.....	1	0	0	17	11	11	0	0	0	0	4	4
Dist. of Col.....	0	1	0	4	12	3	0	0	0	2	1	1
Virginia.....	1	1	1	11	6	8	0	0	0	6	7	8
West Virginia.....	0	0	0	3	12	12	0	0	0	8	8	5
North Carolina.....	1	1	1	22	8	9	0	0	0	5	12	12
South Carolina.....	0	0	3	2	3	1	0	0	0	8	4	10
Georgia.....	1	2	2	0	1	4	0	0	0	8	19	19
Florida.....	2	0	1	1	4	2	0	0	0	2	7	4
EAST SOUTH CENTRAL												
Kentucky.....	0	17	3	7	16	14	0	2	0	11	15	15
Tennessee.....	0	5	2	17	12	12	0	7	0	14	15	15
Alabama.....	3	3	3	8	12	10	0	0	0	7	10	10
Mississippi.....	2	0	0	3	2	2	0	0	0	8	11	9
WEST SOUTH CENTRAL												
Arkansas.....	7	11	1	6	3	3	0	1	0	15	14	14
Louisiana.....	0	1	1	4	5	5	0	0	0	5	11	21
Oklahoma.....	39	0	1	3	10	10	0	0	0	10	6	17
Texas.....	102	1	1	26	14	14	0	0	0	25	27	30
MOUNTAIN												
Montana.....	0	0	0	8	3	8	9	0	0	0	0	1
Idaho.....	0	0	0	2	0	2	0	0	0	1	1	1
Wyoming.....	0	0	0	15	5	3	0	0	0	1	2	0
Colorado.....	1	0	0	25	9	9	0	0	1	0	2	2
New Mexico.....	1	1	1	3	3	3	0	0	0	0	4	3
Arizona.....	3	0	0	9	1	1	0	0	0	1	0	3
Utah.....	2	0	0	7	5	4	0	0	0	0	0	0
Nevada.....	2	1	1	1	0	0	0	0	0	0	1	0
PACIFIC												
Washington.....	0	0	0	13	14	14	1	0	1	0	2	2
Oregon.....	0	0	0	11	6	5	0	0	1	0	0	1
California.....	90	3	8	69	53	58	0	0	0	3	5	5
Total.....	297	83	101	846	831	956	1	16	49	207	254	254
28 weeks.....	1,626	751	948	93,978	85,950	112,675	584	593	1,843	2,160	2,847	3,099

See footnotes at end of table.

Telegraphic morbidity reports from State health officers for the week ended July 17, 1943, and comparison with corresponding week of 1942 and 5-year median—Con.

Division and State	Whooping cough			Week ended July 17, 1943								
	Week ended—		Median 1933-42	Anthrax	Dysentery			Encephalitis, infectious	Leprosy	Rocky Mt. spotted fever	Tularemia	Typhus fever
	July 17, 1943	July 18, 1942			Amebic	Bacillary	Unspecified					
NEW ENGLAND												
Maine.....	20	21	21	0	0	0	0	1	0	0	0	0
New Hampshire.....	7	3	0	0	0	0	0	0	0	0	0	0
Vermont.....	9	57	36	0	0	0	0	0	0	0	0	0
Massachusetts.....	75	105	116	0	0	1	0	1	0	0	1	0
Rhode Island.....	19	6	12	0	9	0	0	0	0	0	0	0
Connecticut.....	16	54	54	0	0	0	0	0	0	0	0	0
MIDDLE ATLANTIC												
New York.....	236	393	393	0	0	10	0	0	0	1	0	0
New Jersey.....	221	353	239	0	1	0	0	0	0	1	0	0
Pennsylvania.....	265	235	334	2	0	0	0	0	0	0	0	1
EAST NORTH CENTRAL												
Ohio.....	223	224	270	0	0	3	0	0	0	0	1	0
Indiana.....	68	51	30	0	0	0	0	0	0	0	0	0
Illinois.....	207	310	310	0	0	0	0	1	1	1	1	0
Michigan ¹	250	198	261	0	0	3	0	0	0	0	0	0
Wisconsin.....	262	208	208	0	1	0	0	0	0	0	0	0
WEST NORTH CENTRAL												
Minnesota.....	64	71	66	0	0	0	0	0	0	0	1	0
Iowa.....	53	44	34	0	0	0	0	0	0	0	0	0
Missouri.....	53	21	36	0	0	0	0	2	0	0	0	0
North Dakota.....	25	0	20	0	0	0	0	0	0	0	0	0
South Dakota.....	12	1	3	0	0	0	0	0	0	0	0	0
Nebraska.....	24	25	20	0	0	0	0	0	0	0	0	0
Kansas.....	92	63	63	0	0	0	0	1	0	0	0	0
SOUTH ATLANTIC												
Delaware.....	2	2	7	0	0	0	0	0	0	2	0	0
Maryland ¹	102	35	65	0	0	0	9	0	0	4	0	0
Dist. of Col.....	32	15	13	0	0	0	0	0	0	10	0	0
Virginia.....	148	49	58	0	0	0	373	0	0	3	1	1
West Virginia.....	109	35	38	0	0	0	0	0	0	0	0	1
North Carolina.....	226	87	229	0	2	0	0	0	0	3	0	2
South Carolina.....	101	42	42	0	0	0	0	0	0	0	0	4
Georgia.....	79	49	26	0	1	16	0	0	0	0	3	40
Florida.....	13	29	13	0	2	0	0	0	0	0	0	15
EAST SOUTH CENTRAL												
Kentucky.....	25	72	64	0	0	0	2	0	0	0	0	0
Tennessee.....	55	40	56	0	0	0	27	0	0	0	3	1
Alabama.....	96	42	26	0	0	0	0	1	0	0	1	8
Mississippi ².....	.....	.....	.....	0	0	0	0	0	0	0	0	1
WEST SOUTH CENTRAL												
Arkansas.....	25	52	18	0	0	33	0	0	0	0	0	0
Louisiana.....	5	12	64	0	0	11	0	0	0	0	3	2
Oklahoma.....	28	5	19	0	0	0	0	0	0	0	0	0
Texas.....	411	187	203	0	42	503	0	0	0	0	1	47
MOUNTAIN												
Montana.....	25	16	10	0	0	0	0	0	0	0	1	0
Idaho.....	0	15	14	0	0	0	0	0	0	0	0	0
Wyoming.....	0	4	5	0	0	0	0	0	0	3	1	0
Colorado.....	35	38	38	0	1	0	0	0	0	0	0	0
New Mexico.....	10	26	18	0	0	4	0	0	0	0	0	0
Arizona.....	30	14	14	0	0	0	26	0	0	0	0	0
Utah ³	95	28	76	0	0	0	0	0	0	1	1	0
Nevada.....	0	3	.....	0	0	0	0	0	0	0	0	0
PACIFIC												
Washington.....	63	52	62	0	0	0	0	0	0	0	0	0
Oregon.....	54	27	27	0	0	0	0	0	0	0	6	0
California.....	195	190	242	0	3	15	0	10	0	0	0	0
Total	4,185	3,699	4,078	2	53	599	437	17	1	19	19	123
28 weeks.....	113,876	105,735	109,344	37	1,048	7,509	2,602	323	16	223	518	1,507
28 weeks, 1942.....	113,876	105,735	109,344	50	550	4,039	2,668	246	32	244	553	1,130

¹ New York City only.

² Period ended earlier than Saturday.

³ Exclusive of delayed report from the District of Columbia of 1 case for the week ended June 26.

WEEKLY REPORTS FROM CITIES

City reports for week ended July 3, 1943

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	57	2	1	0	0	0	0	3
New Hampshire:												
Concord.....	0	0		0	2	0	0	0	0	0	0	0
Vermont:												
Barre.....	0	0		0	2	0	0	0	0	0	0	0
Massachusetts:												
Boston.....	0	0		0	87	6	14	0	72	0	1	20
Fall River.....	0	0		0	22	1	0	0	1	0	0	2
Springfield.....	0	1		0	1	0	1	0	8	0	0	3
Worcester.....	0	0		0	0	0	2	0	5	0	0	10
Rhode Island:												
Providence.....	0	0		0	112	1	2	0	0	0	1	37
Connecticut:												
Bridgeport.....	0	0		0	1	0	1	0	0	0	0	0
Hartford.....	1	0		0	1	0	5	0	3	0	0	2
New Haven.....	0	0		0	21	1	0	0	0	0	0	1
MIDDLE ATLANTIC												
New York:												
Buffalo.....	0	0		0	12	1	4	0	6	0	1	5
New York.....	7	2	3		897	37	56	2	72	0	4	88
Rochester.....	0	0		0	40	1	4	0	1	0	0	8
Syracuse.....	0	0		0	26	0	1	0	0	0	0	18
New Jersey:												
Camden.....	0	0		0	0	1	2	0	0	0	0	0
Newark.....	0	0		0	100	0	7	0	4	0	0	47
Trenton.....	0	0	1	0	1	2	0	0	0	0	0	0
Pennsylvania:												
Philadelphia.....	5	0	3	1	159	6	23	0	21	0	1	88
Pittsburgh.....	6	0	2	2	12	5	12	0	13	0	0	34
Reading.....	0	0		0	2	0	1	0	0	0	0	11
EAST NORTH CENTRAL												
Ohio:												
Cincinnati.....	0	0		0	19	2	4	0	9	0	1	7
Cleveland.....	2	0	1	0	12	3	11	0	10	0	0	66
Columbus.....	0	0		0	32	0	4	0	2	0	0	1
Indiana:												
Fort Wayne.....	0	0		0	11	0	2	0	0	0	0	0
Indianapolis.....	1	0		2	25	0	6	0	4	0	0	26
South Bend.....	0	0		0	8	0	0	0	0	0	0	1
Terra Haute.....	0	0		0	1	0	0	0	0	0	1	1
Illinois:												
Chicago.....	7	0	2	3	222	7	19	0	26	0	1	63
Springfield.....	0	0		0	2	1	0	0	1	0	0	1
Michigan:												
Detroit.....	2	0		0	465	5	8	0	13	0	1	50
Flint.....	0	0		0	4	0	0	0	0	0	0	1
Grand Rapids.....	0	0		0	104	0	0	0	2	0	0	14
Wisconsin:												
Kenosha.....	0	0		0	3	0	0	0	0	0	0	2
Milwaukee.....	0	0		0	222	0	1	0	27	0	0	57
Racine.....	0	0		0	4	0	1	0	8	0	0	1
Superior.....	1	0		0	16	0	0	0	0	0	0	1

City reports for week ended July 3, 1943—Continued

	Diphtheria cases	Encephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Polkemyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
WEST NORTH CENTRAL												
Minnesota:												
Duluth.....	0	0	0	0	146	0	0	0	0	0	0	4
Minneapolis.....	0	0	0	0	11	0	0	0	1	0	1	1
St. Paul.....	0	0	0	0	29	1	2	0	4	0	0	42
Missouri:												
Kansas City.....	0	1	0	0	22	1	10	1	6	0	0	6
St. Joseph.....	0	0	0	0	2	0	0	0	0	0	0	0
St. Louis.....	0	0	1	1	43	4	14	0	5	0	1	32
Nebraska:												
Omaha.....	0	0	0	0	1	1	0	0	2	0	0	0
Kansas:												
Topeka.....	1	0	0	0	15	0	0	0	0	0	0	17
Wichita.....	0	0	0	0	3	0	3	0	0	0	0	7
SOUTH ATLANTIC												
Delaware:												
Wilmington.....	0	0	0	0	1	1	2	0	0	0	0	0
Maryland:												
Baltimore.....	2	0	2	1	73	2	11	0	11	0	0	121
Cumberland.....	0	0	0	0	0	0	1	0	0	0	0	0
Frederick.....	0	0	0	0	0	0	0	0	0	0	0	0
District of Columbia:												
Washington.....	0	0	0	0	55	2	6	0	7	0	0	36
Virginia:												
Lynchburg.....	0	0	0	0	10	1	1	0	0	0	0	8
Richmond.....	0	0	1	1	18	0	0	0	0	0	1	13
Roanoke.....	1	0	0	0	3	0	0	0	0	0	0	2
West Virginia:												
Charleston.....	0	0	0	0	0	0	0	0	0	0	0	1
Wheeling.....	0	0	0	0	0	0	2	0	0	0	0	16
North Carolina:												
Winston-Salem.....	0	0	1	0	1	0	0	0	0	0	0	54
South Carolina:												
Charleston.....	0	0	2	0	0	0	2	0	0	0	0	2
Georgia:												
Atlanta.....	0	0	5	0	1	0	1	0	1	0	0	3
Brunswick.....	0	0	0	0	1	1	0	0	0	0	0	0
Savannah.....	0	0	0	0	0	0	0	0	0	0	0	0
Florida:												
Tampa.....	0	0	0	0	0	0	4	0	0	0	0	5
EAST SOUTH CENTRAL												
Tennessee:												
Memphis.....	0	0	0	0	19	0	3	0	0	0	0	19
Nashville.....	0	0	1	1	2	0	1	0	0	0	0	10
Alabama:												
Birmingham.....	0	0	4	0	10	0	6	0	0	0	3	0
Mobile.....	1	0	1	1	3	0	0	0	1	0	1	0
WEST SOUTH CENTRAL												
Arkansas:												
Little Rock.....	0	0	0	0	0	0	1	0	0	0	0	1
Louisiana:												
New Orleans.....	3	0	1	1	10	4	6	1	1	0	0	2
Shreveport.....	0	0	0	0	0	0	5	0	1	0	0	0
Texas:												
Dallas.....	1	0	0	0	2	0	2	4	4	0	1	17
Galveston.....	0	0	0	0	0	0	0	1	1	0	0	0
Houston.....	0	0	0	0	0	0	6	3	0	0	0	13
San Antonio.....	0	0	0	0	1	0	3	0	2	0	1	3

City reports for week ended July 3, 1943—Continued

	Diphtheria cases	Enecephalitis, infectious, cases	Influenza		Measles cases	Meningitis, meningococcus, cases	Pneumonia deaths	Pollomyelitis cases	Scarlet fever cases	Smallpox cases	Typhoid and paratyphoid fever cases	Whooping cough cases
			Cases	Deaths								
MOUNTAIN												
Montana:												
Billings.....	0	0	0	0	11	0	1	0	0	0	0	0
Great Falls.....	0	0	0	0	5	0	0	3	0	0	0	2
Helena.....	0	0	0	0	2	0	0	0	0	0	0	0
Missoula.....	0	0	0	0	1	0	3	0	1	0	0	0
Colorado:												
Denver.....	3	0	5	0	5	3	6	5	3	0	0	10
Pueblo.....	0	0	0	0	1	0	1	0	0	0	0	6
Utah:												
Salt Lake City.....	0	0	0	0	15	0	0	0	4	0	0	44
PACIFIC												
Washington:												
Seattle.....	1	0	0	0	83	0	7	3	4	0	0	11
Spokane.....	2	0	0	0	13	0	3	0	7	0	0	7
Tacoma.....	0	0	0	0	0	0	1	0	2	0	0	6
California:												
Los Angeles.....	1	0	9	1	89	3	9	2	18	0	0	35
Sacramento.....	1	0	0	0	7	0	4	7	0	0	0	10
San Francisco.....	0	0	1	1	16	3	10	3	9	0	0	15
Total.....	49	4	43	17	3,435	109	335	32	406	0	21	1,247
Corresponding week, 1942.....	60	2	24	12	1,899	15	214	7	379	2	25	1,162
Average, 1938-42.....	66	3	30	14	2,282	1	232	1	539	4	31	1,237

Dysentery, amebic.—Cases: New York, 7; Sacramento, 1.
Dysentery, bacillary.—Cases: New York, 3; Charleston, S. C., 21; Atlanta, 1; Nashville, 3; Los Angeles, 8.
Dysentery, unspecified.—Cases: San Antonio, 16.
Leprosy.—Cases: New Orleans, 1.
Rocky Mountain spotted fever.—Cases: New York, 1; Washington, 1; Winston-Salem, 1.
Typharemia.—Cases: New Orleans, 1.
Typhus fever.—Cases: Brunswick, 5; Tampa, 1; New Orleans, 4; Dallas, 1; Houston, 2.

¹3-year average, 1940-42.
²5-year median.

Rates (annual basis) per 100,000 population, by geographic groups, for the 86 cities in the preceding table (estimated population, 1942, 34,624,400)

	Diphtheria case rates	Enecephalitis, infectious, case rates	Influenza		Measles case rates	Meningitis, meningococcus, case rates	Pneumonia death rates	Pollomyelitis 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.....	2.5	2.5	0	0	760	27.3	65.6	0	221.1	0	5.0	194
MIDDLE ATLANTIC.....	8.0	0.9	4.0	1.8	557	23.6	49.1	.9	52.2	0	2.7	133
EAST NORTH CENTRAL.....	7.6	1.8	2.9	2.9	672	10.5	32.7	0	59.6	0	2.3	171
WEST NORTH CENTRAL.....	2.0	2.0	2.0	2.0	538	13.8	67.2	2.0	35.6	0	4.0	216
SOUTH ATLANTIC.....	5.2	0	17.4	3.5	283	12.1	53.8	0	33.0	0	1.7	444
EAST SOUTH CENTRAL.....	5.9	0	23.8	11.9	202	0	56.4	0	5.9	0	23.8	172
WEST SOUTH CENTRAL.....	11.7	0	2.9	2.9	35	11.7	67.5	28.4	26.4	0	5.9	111
MOUNTAIN.....	25.1	0	41.8	0	334	25.1	91.9	41.8	91.9	0	0	518
PACIFIC.....	8.7	0	17.5	3.5	364	10.5	59.4	28.2	69.9	0	0	147
Total.....	7.4	.6	6.5	2.6	517	16.4	50.4	4.8	61.1	0	3.2	183

PLAGUE INFECTION IN COLORADO AND OREGON

Plague infection has been reported proved in pools of fleas and lice from rodents collected in Colorado and Oregon as follows:

COLORADO

Larimer County.—June 21, 70 fleas from 38 black-tailed prairie dogs, *Cynomys ludovicianus*, taken on a ranch 5 miles northwest of Wellington. This was stated to be the first indication of plague infection in eastern Colorado, although hunting has been carried on in previous years in this and other areas in the eastern part of the State.

OREGON

Grant County.—June 24, 170 fleas and 25 lice from 63 ground squirrels, *C. oregonus*, taken 6 miles east of Long Creek.

Malheur County.—June 22, 14 fleas from 21 ground squirrels, *C. oregonus*, taken 6 to 11 miles west of Jordan Valley.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended June 19, 1943.—During the week ended June 19, 1943, 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		41	1	126	336	41	25	24	116	710
Diphtheria		23		19		1				43
Dysentery (amebic)						2				2
Dysentery (bacillary)				14						14
German measles		5		24	125	14	10	35	31	244
Influenza		12			7	4	2			28
Measles		87	3	435	1,663	146	103	206	329	2,972
Meningitis, meningococcus		1			4	1		1	3	10
Mumps		79	9	67	407	97	31	40	93	823
Poliomyelitis		1		2		1				4
Scarlet fever	1	18	13	78	132	54	24	55	49	424
Tuberculosis (all forms)	1	8	6	126	52	12	34	12	45	296
Typhoid and paratyphoid fever				12	1					13
Undulant fever				9	2				2	13
Whooping cough				117	191	35	6	31	58	438

CUBA

Provinces—Notifiable diseases—4 weeks ended May 22, 1943.—During the 4 weeks ended May 22, 1943, cases of certain notifiable diseases were reported in the Provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana ¹	Matanzas	Santa Clara	Camaguey	Oriente	Total
Anthrax						1	1
Cancer	1	1	6	9		11	28
Chlokenpox			4	3	3	4	14
Diphtheria		31	3			1	35
Leprosy		4				1	7
Malaria	37	5		2		111	155
Measles		31	6		1	9	47
Poliomyelitis	2		1	2			5
Scarlet fever		1			1		2
Tuberculosis	13	104	17	46	21	51	252
Typhoid fever	9	43	21	72	19	24	188

¹ Includes the city of Habana.

IRISH FREE STATE

Vital statistics—First quarter ended March 31, 1943.—The following vital statistics for Irish Free State for the first quarter ended March 31, 1943, are taken from the Quarterly Return of Marriages, Births, and Deaths issued by the Registrar General and are provisional:

	Number	Rate per 1,000 population		Number	Rate per 1,000 population
Marriages.....	4,549	6.2	Deaths from—Cont.		
Births.....	16,679	22.7	Influenza.....	125	0.2
Deaths, all causes.....	12,603	17.1	Measles.....	9	
Deaths under 1 year of age.....	1,561	1.94	Puerperal infection.....	6	1.4
Deaths from:			Scarlet fever.....	13	
Cancer.....	970	1.3	Tuberculosis (all forms).....	1,183	1.6
Diarrhea and enteritis (under 2 years of age).....	277		Typhoid fever.....	13	
Diphtheria.....	94		Typhus fever.....	1	
			Whooping cough.....	93	

¹ Per 1,000 live births.

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

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

A cumulative table showing the reported prevalence of these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday of each month.

(Few reports are available from the invaded countries of Europe and other nations in war zones.)

Cholera

India (French).—For the 4 weeks ended March 27, 1943, 49 cases of cholera with 35 deaths were reported in French India as follows: Chandernagor, 4 cases, 1 death; Karikal, 28 cases, 23 deaths; Pondichery, 17 cases, 11 deaths.

Plague

Morocco—Casablanca.—On June 16, 1943, 1 confirmed case and 1 suspected case of plague were reported in Casablanca, Morocco.

Peru.—During the month of April 1943, plague was reported in Peru as follows: Libertad Department, 3 cases, 1 death; Piura Department, 2 cases, 2 deaths. Plague infected rats were also reported in Piura Department.

Smallpox

Indochina.—For the period June 1–10, 1943, 120 cases of smallpox were reported in Indochina as follows: Annam, 26 cases; Cambodia, 21 cases; Cochinchina, 53 cases; Tonkin, 20 cases.

Morocco (French).—During the month of May 1943, 57 cases of smallpox were reported in French Morocco.

Sudan (French).—For the period May 21–31, 1943, 128 cases of smallpox with 3 deaths were reported in French Sudan.

Typhus Fever

France—Seine Department.—During the month of May 1943, 2 cases of typhus fever were reported in Seine Department, France.

Hungary.—For the 2 weeks ended June 26, 1943, 30 cases of typhus fever were reported in Hungary.

Iran—Tehran.—During the week ended May 1, 1943, 470 cases of typhus fever with 80 deaths were reported in Tehran, Iran.

Mexico—Mexico, D. F.—Typhus fever has been reported in Mexico, D. F., Mexico, as follows: Weeks ended—April 3, 1943, 40 cases, 9 deaths; April 10, 26 cases, 1 death; April 17, 26 cases, 8 deaths; April 24, 15 cases, 4 deaths.

Morocco (French).—During the month of May 1943, 1,921 cases of typhus fever were reported in French Morocco.

Rumania.—For the period June 24–30, 1943, 148 cases of typhus fever were reported in Rumania.

Spain.—During the week ended May 29, 1943, 59 cases of typhus fever were reported in Spain.

Yellow Fever

Gold Coast—Kibi.—On June 22, 1943, 1 fatal case of suspected yellow fever was reported in Kibi, Gold Coast.

Sierra Leone—Freetown.—On June 12, 1943, 1 fatal case of suspected yellow fever was reported in Freetown, Sierra Leone.