Contrary to popular impression, diphtheria has not ceased to be of public concern in the Nation. Its occurrence and distribution suggest continued vigilance.

Present Distribution of Diphtheria in the United States

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AS a disease of public health importance, the annual total of approximately 2,000 cases places diphtheria before brucellosis, encephalitis, psittacosis, typhoid fever, or typhus fever, or any combination of the less common communicable diseases, such as malaria, human rabies, or anthrax.

At the same time, 2,000 cases of diphtheria yearly, distributed quite unequally, do not constitute a prevalence which gives the disease great preeminence in the minds of physicians or public health workers. Diagnostic acumen and laboratory and public health competency are now being maintained with difficulty or not at all. Such a diminution in awareness of and ability to diagnose diphtheria seems particularly unfortunate. The present low incidence of the disease suggests that this would be a propitious time to intensify all preventive measures and so assist in placing diphtheria in the museum along with cholera, yellow fever, and smallpox.

If diphtheria is to be attacked more appropriately and more vigorously than in the past, the present features of the problem must be known in some detail. The national reviews of Collins, Anderson, and Dauer are now some years in the past (*1–3*). Later discussions have dealt primarily with local problems (*4–6*). To bring the national picture up to date we have added to a résumé of earlier data reports for the most recent years.

Data on the occurrence of diphtheria cases and deaths were obtained primarily from publications of the Public Health Service's National Office of Vital Statistics: Morbidity and Mortality Weekly Reports and their annual supplements, and Vital Statistics of the United States. More detailed information was obtained from current communicable disease reports prepared by States for internal use and from the annual communicable disease statistics published by most States. Additional details were collected by personnel of the Public Health Service's Communicable Disease Center in connection with field assignments which dealt directly or indirectly with diphtheria. The assembling and review of such data are continuing functions of the Surveillance Section of the center.

National Morbidity and Mortality Rates

Annual morbidity and mortality rates for diphtheria have fallen sharply since 1933 and have not increased, even for a single year, since

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1945 (fig. 1, table 1). In distinct contrast is the case fatality rate, which remains at 6 to 7 percent. Neither advances in the quality and availability of medical care nor the effect of immunization has been reflected in a lowered fatality rate for diphtheria. Any improvement has been offset by other adverse factors or by a failure to detect and report nonfatal cases.

The decline in case rates has not been equal and simultaneous in all areas of the United States. Recent case rates for major geographic divisions are shown in figure 2. Rates in the South Atlantic, East South Central, and West South Central States have been noticeably higher than in other geographic divisions; between 1950 and 1954, 69.6 percent of the diphtheria cases in the country occurred in these areas. A slight exception to the general pattern occurred in 1953, when an outbreak of diphtheria in Idaho elevated the case rate for the Mountain States.

This concentration of diphtheria cases in the southern States has been developing since about 1930. In 1936 Dauer (*7*) noted that diphtheria mortality in these States had declined only 40 percent between 1918–22 and 1928–32, whereas in the northern and western States the decline had been 60 to 70 percent. In the earlier period the highest rates were recorded in the North Atlantic and East North Central States; in the later period the East South Central and West South Central States had rates almost twice as high as those areas previously at the top of the list. In the years since 1932 rates throughout the country have fallen farther but the north-south difference has remained prominent.

Experience of States

During the period 1950–54 all of the southern States had annual diphtheria case rates higher than 2.3 per 100,000, the average annual rate for the United States (fig. 3). In Alabama and South Carolina the rates were almost four times the national average.

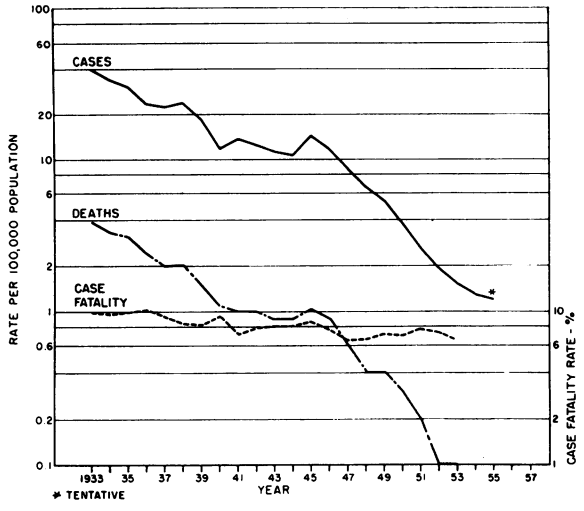
Table 1. Reported diphtheria cases and deaths, United States, 1933–55

Year	Population (in thousands)	Number		Rate per 100,000 population		Case fatality (percent: deaths/cases)
		Cases [1]	Deaths [1]	Case	Death	
1933	125, 579	50, 462	4, 937	40. 1	3. 9	9. 8
1934	126, 374	43, 156	4, 159	34. 1	3. 3	9. 6
1935	127, 250	39, 226	3, 901	30. 8	3. 1	9. 9
1936	128, 053	30, 018	3, 065	23. 4	2. 4	10. 2
1937	128, 825	28, 536	2, 637	22. 1	2. 0	9. 2
1938	129, 825	30, 508	2, 556	23. 5	2. 0	8. 4
1939	130, 880	24, 053	1, 997	18. 3	1. 5	8. 3
1940	131, 936	15, 536	1, 457	11. 8	1. 1	9. 4
1941	133, 058	17, 987	1, 293	13. 5	1. 0	7. 2
1942	133, 752	16, 260	1, 273	12. 4	1. 0	7. 8
1943	133, 971	14, 811	1, 196	11. 1	. 9	8. 0
1944	132, 622	14, 150	1, 145	10. 7	. 9	8. 0
1945	132, 137	18, 689	1, 598	14. 1	1. 2	8. 5
1946	139, 893	16, 354	1, 259	11. 6	. 9	7. 7
1947	143, 375	12, 405	799	8. 6	. 6	6. 4
1948	146, 045	9, 610	634	6. 6	. 4	6. 6
1949	148, 558	8, 027	574	5. 4	. 4	7. 2
1950	151, 228	5, 931	410	3. 9	. 3	6. 9
1951	153, 383	3, 983	302	2. 6	. 2	7. 6
1952	155, 767	2, 960	217	1. 9	. 1	7. 3
1953	158, 320	2, 355	156	1. 5	. 1	6. 6
1954	161, 183	2, 041	----------	1. 3	----------	----------
1955 [2]	164, 280	2, 039	----------	1. 2	----------	----------

[1] Cases and deaths for death-registration States. Registration complete in 1933.
[2] Tentative figures.

SOURCE: Cases, 1933–55, The Notifiable Diseases; 1955 cumulated weekly reports. Deaths, 1933–55, Annual Summary, Vital Statistics of the United States, National Office of Vital Statistics.

Figure 1. Reported case rates, death rates, and case fatality rates for diphtheria in the United States, 1933–55.



Comparison of death rates for individual States in the same order shows considerable irregularity in death rates from diphtheria, due to variations in case fatality rates (fig. 4). Apparently, diphtheria has not been unduly fatal in the States with the highest case rates; in general, diphtheria fatality rates are as high or higher in all other parts of the country. Unexpectedly high rates, based on significant numbers of cases and deaths, are encountered in Washington, Oregon, and California, where diphtheria is occurring in adults. On the other hand, the high rates recorded for Vermont, Connecticut, and the District of Columbia are based on extremely small numbers and have little significance.

Figure 2. Reported diphtheria cases per 100,000 population in the United States, by major geographic division, 1949–55.

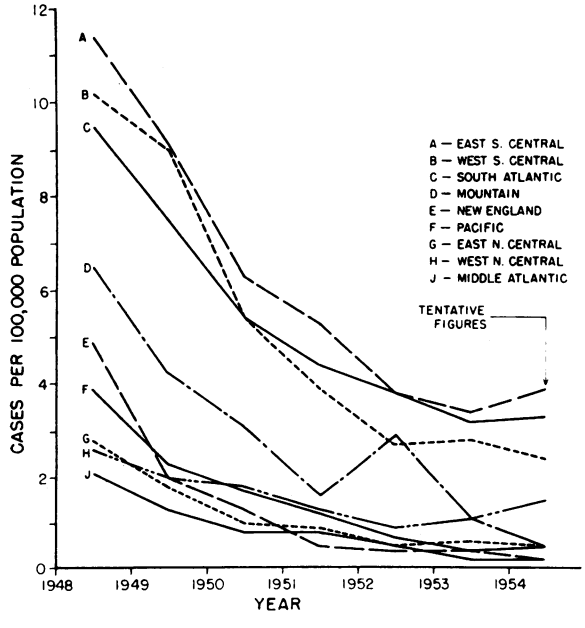
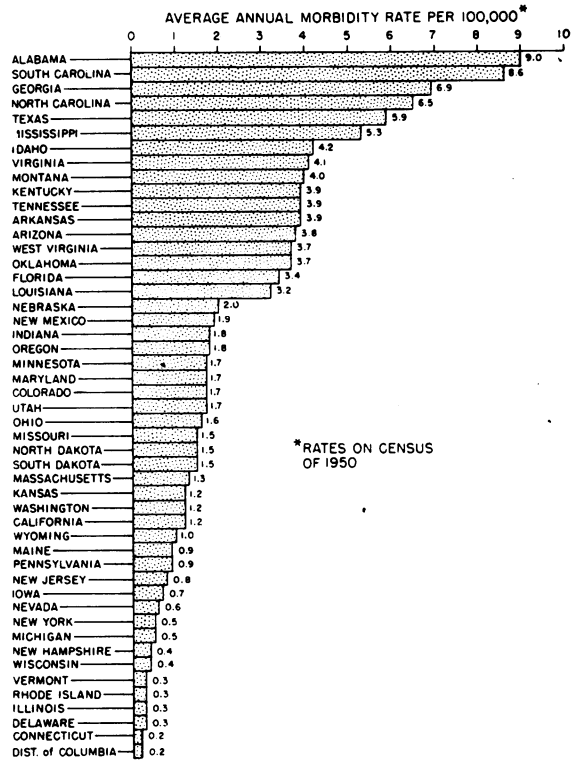


Figure 3. Diphtheria case rates in the United States, by State, 1950–54.



The State of Idaho is distinguished by a low mortality rate and a very low diphtheria case fatality rate. A large proportion (87 of 126) of the diphtheria cases for the 5 years 1950–54 were reported from a localized outbreak in 1953. During the outbreak, heightened awareness of diphtheria undoubtedly stimulated diagnostic activity and the reporting of mild cases which might have escaped detection at other times. Also, the public health and community resources of the area were completely mobilized to combat the disease. It would be much too cynical to attribute this low fatality rate entirely to

Figure 4. Diphtheria death rates in the United States, by State, 1950–54.

"over-reporting" of nonfatal cases. Conversely, one might hold that, given the same degree of alertness, a case fatality rate of 1.6 percent is achievable almost anywhere.

Distribution of Diphtheria in 1955

In 19 of the first 26 weeks of 1955, the weekly incidence of diphtheria was the same as or lower than that of 1954, and the total of reported cases at midyear was 717 as compared with 872 cases in the same period of 1954. Incidence was well below the 5-year median (fig. 5), with the exception of the first week in January. The seasonal low was reached about the fourth week in July.

The diphtheria season began early in August with a fairly sharp outbreak in Alabama, followed almost immediately by an episode in South Carolina, which continued throughout the autumn. During August and September reported cases exceeded the 5-year median on several occasions.

A sharp peak in incidence of diphtheria is noted in November and early December, when an outbreak was in progress in Nebraska. At the same time, two counties in Texas and two in Alabama reported an undue number of cases. This combination, added to the usual seasonal increases, produced the sharp peak in the 48th and 49th weeks of 1955.

During the latter half of the year, 1,327 cases (tentative) were reported, an excess of 110 over the same period in 1954. The number of currently reported cases exceeded the 5-year median in 5 of the last 26 weeks.

In 1955, reported diphtheria cases were concentrated in the southern States (*8*). When this distribution is displayed as rates, the pattern is the same as that which has been seen quite consistently in recent years (fig. 6). The relatively high rates in South Dakota and Nebraska are attributable to localized sharp outbreaks. In almost every year some State in the northern and western areas has such an experience. The same State is not usually affected in 2 successive years.

Outbreaks in 1955

There is no standard numerical definition of a diphtheria "outbreak." Therefore, to facilitate discussion of the areas where the prevalence of diphtheria was considerably different from prevalence of the disease in the country as a whole, an arbitrary definition has been chosen. For convenience, and to suit the present low incidence of the disease, "outbreak" here indicates 10 or more cases in a county, producing a county rate of 20 per 100,000 popula-

Figure 5. Reported diphtheria cases in the United States, by week, 1955.

Table 2. Diphtheria outbreaks in the United States, 1955

State	County	Cases		Date	Remarks
		Number	Rate [1]		
Minnesota	Beltrami	13	52.1	January–February	Rural white population. 5 of 13 cases were in adults.[2]
South Dakota	Charles Mix	14	90.0	March–April	
Kentucky	Meade	24	254.8	April–June	Rural white population. 8 of 24 cases were in adults.[2] 76 percent of school children and 46 percent of preschool children currently and adequately immunized; 38–67 percent of adults Schick positive.
Alabama	Russell	37	91.7	July–August	Rural and urban nonwhite populations.
South Carolina	Charleston	99	44.7	July–November	Rural and urban nonwhite populations.
James Island		52	[3] 776.2	July–October	Focus of outbreak was on a coastal island, not in the city of Charleston. 50 percent of school children and 42 percent of preschool children adequately immunized.
Alabama	Dallas	17	30.2	July–October	
South Carolina	Dillon	10	32.3	August–October	
Alabama	Pike	11	35.9	August–November	
South Carolina	Georgetown	12	37.8	September	
Georgia	Sumter	17	70.2	September–October	
Alabama	Sumter	16	67.8	September–October	
North Carolina	Hoke	11	69.8	September–November	
Georgia	Harris	13	115.4	October–November	Rural nonwhite population. 11.5 percent of nonwhite school children currently and adequately immunized but 84 percent Schick negative.
Georgia	Dougherty	10	22.9	October–December	
Texas	Cameron	56	44.7	October–December	
Texas	Hidalgo	38	23.7	October–December	Primarily in the Latin-American population.
Nebraska	Douglas	63	22.4	October–December	Primarily in the city of Omaha.
Alabama	Tuscaloosa	27	28.7	November–December	
Florida	Lee	10	42.7	November–December	

[1] Per 100,000 of county population, census of 1950.
[2] 25 years of age and over.
[3] Per population of census area, 1950.

tion or higher, on an annual basis. We are fully aware that this definition may exclude a fairly sharp localized outbreak in an institution or neighborhood which would not lead to a rate of 20 per 100,000 in a populous county. This rate should be a departure from the rate usually observed in the county in recent years.

With this definition, 19 outbreaks of diphtheria occurred in 1955. They are shown by order of occurrence in table 2, together with some observations by field personnel of the Communicable Disease Center.

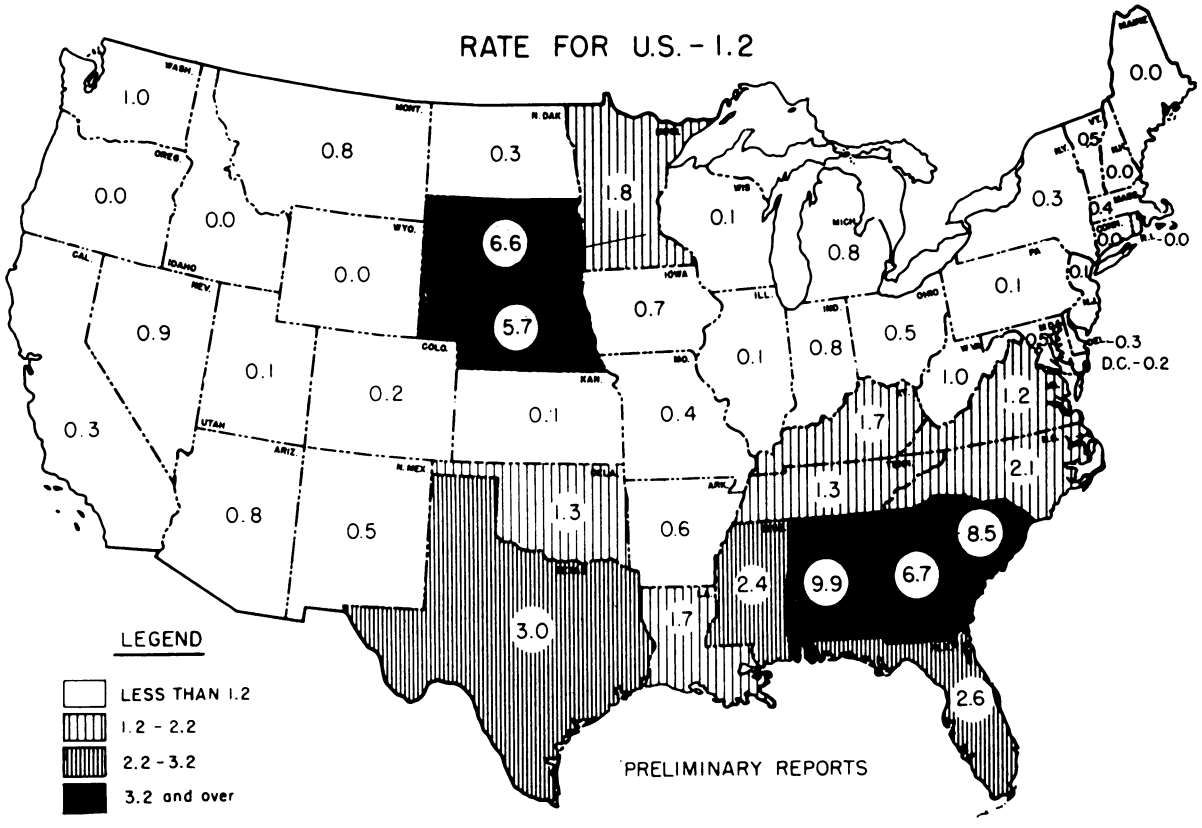
The wide geographic distribution of these episodes, from upper Minnesota to lower Florida and Texas, is noteworthy, as well as the wide distribution with respect to the calendar. The populations affected were found to be quite diverse wherever information on diphtheria outbreaks was obtained.

Summary

1. While diphtheria case rates and death rates have decreased in recent years, the case fatality rate has changed little. A need to inquire into the promptness of diagnosis and the completeness of reporting is suggested.

2. The persistent diphtheria problem in the United States is tending to localize in the South Atlantic, East South Central, and West South Central States.

Figure 6. Reported diphtheria cases per 100,000 population in the United States, by State, 1955.



3. Outbreaks of diphtheria have been observed in these areas but not exclusively so. Localized sharp outbreaks have occurred in recent years in Idaho, Nebraska, Minnesota, South Dakota, and other northern and western States.

4. During 1955, outbreaks of diphtheria were observed in diverse regions and in all months of the year. The populations affected were variously white, nonwhite, and Latin-American. Both rural and urban areas were involved.

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Tables giving the reported diphtheria cases in the United States and the rate per 100,000 population, for major geographic divisions, 1949–55, and for each State, 1950–54, are available from Dr. Moore.

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