

# Diphtheria in the United States in 1956

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**D**URING the autumn of 1955 and the early winter of 1955-56, diphtheria occurred in the Nation with a frequency not witnessed for a number of years. Fear of a definite resurgence was aroused when outbreaks occurred in areas which had been almost entirely free of the disease for extended periods. The particularly high incidence of the disease in the southeastern States has been described in a previous report (1) prepared at the close of 1955. It is the purpose of this paper briefly to summarize the United States diphtheria experience in 1956.

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 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.

The occurrence of diphtheria in 1955 and 1956, by weeks, is given in figure 1, and the States contributing heavily to the weekly peaks are also indicated. During the first half of 1956 diphtheria incidence continued to be relatively high and was above that of the preceding

year in about two-thirds of all weeks. Following the seasonal low, however, the expected pattern of early increase of diphtheria cases in the southern States did not develop to the usual extent. Incidence remained well below that of 1955 throughout the fall and winter, and at the close of the year 1,581 cases had been tentatively reported, compared with 2,039 cases in 1955. Data for 1956 in figures 2 and 3 and table 1 are also preliminary. Although final figures for 1956 are now available, they do not alter the pattern or change the conclusions since they change the total by less than 1 percent.

This 22 percent decrease in the incidence of diphtheria restores somewhat the trend of the last decade. After the last increase in reported diphtheria in 1945 there was a fairly steady decline at about 25 percent per year until 1953. In this year the decrease was only 20 percent. In 1954 it was 13 percent and in 1955 only 3 percent. The small drop in cases for the calendar year does not give as clear a picture as the statistics for the disease years. For the disease season of 1955-56, there was actually a 12 percent increase over the disease year 1954-55. The decline in cases in the calendar year of 1956 was due almost entirely to decreases in the last half of the year and in the southeastern States.

In figure 2 and table 1, diphtheria morbidity rates are shown by standard geographic divisions and by States for 1949-56. The areas showing the greatest decline in 1956 were the South Atlantic and East South Central States. Small decreases, or essentially no change, occurred in all other divisions except the East North Central and the Mountain States, which showed increases of 0.6 cases per 100,000 population.

The increased rate in the East North Central division is almost entirely due to increases in

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the States of Michigan and Indiana (fig. 3 and table 1). The rise in the Mountain States is attributable to an increase of 4 cases per 100,000 population in the reported incidence of diphtheria in New Mexico.

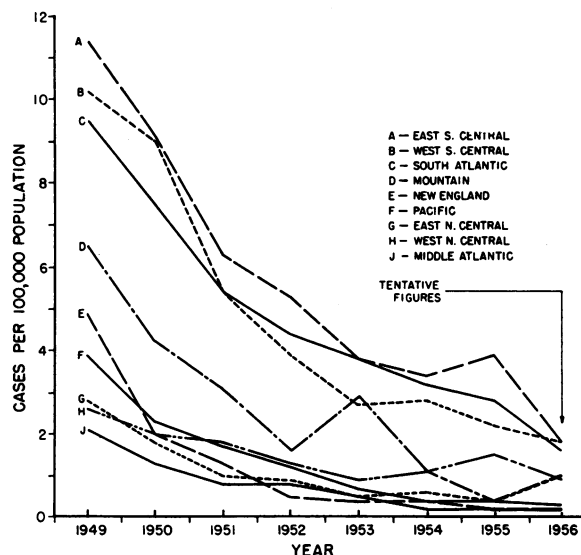
The prominence of the southern States in the persistent reporting of diphtheria is not greatly changed. In 1955, 74 percent of the Nation's cases were reported from the three southern divisions. In 1956, only 57 percent of the total occurred in this area but, again, this change only restores a previous relationship which was exaggerated in 1955.

Brief descriptions of diphtheria experience from localities (counties) reporting 10 or more diphtheria cases in 1956 are found in table 2. A county rate of 20 per 100,000 is used as a demarcation so that such local rates occurring in 1956 may be compared with those of 1955, as previously reported (1). In 1955, 19 localities had rates of 20 per 100,000 or higher. In 1956, only 9 localities reported cases at this or a higher rate.

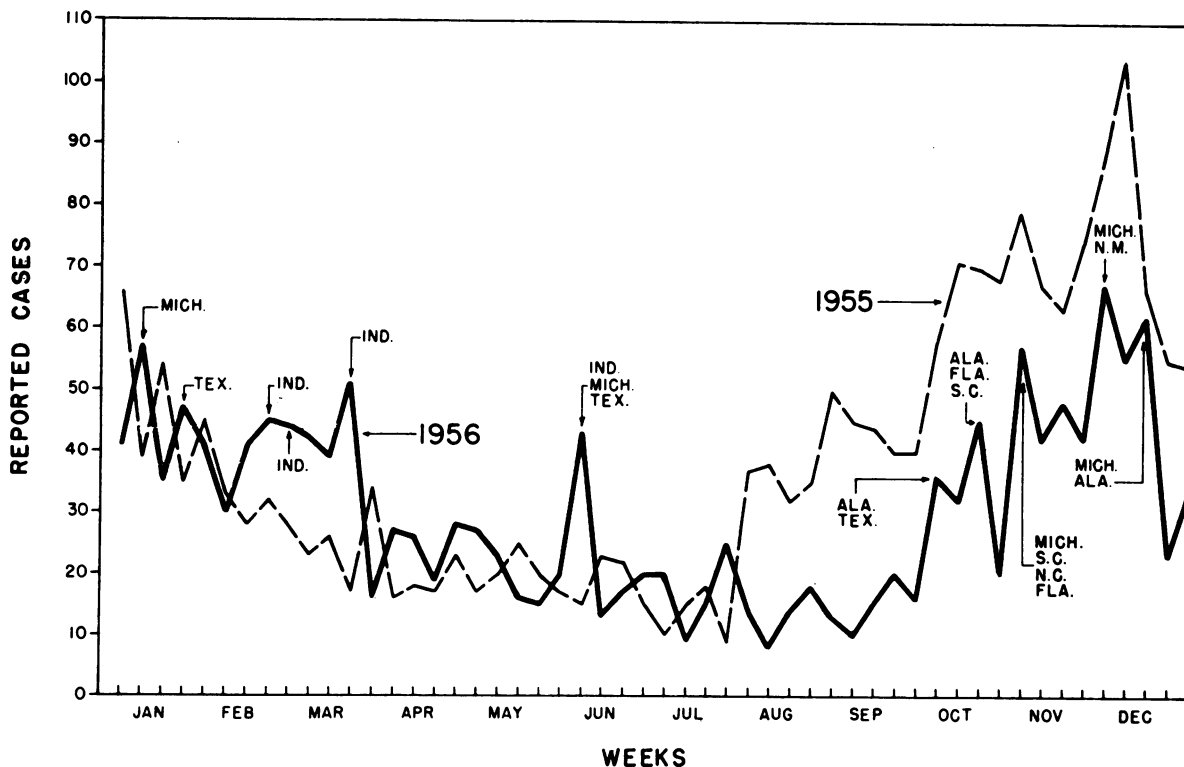
A distinct localization of these sharp disease

episodes to the area east of the Mississippi River and south of the Ohio River was noted in 1955. Fourteen of the 19 outbreaks occurred in this area. In 1956, only three episodes occurred in

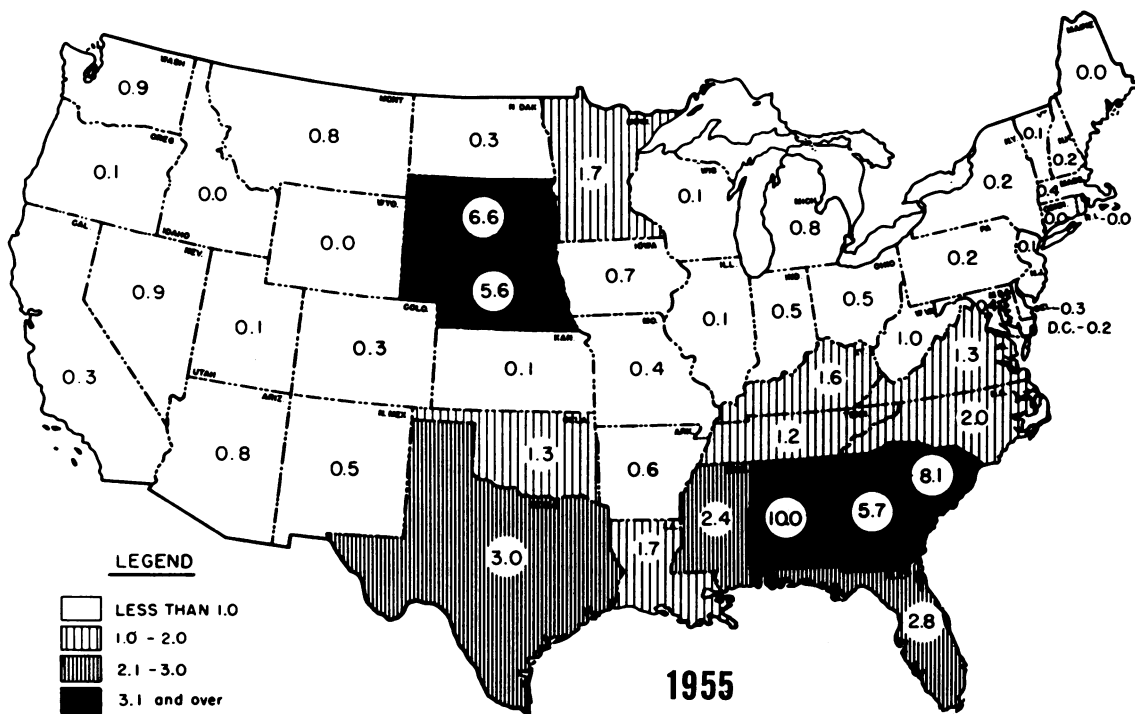
**Figure 2. Reported diphtheria cases per 100,000 population, by major geographic divisions of the United States, 1949-56.**



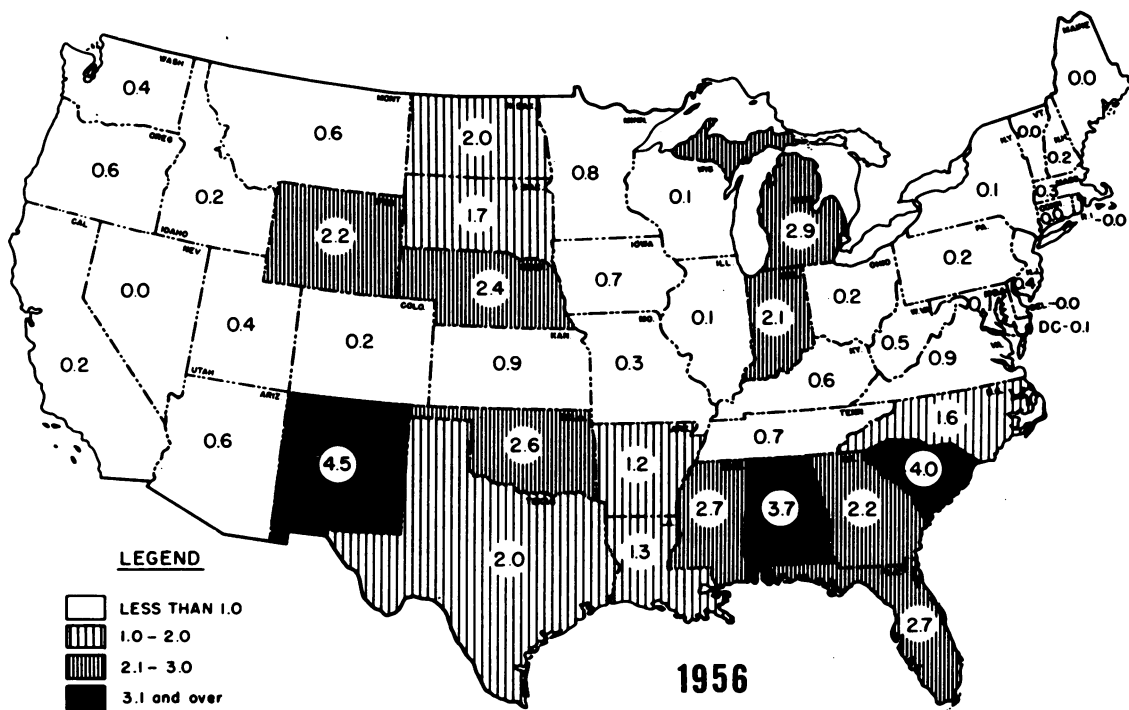
**Figure 1. Reported diphtheria cases in the United States, by week of report, 1955 and 1956.**



**Figure 3. Reported diphtheria cases per 100,000 population, United States, 1955 and 1956.**



RATE FOR U.S. - 1.2



**RATE FOR U.S.-0.95**

the same area. In table 2 it can be seen that one of these (Charleston County, S. C.) was a continuation of an outbreak which began in 1955, and the current rate in Charleston County, while high, is a considerable decrease from 1955. One (Pickens County, Ga.) is of doubtful authenticity and one (Calhoun County, Ala.) appears to be an actual sporadic outbreak beginning in 1956.

The occurrence of 64 cases of diphtheria in and about Michigan City, Ind., was a particularly sharp deviation from the recent experience of the area. The same was true of the incidence in Chaves County and Bernalillo County (Albuquerque), N. Mex.

Other areas in which the incidence of 1956 was unexpectedly high were Mercer County

(Trenton), N. J., Wyandotte County (Kansas City), Kans., Hillsborough County (Tampa), Fla., and Nueces County, Tex., but probably the most marked departure from recent trends occurred in the State of Michigan. Two counties, Kalamazoo and St. Clair, experienced noteworthy increases in cases and in Wayne County (Detroit) an outbreak of considerable size took place.

Within the city of Detroit 141 cases of diphtheria occurred during October, November, and December 1956, and a total of 167 cases were reported during the year. This was a ninefold increase over the median expectancy of the last 7 years. One hundred of the cases originated in an area of six census tracts in the southwestern section of the city. The area is se-

**Table 1. Geographic distribution of diphtheria in the United States, 1955 and 1956**

Geographic division and State	1956		1955		Geographic division and State	1956		1955	
	Cases <sup>1</sup>	Rate per 100,000 <sup>2</sup>	Cases <sup>1</sup>	Rate per 100,000 <sup>2</sup>		Cases <sup>1</sup>	Rate per 100,000 <sup>2</sup>	Cases <sup>1</sup>	Rate per 100,000 <sup>2</sup>
<b>Total</b> .....	1, 581	0. 95	1, 984	1. 2	<b>South Atlantic—Con.</b>				
<b>New England</b> .....	17	. 2	21	. 2	Virginia.....	32	. 9	45	1. 3
Maine.....	0	0	0	0	West Virginia.....	10	. 5	20	1. 0
New Hampshire.....	1	. 2	1	. 2	North Carolina.....	69	1. 6	85	2. 0
Vermont.....	0	0	1	0	South Carolina.....	94	4. 0	188	8. 1
Massachusetts.....	16	. 3	19	. 4	Georgia.....	83	2. 2	210	5. 7
Rhode Island.....	0	0	0	0	Florida.....	102	2. 7	99	2. 8
Connecticut.....	0	0	0	0	<b>East South Central</b> .....	212	1. 8	453	3. 9
<b>Middle Atlantic</b> .....	67	. 2	54	. 2	Kentucky.....	17	. 6	49	1. 6
New York.....	22	. 1	30	. 2	Tennessee.....	23	. 7	42	1. 2
New Jersey.....	24	. 4	6	. 1	Alabama.....	115	3. 7	311	10. 0
Pennsylvania.....	21	. 2	18	. 2	Mississippi.....	57	2. 7	31	2. 4
<b>East North Central</b> .....	341	1. 0	136	. 4	<b>West South Central</b> .....	297	1. 8	349	2. 2
Ohio.....	21	. 2	43	. 5	Arkansas.....	22	1. 2	11	. 6
Indiana.....	92	2. 1	21	. 5	Louisiana.....	38	1. 3	49	1. 7
Illinois.....	10	. 1	10	. 1	Oklahoma.....	59	2. 6	29	1. 3
Michigan.....	216	2. 9	59	. 8	Texas.....	178	2. 0	260	3. 0
Wisconsin.....	2	. 1	3	. 1	<b>Mountain</b> .....	62	1. 0	25	. 4
<b>West North Central</b> .....	137	. 9	218	1. 5	Montana.....	4	. 6	5	. 8
Minnesota.....	27	. 8	54	1. 7	Idaho.....	1	. 2	0	0
Iowa.....	18	. 7	19	. 7	Wyoming.....	7	2. 2	0	0
Missouri.....	14	. 3	17	. 4	Colorado.....	4	. 2	5	. 3
North Dakota.....	13	2. 0	2	. 3	New Mexico.....	37	4. 5	4	. 5
South Dakota.....	12	1. 7	45	6. 6	Arizona.....	6	. 6	8	. 8
Nebraska.....	34	2. 4	78	5. 6	Utah.....	3	. 4	1	. 1
Kansas.....	19	. 9	3	. 1	Nevada.....	0	0	2	. 9
<b>South Atlantic</b> .....	393	1. 6	662	2. 8	<b>Pacific</b> .....	55	. 3	66	. 4
Delaware.....	0	0	1	. 3	Washington.....	12	. 4	23	. 9
Maryland.....	2	. 1	12	. 4	Oregon.....	11	. 6	1	. 1
District of Columbia.....	1	. 1	2	. 2	California.....	32	. 2	42	. 3

<sup>1</sup> Preliminary reports.

<sup>2</sup> U. S. Bureau of the Census: Population estimates. Series P-25, Nos. 145 and 148. Washington, D. C., U. S. Government Printing Office, 1956.

SOURCE: Morbidity and Mortality Weekly Reports (National Office of Vital Statistics), January 4, 1957; Annual Supplement, September 27, 1957.

**Table 2. Counties reporting 10 or more diphtheria cases per 100,000 population, United States, 1956**

Time	State	County	Cases	Rate	Remarks
<i>Over 20 cases <sup>1</sup></i>					
February–April.....	Indiana.....	La Porte.....	54	70.3	49 cases from nonofficial reports. 26 cases within Michigan City. 23 cases in adjacent rural areas. Sharp increase from 0 cases in 1955.
March–April.....	Indiana.....	Porter.....	10	25.0	12 cases from nonofficial reports. All from rural area adjacent to Michigan City. Increase from 0 cases in 1955.
February–April.....	Oklahoma.....	Pittsburgh.....	13	31.7	Increase from 8 cases in 1955.
May–June.....	Texas.....	San Patricio.....	10	27.9	Increase from 2 cases in 1955; 6 cases in 1954. Adjacent to Nueces County below.
October–November.....	Alabama.....	Calhoun.....	18	22.6	Increase from 1 case in 1955.
November–December.....	New Mexico.....	Chaves.....	14	34.5	Increase from 0 cases in 1955.
October and scattered cases.	South Carolina.....	Charleston.....	43	26.1	Continuation of an episode which began in 1955. Decrease from 99 cases in 1955.
Around the calendar.....	Texas.....	Hidalgo.....	38	23.7	Continuation of an episode which began in 1955. No change in cases or rate.
Around the calendar.....	Georgia.....	Pickens.....	12	135.5	No case confirmed in the laboratory. Very unusual distribution in time for area of low population density.
<i>Under 20 cases <sup>1</sup></i>					
January–February.....	Michigan.....	Kalamazoo.....	11	8.7	Increase from 1 case in 1955.
February–March.....	Minnesota.....	Hennepin.....	11	1.6	Essentially no change from 1955.
February–April.....	Michigan.....	St. Clair.....	18	19.7	Increase from 5 cases in 1955.
May–June and scattered cases.	California.....	Los Angeles.....	12	1.0	Essentially no change from 1955.
May and November.....	New Jersey.....	Mercer.....	12	5.2	Increase from 0 cases in 1955.
September–October and scattered cases.	Texas.....	Nueces.....	20	12.1	Sharp increase from 1 case in 1955. Reported 30 cases in 1954.
October–November and scattered cases.	Alabama.....	Mobile.....	10	4.3	Decrease from 19 cases in 1955.
October–December and 1957.	Michigan.....	Wayne.....	172	7.1	Sharp increase from 27 cases in 1955. Two distinct areas of Detroit involved and 2 different types of organisms found.
October–December and scattered cases.	Alabama.....	Jefferson.....	18	3.2	Decrease from 51 cases in 1955.
November.....	Kansas.....	Wyandotte.....	12	7.3	9 cases from one school. Children were 67 percent Schick negative. Increase from 0 cases in 1955.
November–December.....	New Mexico.....	Bernalillo.....	15	10.3	22 cases from nonofficial reports. 21 cases from circumscribed area in city of Albuquerque.
Around the calendar.....	Florida.....	Hillsborough.....	24	9.6	Increase from 11 cases in 1955.
Around the calendar.....	Nebraska.....	Douglas.....	21	7.5	Continuation of an episode which began in 1955. Decrease from 63 cases in 1955.
Around the calendar.....	Florida.....	Duval.....	18	5.9	Decrease from 26 cases in 1955.
Around the calendar.....	Texas.....	Harris.....	17	2.1	Essentially no change from 1955.
Around the calendar.....	Washington.....	King.....	10	1.4	Decrease from 19 cases in 1955.
Around the calendar.....	New York.....	New York.....	21	1.1	Decrease from 31 cases in 1955.

<sup>1</sup> Rates on census of 1950.

SOURCE: Statistics Section, Communicable Disease Center, Public Health Service.

verely congested and housing is generally substandard.

Of the 141 cases occurring during the outbreak period, 126, or 89 percent, were mild.

Only 15 persons were moderately or severely ill. There were four deaths. Cultures positive for *Corynebacterium diphtheriae* were obtained from 101 of the 141 patients and from many

carriers. Two types of organisms were found and the two strains were greatly different in toxogenicity (virulence).

There had not been what could be construed as serious neglect of immunization in the area of the outbreak, although the immunization levels were not as high as in some other areas of the city. Some contiguous census tracts with the same, or lower, immunization rates were not affected by the outbreak. Again, it was demonstrated that diphtheria can occur in outbreak proportions in places where the immunization levels are at or above those currently thought to be "adequate."

### Summary

1. An increase in reported diphtheria during the disease year of 1955-56 is noted. During the first half of the disease year of 1956-57, including the seasonal peak, weekly incidence was well below that in the preceding year.

2. Diphtheria morbidity rates for 1956 fell most noticeably in the South Atlantic and East South Central States. Increases were noted in the East North Central and the Mountain States.

3. Localized diphtheria outbreaks decreased

in the Southeast and increased in other areas but the total of such episodes in the Nation was lower than in 1955.

The relative absence of localized sharp outbreaks of diphtheria in rural regions of the southeastern States must account for a portion of the decrease in this area. A sparing effect from the preceding high season might be postulated; however, it has been noted that such outbreaks seldom affect the same locality or even adjacent localities in successive years. Decreases were noted also in some of the southern population centers which have been persistent foci. If this be accounted an expected cyclic variation, it is not one which has been very obvious in recent years (fig. 2).

4. The recurrence of outbreaks in northern urban centers might be taken as a fairly ominous sign; one calling for an "agonizing reappraisal" of present definitions of "adequate" immunization levels.

### REFERENCE

- (1) Moore, H. A., and Larsen, G. I.: Present distribution of diphtheria in the United States. *Pub. Health Rep.* 72: 537-542, June 1957.

## Institutes on Nuclear Energy

Nine institutes on nuclear energy for engineering educators will be held in the summer of 1958 at universities and laboratories throughout the Nation. Sponsored by the Atomic Energy Commission and the American Society for Engineering Education, the institutes will provide special training in nuclear energy and the nature of nuclear reactor problems which the educators can incorporate into their teaching.

There will be 4 basic courses for those with no background in nuclear energy, 4 advanced courses, and a basic course for teachers in technical institutes. Applications for the institutes can be obtained from deans of engineering or the society's headquarters. Address W. Leighton Collins, Secretary, American Society for Engineering Education, University of Illinois, Urbana, Ill.