

**DIPHThERIA, ITS EXTENT AND FATALITY IN
THE LARGE PROVINCIAL TOWNS OF ENGLAND
AND WALES, AND IN THE HOSPITALS OF THE
METROPOLITAN ASYLUMS BOARD, DURING THE
YEARS 1894-1904 INCLUSIVE, IN RELATION TO
THE USE OF ANTITOXIC SERUM IN THE TREAT-
MENT OF THE DISEASE.**

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THE following tables have been prepared from : (a) Statistics of notified cases of the disease, courteously furnished by the Medical Officers of Health of the large provincial cities and towns ; (b) the Registrar General's Annual Summaries of Deaths ; (c) the Annual Reports of the Metropolitan Asylums Board. The object of the Tables is to show as fully as possible the extent and annual fatality (actual and relative) of Diphtheria in England and Wales since the introduction of Anti-diphtheritic Serum in the treatment of the disease. This object is to some degree frustrated by the want of definite information as to the precise dates at which the serum came into use in the respective provincial towns, and the relative extent of its employment in each. It is also affected by the question of probably increased accuracy of diagnosis in recent, as compared with earlier, years. Apart from these points, certain facts stand out prominently in the tables, viz. :—

1. That during the eleven years ended 1904, 64,498 cases of diphtheria have been treated in the hospitals of the Metropolitan Asylums Board, and 95,692 have been notified in the 31 large English towns named in Table I., making a total of 160,190.

2. That the deaths from diphtheria in the above period have been as under, viz. :—

In Metropolitan Asylums Board Hospitals	..	9,512
In 31 large provincial towns .. ..	..	18,869
Total .. ..	..	<u>28,381</u>

These figures represent a mortality rate per cent of 17·7

3. That diphtheria (as notified) has during recent years shown a greatly increased general prevalence in the large urban districts of England and Wales, the maximum for the 31 towns (12,721 cases) having occurred in the year 1900, since which a gradual reduction has

taken place (see Table I). The numbers during the latter half of the period, however, greatly exceed those of the former half. This prevalence is for the most part due to the increase of the disease in certain towns only (as shown in paragraph 5).

4. That the above increase is only in small part, if at all, to be explained by the growth of the populations in the towns in question. Thus, apart from the periods of greatest prevalence, the total number of cases in the last of the eleven years in question (9,553), is more than double that of the first year (4,535). The average yearly number of notifications in these provincial towns during the five years 1894–1898 inclusive is 5,625, and during the six years immediately following 11,261. These figures denote a rate of increase of the disease out of all proportion to that of the population.

5. That the foregoing increased prevalence has been chiefly due to epidemics in some sixteen of the large towns, lasting for the most part for three or more years. These outbreaks are indicated in Table I. by italic type.

6. That in the London hospitals the number of cases for the five years 1894–98 inclusive averaged 4,809 per annum, and in the six years 1899–1904 inclusive 6,742 per annum.

7. That in the 31 provincial towns specified the mean death rate per cent to cases of diphtheria has fallen (see Table III.) from 30·5 and 33·1 in 1894 and 1895 respectively, to 17·7 and 18·0 in 1903 and 1904 respectively. This reduction has for the most part been steady and gradual. The individual mortality rates of the respective towns in the table cannot be satisfactorily summarized in detail here. They show, however, the remarkable fact that during the first four of the years under report the death rate per cent of cases from diphtheria in one or other of seven of the towns reached a maximum of from 50·0 to 61·1 per cent; and that during the last four years it fell in four towns to a minimum of from 6·5 to 3·6 per cent. In the Metropolitan hospitals (see Table IV.) the mortality has fallen from 29·3 per cent in 1894 to 10·0 per cent in 1904.

8. That the reduced fatality of diphtheria in the Metropolitan hospitals coincides with the introduction of antitoxin, which was first employed to a slight extent in the treatment of the disease towards the close of 1894, after which the fall in the death rate was marked. The direct effect of antitoxin in the reduction of the mortality in the large provincial towns (see Table III.), although doubtless largely contributory to this result, cannot be so accurately gauged as in London, owing to the want of information as to the extent of its use, either in hospital or in private practice, in these towns.

TABLE I.—ENGLAND AND WALES.
DIPHTHERIA.

Return showing the number of cases notified during each of the years 1894-1904 in the undermentioned towns.

Town.	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	Total
Brighton ...	124	204	164	185	380	667	552	702	437	410	265	4,120
Bristol ...	128	165	258	205	217	215	512	908	1,109	1,134	1,051	5,902
Birmingham ...	406	741	1,194	713	689	720	542	583	787	884	630	7,889
Birkenhead ...	133	142	115	80	190	86	48	75	114	101	97	1,181
Bolton ...	25	34	29	17	27	52	56	91	202	142	150	825
Burnley ...	109	104	147	207	126	109	69	126	185	83	69	1,336
Blackburn ...	40	31	25	15	77	229	334	284	88	132	60	1,340
Bradford ...	49	39	41	28	35	87	109	122	271	196	832	1,809
Croydon ...	161	132	172	135	162	127	187	448	285	259	312	2,380
Cardiff ...	326	229	296	512	940	628	706	724	686	438	889	5,874
Derby ...	46	43	45	57	74	60	52	74	63	83	150	747
Gateshead ...	73	50	65	28	37	19	18	80	37	44	48	449
Huddersfield ...	36	34	43	56	46	26	14	24	37	79	60	455
Halifax ...	43	29	37	67	23	58	41	61	37	50	80	526
Hull ...	86	105	156	195	119	157	99	231	480	494	526	2,648
Leicester ...	66	75	170	229	218	322	1,452	1,034	320	211	97	4,764
Liverpool ...	275	263	444	370	503	746	669	823	1,048	851	1,020	7,012
Leeds ...	*	129	120	180	353	1,752	1,213	1,012	648	588	347	6,842
Manchester ...	512	402	239	150	196	248	337	457	422	620	474	4,057
Norwich ...	120	77	94	61	53	123	65	150	79	87	72	981
Nottingham ...	...	...	...	...	Information not received.	...	...	...	...	...	...	...
Newcastle ...	112	174	164	102	89	107	86	142	123	137	223	1,459
Oldham ...	67	70	61	38	39	71	94	56	187	201	158	1,042
Portsmouth ...	139	124	124	148	233	566	563	454	495	633	601	4,185
Plymouth ...	54	33	37	57	52	47	58	39	54	60	61	552
Preston ...	39	16	34	24	19	116	108	65	60	83	73	637
Swansea ...	23	31	29	44	503	837	494	198	199	134	216	2,708
Salford ...	242	194	158	103	97	184	309	420	292	335	422	2,756
Sheffield ...	149	122	138	136	332	2,454	1,598	969	969	492	400	9,084
Sunderland ...	26	26	26	32	26	19	50	76	63	94	74	509
West Ham ...	847	850	894	675	969	1,256	1,300	1,170	994	548	518	10,021
Wolverhampton ...	82	308	360	311	202	105	95	106	91	46	78	1,784
TOTAL ...	4,535	4,976	5,879	5,160	7,576	12,553	12,721	12,233	10,857	9,649	9,553	95,692

* Not notified.

TABLE II.—ENGLAND AND WALES.
 Number of Deaths from Diphtheria in each of the undermentioned towns during each of the years 1894-1904. Extracted from the
 Annual Summaries of the Registrar General.

Town.	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	Total.
Brighton ...	26	18	19	12	21	61	72	64	36	32	15	376
Bristol ...	48	34	37	35	44	33	100	124	185	118	103	861
Birmingham ...	75	133	270	147	131	147	75	84	131	136	127	1,506
Birkenhead ...	41	45	22	26	49	24	11	28	27	11	28	312
Bolton ...	10	16	14	6	8	14	20	27	43	37	28	223
Burnley ...	29	43	48	60	30	26	22	40	45	20	12	375
Blackburn ...	18	9	10	8	31	72	89	65	23	26	11	362
Bradford ...	17	20	17	15	17	27	33	33	85	55	162	481
Croydon ...	32	22	29	8	17	17	24	29	29	17	25	242
Cardiff ...	69	56	62	90	129	61	81	78	89	35	31	781
Derby ...	5	6	10	9	9	8	7	20	12	3	30	119
Gateshead ...	21	19	18	8	10	8	5	13	12	11	14	139
Huddersfield ...	22	15	21	20	13	5	2	6	13	14	14	145
Halifax ...	12	14	21	9	8	15	13	18	9	10	17	146
Hull ...	29	37	51	32	17	29	19	43	88	76	63	484
Leicester ...	13	35	64	73	62	227	330	154	34	28	6	1,026
Liverpool ...	97	120	157	126	147	212	162	182	210	162	193	1,768
Leeds ...	73	65	49	67	223	328	253	174	94	65	47	1,438
Manchester ...	146	108	81	47	53	33	101	132	118	135	96	1,100
Norwich ...	18	19	24	10	14	40	12	30	10	12	8	197
Nottingham ...	...	...	...	...	...	...	...	...	...	...	...	...
Newcastle ...	32	52	39	25	30	29	32	34	23	37	49	382
Oldham ...	39	26	35	11	10	24	20	13	47	54	35	314
Portsmouth ...	33	19	20	28	55	121	103	72	67	75	71	664
Plymouth ...	5	10	13	13	10	20	11	12	14	14	14	136
Preston ...	8	8	12	4	8	39	45	18	28	21	23	214
Swansea ...	10	12	10	11	124	141	61	18	24	21	24	456
Salford ...	63	62	49	32	32	75	90	140	74	86	113	816
Sheffield ...	66	52	56	44	94	460	461	242	114	40	47	1,676
Sunderland ...	9	8	8	4	9	183	22	30	15	31	27	172
West Ham ...	190	192	187	101	180	157	157	175	128	72	44	1,610
Wolverhampton ...	35	84	53	54	38	17	9	12	19	9	18	348
TOTAL ...	1,291	1,409	1,506	1,135	1,623	2,555	2,442	2,103	1,846	1,464	1,495	18,869

TABLE III.—ENGLAND AND WALES.
DIPHTHERIA.

Rate per cent of deaths to cases notified in each of the undermentioned towns during each of the years 1894—1904. Calculated from returns of cases of the disease furnished by the Medical Officers of Health to the respective towns and the deaths in these towns as given in the Annual Summaries of the Registrar General.

Town.	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904
Brighton	20.9	8.8	11.6	6.5	5.5	9.1	12.4	9.1	8.2	7.8	5.7
Bristol	37.5	20.6	14.3	17.1	20.3	15.3	19.5	13.7	16.7	10.4	9.8
Birmingham	18.5	24.7	22.6	20.6	19.0	20.4	13.8	15.8	16.6	15.4	20.2
Birkenhead	30.8	31.7	19.1	32.5	25.8	27.9	22.9	37.3	23.7	10.9	28.9
Bolton	40.0	47.1	48.3	35.3	29.6	26.9	35.7	29.7	21.3	26.0	18.7
Burnley	26.6	41.3	32.6	29.0	23.8	23.9	31.9	31.7	24.3	24.1	17.4
Blackburn	45.0	29.0	40.0	53.3	40.3	31.4	26.6	22.9	27.7	19.7	18.3
Bradford	34.7	51.3	41.5	53.6	48.6	31.0	30.3	27.0	31.4	28.0	19.5
Croydon	19.9	16.7	16.9	5.9	10.5	13.4	12.8	4.9	10.2	6.5	8.0
Cardiff	21.2	24.5	20.9	17.6	13.7	9.7	11.5	10.8	13.0	8.0	8.0
Derby	10.9	14.0	22.2	15.8	12.2	13.3	13.5	27.0	19.0	3.6	20.0
Gateshead	28.8	38.0	27.7	28.6	27.0	42.1	27.8	43.3	32.4	25.0	29.2
Huddersfield	67.1	44.1	48.8	35.7	28.3	19.2	14.3	12.5	35.1	17.7	23.3
Halifax	27.9	48.3	56.8	13.4	34.8	25.9	31.7	29.5	24.3	20.0	21.2
Hull	33.7	35.2	32.7	16.4	14.3	18.5	19.2	18.6	18.3	15.4	12.0
Leicester	19.7	46.7	37.6	31.9	28.4	25.4	22.7	14.9	10.6	13.3	6.2
Liverpool	35.3	45.6	35.4	34.1	29.2	28.4	24.2	22.1	20.0	19.0	18.9
Leeds	28.5	50.4	40.8	37.2	26.1	18.7	20.9	17.2	14.5	11.1	13.5
Manchester	28.5	26.9	35.1	31.3	27.0	33.5	30.0	28.9	28.0	21.8	20.3
Norwich	15.0	24.7	25.5	16.4	26.4	32.5	18.5	20.0	12.7	13.8	11.1
Nottingham	28.6	29.9	23.8	Informa- tion as to cases not received.	23.7	27.1	37.2	23.9	18.7	27.0	22.0
Newcastle	58.2	37.1	57.4	28.9	25.6	33.8	21.3	23.2	25.1	26.9	23.2
Oldham	23.7	15.3	16.1	18.9	19.4	21.4	18.1	15.9	13.5	11.8	11.8
Portsmouth	9.3	30.3	35.1	22.8	19.2	42.6	19.0	30.8	25.9	23.3	23.0
Plymouth	20.5	50.0	35.3	16.7	42.1	33.6	41.7	27.7	46.7	25.3	31.5
Preston	43.5	38.7	34.5	25.0	24.7	16.8	12.3	9.1	12.1	15.7	11.1
Swansea	26.0	32.0	31.0	33.0	33.0	40.8	29.1	33.3	25.3	25.7	26.8
Salford	44.3	42.6	40.6	32.4	28.3	20.5	18.8	15.1	11.8	8.1	11.7
Sheffield	39.1	30.8	30.8	12.5	34.6	47.4	44.0	39.5	23.8	33.0	36.5
Sunderland	22.4	22.6	20.9	15.0	18.6	14.6	12.1	15.0	13.9	13.3	8.5
West Ham	42.7	27.3	14.7	17.4	18.8	16.2	9.5	11.3	20.9	19.6	23.1
Wolverhampton	30.5	33.1	31.3	25.1	25.4	25.2	22.7	22.0	20.8	17.7	18.0
Mean Death Rate per cent of cases in the above towns	30.5	33.1	31.3	25.1	25.4	25.2	22.7	22.0	20.8	17.7	18.0

† Diphtheria not notifiable.

TABLE IV.—LONDON.

DIPHTHERIA.

Cases treated in the Hospitals of the Metropolitan Asylums Board.
Extracted from the Annual Report of the Board for 1904.

Year.	Total Cases Admitted.	Number of Deaths.	Mortality. Per cent.*	Remarks.
1888	99	46	59'3	
1889	722	275	40'7	
1890	942	316	33'5	
1891	1,312	397	30'6	
1892	2,009	583	29'3	
1893	2,848	865	30'4	
1894	3,666	1,035	29'3	Antitoxin first used in this year.
1895	3,635	820	22'8	
1896	4,508	948	21'2	{ Antitoxin used in severe cases, 66'2 % of the whole number.
1897	5,673	987	17'6	Antitoxin used in 80'2% of the cases.
1898	6,566	991	15'3	" " 81'4% "
1899	8,676	1,182	13'9	
1900	7,873	988	12'2	
1901	7,622	849	11'1	
1902	6,520	739	11'0	{ In these years Antitoxin has been given in about 80% of the cases.
1903	5,072	504	9'7	
1904	4,687	469	10'0	

* The Mortality Rates of Patients in the Hospitals of the Board are calculated according to the Registrar General's formula, *i.e.*, by dividing the deaths, multiplied by 100, by half the sum of the admissions, discharges, and deaths for the year.

Diphtheria cases have only been admitted into the Hospitals of the Board since 23rd October, 1888. The use of Antitoxic Serum in the treatment of Diphtheria began in 1894.

Average Annual Mortality per cent during the years 1888-1893 37'3
" " " " " 1894-1904 15'8

LONGEVITY OF BACILLUS TYPHOSUS IN SURFACE WATERS AND SEWAGE.—Prof. H. L. Russell and Mr. C. A. Fuller, reported at the meeting of the American Public Health Association (September, 1905) that from their experimental work it appears that in relatively pure water of a surface character the typhoid bacillus is capable of retaining its vitality for about eight days. The results of their experiments confirm and extend on a broader basis the data obtained in the investigations made on the Chicago Drainage Canal. They have been carried out under sufficiently diverse conditions to warrant the belief that the typhoid organism does not live as long in natural sewage as it will in relatively pure water.