SMALLPOX INCIDENCE AND MEASURES OF CONTROL IN AMERICAN AND CANADIAN CITIES 1919 AND 1920

(A report of an inquiry conducted by the Metropolitan Life Insurance Company)

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I. SMALLPOX DATA FOR CITIES

1. *Smallpox incidence in American and Canadian Cities, 1919 and 1920*

THE increasing prevalence of smallpox in the United States and Canada led the Company early in 1921 to make an inquiry into the incidence rate of the disease in the principal cities. A questionnaire was sent to a large number of municipal health officers covering the number of cases and deaths which occurred in 1919 and 1920. Information was asked for also on the measures pursued by health departments in the prevention and control of the disease. Replies were received from the health officers of 243 cities in the United States and Canada. In 154, or 63.4 per cent of these cities, a total of 19,104 cases of smallpox were reported in 1920. In 1919, 140 of the cities, or 57.6 per cent, reported 14,335 cases of smallpox.

Since the information was requested of all municipal health officers, without any particular fore-knowledge of the presence or absence of smallpox in any of the municipalities, our data should give a fairly representative indication of the prevalence of the disease in recent years, of the kind of municipal control, of the attitude of the public toward vaccination and of other factors which play a part in the campaign against smallpox.

The highest smallpox incidence rates occurred in cities of the Rocky Mountain, West North Central, and Pacific Coast group of states and in Canada. A fairly high prevalence rate was reported also for cities of the West South Central states (Arkansas and Louisiana). The least incidence rates occurred in the New England, Middle Atlantic, and South Atlantic states. These areas also included most of the cities not reporting smallpox at all in 1920.

Considering the cities according to individual states, the highest rates per 100,000 of population were observed in the cities located in the states of Washington, Minnesota, Nebraska, Colorado, Wisconsin, Montana, Iowa, and Louisiana, in order of decreasing incidence.

2. *Mortality from Smallpox*

In all of the cities of the United States and Canada reporting, there were 181 deaths from smallpox, or at a rate of one per 100,000 population. In the cities of Mississippi and Louisiana a considerable death-rate was reported. The 8 deaths in a city population of 35,000 in Mississippi produced a death-rate of 23 per 100,000. In the Louisiana cities comprising a population of about 400,000, the 134 deaths occurred at a rate of 34 per 100,000. This is the highest rate recorded for any municipal group in that year. Most of this mortality came from the city of New Orleans.

3. *The Case Fatality Rate*

The fatality rate of smallpox in the northern, eastern and western sections of the country was extremely low during 1920. In the state of Louisiana, however, among 891 cases, 134 deaths were reported, a case-fatality rate of 15 per cent. For 20 cases reported in the cities of Mississippi, there were 8 deaths, or a case-fatality rate of 40 per cent. It would seem, therefore, that smallpox is present in virulent form in these Southern areas. The prevalence of this type

of smallpox in the far South is really dangerous to other sections of the country because of the easy facilities for dissemination of the infection throughout the United States and Canada. A communicable disease which causes one death for every 7 or 8 cases is by no means to be regarded lightly, however restricted the area of its prevalence may be.

4. *The Increased Prevalence of Smallpox*

It may be worth while to consider, for a moment, the increase in smallpox prevalence during 1920 for the several geographical divisions of the United States and Canada.

The Canadian cities showed an increase in case incidence from 150 to 165 per 100,000 of population between 1919 and 1920. In Edmonton, the figure increased from 30 in 1919 to 436 per 100,000 in 1920; in Ottawa, from 37 to 666; in Brantford, from 77 to 257 per 100,000. The Toronto record showed a slight decline from 381 to 240 per 100,000. In the latter city 1,175 cases were reported in the calendar year 1920.

For all of the cities in the United States, there was an increase from 42 in 1919 to 58 per 100,000 of population in 1920. Cities in the East North Central states registered an increase from 48 to 70 per 100,000 of population; in the West North Central states, from 125 to 238 per 100,000; in the cities of the East South Central states, from 38 to 112; in the West South Central states, from 30 to 185. The cities of the Mountain states showed an increase from 206 to 340; and the Pacific Coast cities, from 94 to 222. In cities of the South Atlantic states the case-incidence rate declined from 184 in 1919 to 37 per 100,000 in 1920. The New England and Middle Atlantic states, with a small number of cases in each year, showed slight increases in the incidence rate.

Considering in greater detail the cities of each geographical division we find in the East North Central group a rise from 11 to 203 per 100,000 in Akron, O.; an increase from 59 to 280 for Canton, O.; an increase from 307 to 335 for Youngstown. In Indiana, Indianapolis recorded an increase from 44 in 1919 to 111 in 1920. The Illinois cities showed an increase from 11 to 18 per 100,000; the city of Rock Island, with 173 cases in a population of 35,000 in 1920, registered an increase in the rate from 404 in 1919 to 492 per 100,000. The Chicago rate increased from 4 to 6 per 100,000 in the two years. In Michigan, the chief increase was recorded for Detroit, from 25 in 1919 to 113 per 100,000 in 1920. In Wisconsin, the city of Milwaukee reported an increase from 73 to 124 per 100,000. The Minnesota cities, in the West North Central group, registered substantial increases also. The 2,174 cases reported for Minneapolis represented a rate of 571 per 100,000 in 1920, an increase from 147 in 1919. Davenport, Iowa, reported a rate of 194 in 1919 and 435 in 1920, Des Moines an increase from 58 to 122. The Missouri cities reported as follows: Kansas City, an increase from 85 to 158 per 100,000; St. Louis, from 11 to 34; Columbia, from 144 to 192. The Nebraska group showed a marked increase for Grand Island (from 1,276 to 2,976 per 100,000) in a population of 14,000. While decreases were recorded for Lincoln and Omaha, the 1920 rates were still high (672 for Lincoln and 251 for Omaha). The Kansas group reported increases in the incidence-rate as follows: Kansas City, from 44 to 85; Lawrence, from 24 to 124; Topeka, from 66 in 1919 to 194 per 100,000 in 1920. The South Atlantic states recorded sharp decreases in the case-incidence of North Carolina cities, chiefly for Wilson, Winston-Salem, Weldon, and Raleigh.

In the East South Central states, the

Kentucky cities recorded increases. The Louisville rate increased from 8 to 10 per 100,000; for Paducah the increase was from 77 to 251 per 100,000 of population. Tennessee cities (Memphis and Nashville combined) reported an increase from 18 to 69 per 100,000 of population. In Alabama, the Birmingham rate rose from 31 in 1919 to 149 in 1920; in Gadsden, a city of 15,000, the rate increased from 326 to 1,018 per 100,000 of population.

Cities of the West South Central group returned data which showed decreases in Arkansas cities, but increases for the two Louisiana cities. In New Orleans, the case-incidence rate increased from 25 in 1919 to 230 in 1920 per 100,000. The 891 cases in 1920 were accompanied by 134 deaths, a case-fatality rate of 15 per cent. In the Mountain states, Great Falls, Montana, reported an increase from 282 to 294 per 100,000, and Denver an increase from 221 to 372.

The Pacific Coast group showed for Alameda an increase from 94 to 135 per 100,000; Los Angeles, from 20 to 47; Oakland, from 31 to 61; Pasadena, from 18 to 33; Sacramento, from 115 to 194; San Francisco, from 41 to 80 per 100,000. The Portland, Oregon, rate declined slightly, from 648 to 564, but this latter rate is one of the highest recorded for large cities in 1920. In Washington, Aberdeen registered an increase from 98 to 411 per 100,000; the Bellingham rate increased from 571 to 692 per 100,000. In Tacoma, during 1920, the rate was 345 per 100,000 of population. The Spokane figures showed an increase from 593 to 1,107. This latter rate for 1920 represented 1,156 cases. The Seattle rate in 1920, 260 per 100,000 for 821 reported cases was high.

5. *Opposition to Vaccination in Certain Areas and the Increased Incidence of Smallpox*

It would seem, therefore, that where, despite the efforts of conscientious health officials, the forces opposed to vaccination held the upper hand, the prevalence of smallpox is high and increasing. The menace of the disease is not confined to these particular areas, however. If it were, it might be well to permit these areas to reap the inevitable harvest of an increasing number of cases of the disease and to suffer the consequences, perhaps a sudden shift of virulence and a high mortality. But the presence of this dangerous disease in areas which have easy communication with all other parts of the United States and Canada, constitutes a menace to the health and safety of the other and innocently exposed population. The existence of smallpox plague-spots in certain areas threatens the safety of all other areas having connection with these focal centers.

The following table gives a consolidation of the smallpox figures reported by health officers of cities within the specified state and divisional groups.

CONSOLIDATION OF DATA ON SMALLPOX PREVALENCE IN AMERICAN CITIES GROUPED BY MAIN GEOGRAPHIC DIVISIONS AND BY STATES

No. of Cities	Geographical Divisions	Population of Cities, 1920	Cases				Deaths				Deaths per 100 Cases	
			1920		1919		1920		1919			
			Number	Per 100,000	Number	Per 100,000	Number	Per 100,000	Number	Per 100,000	1920	1919
10	Cities in Canada	1,390,909	2301	165	2088	150	18	1	—	—	.8	
233	Cities in United States	28,904,208	16,803	58	12,247	42	163	1	25	*	1.0	.2
42	New England States	2,867,342	141	5	124	4	—	—	—	—	—	—
64	Middle Atlantic	11,919,349	240	2	114	1	—	—	—	—	—	—
50	East North Central	7,114,074	4977	70	3412	48	9	—	6	—	.2	.2
17	West North Central	2,184,749	5196	238	2722	125	3	—	6	—	.1	.2
20	South Atlantic	1,981,883	728	37	3649	184	1	—	3	—	.1	.1
13	East South Central	893,253	996	112	343	38	12	1	2	—	1.2	.6
5	West South Central	505,601	933	185	151	30	134	27	7	1	14.4	4.6
7	Mountain	336,682	1146	340	694	206	1	—	—	—	.1	—
15	Pacific	1,101,275	2446	222	1038	94	3	—	1	—	.1	.

*Less than .5 per 100,000 of population.

CONSOLIDATION OF DATA ON SMALLPOX PREVALENCE IN AMERICAN CITIES GROUPED BY MAIN GEOGRAPHIC DIVISIONS AND BY STATES (Continued)

No. of Cities	Geographical Divisions	Population of Cities, 1920	Cases				Deaths				Deaths per 100 Cases	
			1920		1919		1920		1919			
			Number	Per 100,000	Number	Per 100,000	Number	Per 100,000	Number	Per 100,000	1920	1919
42	New England:	**2,867,342**	**141**	**5**	**124**	**4**	—	—	—	—	—	—
6	Maine	154,717	99	64	76	49	—	—	—	—	—	—
4	New Hampshire	141,959	—	—	2	1	—	—	—	—	—	—
1	Vermont	22,779	2	9	—	—	—	—	—	—	—	—
23	Massachusetts	1,912,570	38	2	41	2	—	—	—	—	—	—
2	Rhode Island	52,048	—	—	—	—	—	—	—	—	—	—
6	Connecticut	583,269	2	—	5	1	—	—	—	—	—	—
64	Middle Atlantic:	**11,919,349**	**240**	**2**	**114**	**1**	—	—	—	—	—	—
30	New York	7,524,846	103	1	71	1	—	—	—	—	—	—
18	New Jersey	1,397,035	98	7	7	1	—	—	—	—	—	—
16	Pennsylvania	2,997,468	39	1	36	1	—	—	—	—	—	—
50	East North Central:	**7,114,074**	**4977**	**70**	**3412**	**48**	**9**	—	**6**	—	**.2**	**.2**
18	Ohio	2,311,690	1871	81	1487	64	4	—	3	—	.2	.2
6	Indiana	203,078	448	221	451	222	—	—	1	—	—	.2
11	Illinois	3,010,080	553	18	318	11	1	—	—	—	.2	—
10	Michigan	1,471,585	1753	119	1049	71	4	—	2	—	.2	.2
5	Wisconsin	117,641	352	299	107	91	—	—	—	—	—	—
17	West North Central:	**2,184,749**	**5196**	**238**	**2722**	**125**	**3**	—	**6**	—	**.1**	**.2**
1	Minnesota	380,582	2174	571	560	147	—	—	2	1	—	.4
3	Iowa	219,357	491	224	285	130	—	—	—	—	—	—
6	Missouri	1,143,747	1056	92	428	37	3	—	2	—	.3	.5
	North Dakota*											
	South Dakota*											
3	Nebraska	260,496	1265	486	1368	525	—	—	2	1	—	.1
4	Kansas	180,567	210	116	81	45	—	—	—	—	—	—
20	South Atlantic:	**1,981,883**	**728**	**37**	**3649**	**184**	**1**	—	**3**	—	.1	**.1**
	Delaware*											
2	Maryland	763,663	45	6	28	4	—	—	—	—	—	—
1	District of Columbia	437,571	89	20	174	40	—	—	1	—	—	.6
7	Virginia	476,399	293	62	282	59	—	—	—	—	—	—
1	West Virginia	39,608	27	68	23	58	—	—	—	—	—	—
6	North Carolina	127,546	171	134	3127	2452	1	1	2	2	.6	.1
	South Carolina*											
2	Georgia	45,538	—	—	10	22	—	—	—	—	—	—
1	Florida	91,558	103	112	5	5	—	—	—	—	—	—
13	East South Central:	**893,253**	**996**	**112**	**343**	**38**	**12**	**1**	**2**	—	**1.2**	**.6**
3	Kentucky	300,359	332	111	38	13	3	1	—	—	.9	—
2	Tennessee	280,693	194	69	51	18	—	—	—	—	—	—
6	Alabama	277,242	450	162	154	56	1	—	2	1	.2	1.3
2	Mississippi	34,959	20	57	100	286	8	23	—	—	40.0	—
5	West South Central:	**505,601**	**933**	**185**	**151**	**30**	**134**	**27**	**7**	**1**	**14.4**	**4.6**
3	Arkansas	105,707	42	40	53	50	—	—	1	—	—	1.9
2	Louisiana	399,894	891	223	98	25	134	34	6	2	15.0	6.1
	Oklahoma*											
	Texas*											
7	Mountain:	**336,682**	**1146**	**340**	**694**	**206**	**1**	—	—	—	**.1**	—
2	Montana	39,221	98	250	97	247	—	—	—	—	—	—
	Idaho*											
	Wyoming*											
4	Colorado	287,158	1048	365	597	208	1	—	—	—	.1	—
	New Mexico*											
	Arizona*											
1	Utah	10,303	—	—	—	—	—	—	—	—	—	—
	Nevada*											
15	Pacific:	**1,101,275**	**2446**	**222**	**1038**	**94**	**3**	—	**1**	—	**.1**	**.1**
4	Washington	242,324	1731	714	780	322	2	1	1	—	.1	.1
1	Oregon	17,679	34	192	6	34	—	—	—	—	—	—
10	California	841,272	681	81	252	30	1	—	—	—	.1	—

*No data available.

II. MEASURES OF SMALLPOX CONTROL IN AMERICAN AND CANADIAN CITIES

Certain information on measures of smallpox control became available also from the replies of health officers on the inquiry schedule. The returns may be summarized as follows:

1. *Are Smallpox Cases Imported?*

In nearly two thirds of the cities in question, it was reported by the health

officers that smallpox had its origin in points outside the city. This impression seemed to be stronger in the Middle West, on the Pacific Coast, and in the South, than in the Northeast or in Canada.

2. *Is Vaccination Compulsory for Admission to Schools?*

In half the cities, evidence of satisfactory vaccination of children entering school is required. In New England and in New Jersey and Pennsylvania this requirement held for nearly four fifths of the cities reporting. In about one third of the cities of New York state, in Canada, in the South and the East North Central states, this measure was required. On the Pacific Coast, only 14 per cent of the cities reported vaccination as a requirement for admission to schools. In general, the figures with respect to this control measure were high in those areas where, apparently, public sentiment is not strongly opposed to vaccination practice, and lowest, as on the Pacific Coast, where there is a considerable sentiment against vaccination practice.

Some figures were reported by health officials on the percentage of schoolchildren vaccinated, but these were reported in such broad terms and were based, perhaps, only upon the evidence of personal impression; so it was thought unwise to publish the data. It would be well if health officials determined by actual census of the schools the proportion of such children protected by vaccination. This fact is of supreme importance in the movement of smallpox control and the figures should be obtained in order that a proper idea of the extent of protection among school children may be obtained.

3. *Difficulties in Enforcing Vaccination Laws*

Two thirds of the cities had more or less difficulty in enforcing vaccination laws. About the same percentage held for New York state. The least difficulty seemed to be encountered in the Southern cities on the Atlantic seaboard, in New England, and in Pennsylvania and New Jersey. The greatest difficulties seem to exist in the West North Central states and on the Pacific Coast. A high percentage was reported also from a group of Middle Western cities (82 per cent reported difficulty in enforcing vaccination laws).

Information was also given by health officers on the special difficulties met in their work. On the Pacific Coast, one quarter of the cities reported public indifference as an important difficulty; inadequate legislation was mentioned in one third of the reports of this section of the country. Strong opposition from Christian Scientists and irregular medical cults was reported in 14 per cent of these cities, and obstructive tactics of school boards in 9 per cent of the cases in this particular region. In the West North Central states public indifference, inadequate legislation, the opposition of parents, Christian Scientists, irregular medical cults, and organized anti-vaccination movements seemed to be the chief sources of difficulty. In Canada, public indifference and the activities of anti-vaccinationists were specified. In the cities of the Atlantic Coast region of the South, where the least opposition was encountered, public indifference, inadequate legislation, opposition of parents, the fear of death from tetanus and vaccination accidents, the existence of "religious grounds" and the mildness of prevailing smallpox seemed to be the chief elements in the health officer's problem with respect to smallpox control. Of course, no extensive numerical data could be compiled under these heads but it is believed that the figures are of sufficient value to indicate, as for the Pacific Coast incidence, the extent and sources of the difficulty experienced in the protection of the population of cities against the smallpox menace.

4. *Procedure in Handling Smallpox Cases*

"Placarding only" was reported from two of the cities. Quarantine or isolation seemed to be the chief measure employed, i. e., in 80 per cent of the cities. Hospital treatment of smallpox cases was reported in 28 per cent of the cities. In a number of these municipalities either hospital treatment or quarantine was employed.

Contacts received vaccination treatment only in 27 per cent of the cities, and both vaccination and quarantine in 32 per cent of the cities. Two of the cities reported that contacts were given hospital observation, and in seven instances observation and parole were the only measures employed.

5. *Sentiment of Community Toward Compulsory Vaccination*

In general, the figures on this topic of the inquiry schedule, followed very closely the facts on the requirement of compulsory vaccination for admission to school. In slightly more than half of these cities, sentiment seemed to be in favor of vaccination. In Southern cities on the Atlantic seaboard, in New England and in New York and Pennsylvania, well above 70 per cent of the cities reported a favorable trend of community sentiment. Most opposition of sentiment was recorded on the Pacific Coast, where two thirds of the cities reported that the community opinion was opposed to compulsory vaccination. The Middle West and Canadian cities followed with a figure of 46 per cent of the cities opposed to compulsory vaccination.

6. *Facilities for Free Vaccination*

Practically 90 per cent of the cities had facilities for free vaccination. In the eastern part of the South, all of the cities reporting had facilities, generally in the health department, for administering free vaccination. In New York state, 17 per cent of the cities; in Canada, 9 per cent; in the West North Central states, 22 per cent; throughout the Southwest, 19 per cent; and in the Middle West, 18 per cent had no facilities for free vaccination. On the Pacific Coast, 9 per cent reported the same condition. In most of the cities where free vaccination is available, the health department seemed to be the agency in supplying such service.

7. *Is Vaccine Furnished Free?*

Half of the cities reported that they furnished vaccine free. In the South, in Canada and in the New England states, between 70 and 80 per cent of the cities maintain this service. On the Pacific Coast, only 18 per cent of the cities reported free vaccine. In about one third of the cities in the Middle West and in the West North Central states, this service was specified.

8. *Who Makes the Vaccine?*

In nearly 70 per cent of the cities, commercial vaccine is used. In the Southwest and in the Middle West, more than 90 per cent, and on the Pacific Coast 100 per cent of the cities recorded the use of commercial vaccine. In New York state, commercial vaccine was reported in only one half of the cities. In 30 per cent of these New York state municipalities, the New York City Department of Health furnished the vaccine, and in 27.6 per cent, the state laboratory. In the eastern part of the South, the state laboratory seemed to be the chief agency supplying vaccine outside of commercial firms. In New England, 40 per cent of the cities used commercial vaccine and 50 per cent used the vaccine supplied by the state laboratory. In Canada, where nearly two thirds of the cities used commercial vaccine, another quarter of the cities secured their supply from the university laboratories.

9. *Is Chicken-pox in Adults Verified?*

This seemed to be a very generally employed procedure; nearly 90 per cent of the cities reported that chicken-pox

was verified by some agency satisfactory to the department of health. Nearly all of the New York state cities and all of the Canadian cities employed this procedure. In the Middle West only 80 per cent of the cities verified chicken-pox in adults.

10. *Conclusion*

It will seem from the foregoing that there is great diversity of practice in smallpox control. What seems to be needed is that each city should take stock of its smallpox situation, and the degree to which it is menaced by importation of the disease from areas now showing a high prevalence of cases of some severity. These facts should be brought to public attention and sufficient opinion created to secure needed changes in vaccination legislation, and greater coöperation between school boards, health boards and parents.

There is hardly any public-health evidence more definite than that vaccination, properly performed, protects against smallpox. The community with the least number of unprotected persons is likely to have the least smallpox. That is the evidence of smallpox data we have been able to secure from American states and cities during the past two years. It is greatly to be feared that unless the American people take heed of the numerous warnings which have been issued by conscientious, able health officers in recent years, there may grow up a still greater number of persons unprotected against smallpox. In that event, there may be a recurrence of the extensive and destructive epidemics of a century ago.

At no time during the past 20 years has smallpox menaced the American population as much as it does to-day. We are threatened, not only by the importation of the disease from areas of central and southern Europe, as a result of the revival of immigration, but also from parts of our own country where vaccination practice has been lax and from which there are easy means of communication with other cities in the United States and Canada. *The only measure which promises any smallpox protection to the people of the United States, is vaccination performed in a proper, cleanly manner.*

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THE LEAGUE OF RED CROSS SOCIETIES

The League of Red Cross Societies is the concrete answer to the question thoughtful Red Cross workers everywhere began to ask as soon as the World War was ended. Were the Red Cross organizations, so strong and so full of power for good in the world, to become weak and ineffective through lack of a definite and useful program for peace time work? The League is also a practical testimony to the growth of a world-wide conviction that to be in a real sense one's brother's keeper is the part of wisdom; that, no matter what artificial barriers are fixed by political governments, health problems are not national but world affairs, and that no community can account itself safe unless the sources of disease at the end of a chain of communities are wiped out.

At the close of the war the ideas later embodied in the League's Articles of Association were laid before the International Committee of the Red Cross in Geneva, and as a result of conferences which followed, it was decided that the Committee should not take up the suggested new program, but that a new organization should be created to supplement war-time humanitarian activities