Safety and Health

LEAD POISONING IN 1936 AND EARLIER YEARS

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STATISTICS for this and other countries are consistently indicative of a marked decline in the occurrence of fatal lead poisoning. This decline is one of the most encouraging signs of progress in the sanitary administration of modern industry and in public health generally. For foreign countries the returns are not always precise, because of their varying practices of including or excluding deaths from nonindustrial sources. It would be highly desirable to have uniformity of procedure in recording occupational deaths from lead poisoning separately, as is the practice in Great Britain. For the United States the returns include both occupational and nonoccupational deaths from lead poisoning; in other words, they include deaths from nonindustrial causes, such as contaminated water supplies, the poisoning of children by lead-painted toys, and other sources.

The incidence of the fatal form of lead poisoning in this country declined from 2.5 deaths per million of population in 1900–1904 to 1.0 death per million in 1936, or 60 percent. In England and Wales the occupational death rate from lead poisoning declined from 2.5 per million in 1911–15 to 0.6 in 1936, or 76.0 percent. In Scotland the rate declined from 0.6 in 1911–15 to 0.2 in 1936, or 66.7 percent. Similar downward trends are shown for most of the other countries included in the present review.

During 1935 there were 130 deaths from lead poisoning in the United States, 36 of which were of painters, the remainder being scattered among a wide range of occupations, as well as among women and among boys and girls under 18 years of age. The decline in industrial lead poisoning is largely the result of sanitary improvements in factory conditions, which during the last 20 years have continued on a progressive scale from year to year. Another factor is the improved economic condition of the workmen, who receive higher wages, work shorter hours, and represent a decidedly better type of physique than during earlier years. Chronic intoxication, which was once common among lead workers, has disappeared. Another factor of importance is the introduction of workmen's compensation, which places the financial responsibility for the occurrence of lead poisoning on the employers in the lead-using industries. Unfortunately, no uniform statistics of workmen's compensation for lead poisoning are available.

The physical and clinical statistics of lead workers are indicative of thoroughly healthy and physically sound bodies of the workers, whose condition has been materially improved by more widespread practices of personal hygiene and bodily cleanliness, and the use of improved respirators in dust-exposing occupations. The increasing practice of medical supervision of employees and their periodical examination is proving its value in other directions, as the early recognition of lead absorption prevents the development of toxic conditions and avoids the risk of death or permanent disability.

It is regrettable that there are no statistics of lead absorption on a large scale showing the number of nonfatal cases of lead poisoning in industry, corresponding to the returns of the factory inspector of Great Britain. In that country, during the 5 years 1931–35 there were 884 cases reported under the Factory Acts, of which 105, or 11.9 percent, terminated fatally. It would be mere blind conjecture to apply this ratio to our American deaths from lead poisoning, in the absence of any useful data on the probable number of cases in American industry at the present time.

Finally, it may be pointed out that there has been considerable progress in the diagnosis of lead poisoning in both industrial and nonindustrial cases, and that treatment is making considerable progress, with the result that the incidence of fatal forms of lead poisoning is now decidedly less common than in former years.

Fatal lead poisoning occurs not only in the lead-using industries but also in the general population, though only to a negligible degree in the latter case. The situation is somewhat confused by the varying practices of local authorities in reporting the occurrence of fatal lead poisoning in conformity to the international classification of causes of death, which, if strictly complied with, records only deaths from occupational lead poisoning while disregarding deaths occurring in the population at large from nonoccupational sources. The practice varies for different countries, although general statistics, as a rule, include both types of the disease, and in most of the discussion following it is assumed that the term includes all cases of lead poisoning, whether of industrial or nonindustrial origin. In a special and extended inquiry for different countries and localities no other procedure is feasible at the present time.

The following discussion is divided into four separate sections: (1) Statistics of occupational and nonoccupational lead poisoning in the United States, as derived from the general mortality returns;

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(2) statistics of cases of lead poisoning and deaths resulting from the disease, according to workmen's compensation practices and other sources of information utilized for the present purpose; (3) statistics for foreign countries, limited to those countries for which the returns are conveniently available; and (4) physical and clinical statistics of lead workers.

Lead Poisoning in the United States

CASES AMONG GENERAL POPULATION

Statistics for the United States registration area are available since 1900, when the area comprehended 40.5 percent of the total population. Since 1933 the registration area has included the entire population. During the 37 years 1900 to 1936, the rate per million for lead-poisoning deaths has varied from a maximum of 3.1 in 1903 to a minimum of 0.6 in 1932. By quinquennial periods the fluctuation in the rate has been as follows:

TABLE 1.—*Deaths From Lead Poisoning in United States Registration Area, 1900 to 1936, by 5-Year Periods*

Period	Registration area				Estimated number of lead-poisoning deaths in United States
	Aggregate population included		Total lead-poisoning deaths		
	Number	Percent of total population	Number	Rate per million	
1900–1904	160,212,631	40.4	407	2.5	[illegible]
1905–9	216,713,041	50.2	457	2.1	916
1910–14	302,388,727	64.2	740	2.4	1,141
1915–19	379,929,059	74.8	763	2.0	1,022
1920–24	468,499,432	86.0	682	1.5	831
1925–29	546,643,899	93.2	688	1.3	769
1930–34	610,422,900	97.8	525	.9	562
1935	127,521,000	100.0	130	1.0	130
1936 [1]	128,429,000	100.0	131	1.0	131

[1] According to preliminary statistics received from the Bureau of Census, the number of deaths from lead poisoning in Continental United States in 1936 was 131. For certain States the deaths were as follows: California, 9; Florida, 4; Illinois, 9; Indiana, 4; Maryland, 11; Massachusetts, 7; Michigan, 6; Missouri, 4; New Jersey, 8; New York, 19; Ohio, 6; and Pennsylvania, 11. There were no deaths reported in Arizona, Arkansas, Colorado, Delaware, District of Columbia, Idaho, Louisiana, Montana, Nevada, New Mexico, North Carolina, North Dakota, Oregon, South Carolina, South Dakota, Vermont, and Wyoming. In the remainder of the States the number of lead-poisoning deaths was from 1 to 3 in each State.

The preceding table shows that the death rate from lead poisoning in the United States has declined from 2.5 per million in 1900–1904 to 0.9 in 1930–34 and 1.0 in 1936. Statistics of lead poisoning for the United States include both occupational and nonoccupational deaths from the disease.

There were 130 deaths from lead poisoning in the United States in 1935; these included 36 painters, 6 paint workers, 10 laborers, 7 persons in lead-using industries, 8 farmers, 5 miners, 3 metal workers, 4 printers, 2 electric-storage-battery workers, 1 rubber worker, 1 worker in the automobile industry, and 13 whose occupations were unknown or miscellaneous. Among the nonoccupational deaths there were 6 women, and 14 girls and 14 boys under 18 years of age, a total

of 34, leaving 96 deaths from lead poisoning strictly chargeable to industry.

The average age at death in the lead-poisoning cases in 1935 was 42.5 years, the ages ranging from 1 to 90. The average age for painters was 58.9 years and for lead workers, 61.8 years. During the 11 years 1925–35, there were 1,343 deaths from lead poisoning in the United States registration area, at an average age of 48.5 years. The average age of 584 painters who died from this cause during this period was 53.9 years, and for 51 lead workers, 51.8 years. The number of deaths clearly nonoccupational during this period was 195, leaving 1,148 in the strictly occupational group, or 85.5 percent of the total. During this period there were 47 deaths of women from lead poisoning, at an average age of 49.7 years. These deaths in most cases were due to contaminated water supplies and in a few other cases, in all probability, to painting at home. There were 36 deaths of farmers, at an average age of 55.5 years, most of which were probably caused by painting at home, but some also by contaminated water supplies. There were 56 deaths of boys under 18 years of age, 22 of whom were 1 year of age, 24 were 2 years, 6 were 3 years, 1 was 5 years, 1 was 6 years, and 2 were 17 years of age; the average age for the group was 2.4 years. There were also 56 deaths of girls under 18, 17 of whom were 1 year of age, 22 were 2 years, 7 were 3 years, 3 were 4 years, 1 was 5 years, 4 were 6 years, 1 was 10 years, and 1 was 16 years; the average age for the group was 2.7 years. Most of the deaths of the little children were due to sucking paint on lead-painted toys, furniture, walls, or banisters.

The number and rate of deaths from lead poisoning in four leading industrial States, by 5-year periods, are shown in table 2.

TABLE 2.—*Fatal Cases of Lead Poisoning in Specified States, by 5-Year Periods*

Period	Aggregate population	Total deaths		Period	Aggregate population	Total deaths	
		Number	Rate per million			Number	Rate per million
New York State:				Pennsylvania:			
1921–25	54,153,217	71	1.3	1925–29	46,934,224	61	1.3
1926–30	58,766,394	72	1.2	1930–34	49,179,000	42	.9
1931–35	65,894,610	55	.8	1935–36	20,187,000	22	1.1
1936	13,345,226	15	1.1	Massachusetts:			
New Jersey:				1901–5	14,654,094	30	2.0
1915–20	18,007,290	48	2.7	1906–10	16,175,209	30	1.9
1921–25	17,107,645	36	2.1	1911–15	17,873,184	38	2.1
1926–30	19,321,224	31	1.6	1916–20	19,212,914	43	2.2
1931–35	20,968,485	28	1.3	1921–25	19,238,649	46	2.3
1936	4,328,000	7	1.6	1926–30	21,437,990	44	2.1
				1931–35	21,581,290	29	1.3
				1936	4,425,000	7	1.6

A tabulation of deaths from lead poisoning in 18 American cities in which the lead-using industries are more or less concentrated gives the following results: In the aggregate there were 179 deaths during

the period 1929–36, of which 30 occurred in New York City, 29 in Baltimore, 28 in Philadelphia, 22 in Boston, 16 in Chicago, 15 in Cleveland, and 10 in Providence. By single years the number of lead poisoning deaths in these cities has been as follows: 1929, 18; 1930, 20; 1931, 24; 1932, 17; 1933, 17; 1934, 24; 1935, 26; 1936, 33.

The Metropolitan Life Insurance Co. has furnished returns of deaths from lead poisoning in the experience of the industrial department of that company for the period 1914–36. According to these returns the death rate from lead poisoning of these policy holders declined from 3.0 per million in 1914–18 to 2.3 in 1919–23, 1.6 in 1924–28, and 1.1 in 1929–33. It was 1.0 in 1934, 1.4 in 1935, and 1.7 in 1936. For the entire period the rate was 1.8 per million exposed to risk, ages 1 year and over, the highest rate, or 4.2, having been reached in 1914, and the lowest, or 0.7, in 1930. In the aggregate there were 605 deaths in the experience of the company during the period under review.

Of interest in connection with the foregoing are the statistics of the Massachusetts General Hospital for the period 1918–36, differentiating acute and chronic cases. By 5-year periods the figures are as follows:

TABLE 3.—*Lead Poisoning at Massachusetts General Hospital, 1918 to 1936, by 5-Year Periods*

Period	Total cases	Acute cases	Chronic cases
1918–22	65	11	54
1923–27	116	14	102
1928–32	37	10	27
1933–36	19	5	14

The statistics for the United States Navy, for the period 1913–35, differentiating acute and chronic cases, show a remarkable decline for both types of lead poisoning—from 300 cases in 1913–17 to 56 cases in 1928–32 and 35 cases in 1933–35. The details by 5-year periods are given in table 4.

TABLE 4.—*Lead Poisoning in the United States Navy, 1913 to 1935, by 5-Year Periods*

Period	Average strength of Navy	Acute cases		Chronic cases	
		Total number	Number of deaths	Total number	Number of deaths
1913–17	516,016	169	----------	131	----------
1918–22	1,214,326	45	----------	33	----------
1923–27	580,308	85	1	33	----------
1928–32	574,372	42	----------	14	----------
1933–35	328,283	28	----------	7	----------

WORKMEN'S COMPENSATION EXPERIENCE

Workmen's compensation statistics for lead poisoning are especially interesting, in that they afford a view into the financial aspects of the problem. As a result of new laws passed in 1937, there are now 21 States which compensate for occupational diseases, as compared with 16 a year ago. These States are California, Connecticut, Delaware, Illinois, Indiana, Kentucky, Massachusetts, Michigan, Minnesota, Missouri, Nebraska, New Jersey, New York, North Carolina, North Dakota, Ohio, Pennsylvania, Rhode Island, Washington, West Virginia, and Wisconsin. Coverage for occupational diseases is also extended to employees under the workmen's compensation laws of the District of Columbia, Hawaii, Puerto Rico, and the Philippine Islands, and to employees covered by the Federal Employees' Compensation Act and the Longshoremen's and Harbor Workers' Act. Of the 21 States enumerated above, all but Kentucky and West Virginia compensate for lead poisoning. Unfortunately, for only a few of these States are statistics available which are useful for the present purpose. The most important of these are for the State of New York, 1935–36, yielding the results shown in the following table:

TABLE 5.—*Workmen's Compensation for Lead Poisoning in New York State, 1935 and 1936*

Type of disability	1935			1936		
	Total cases	Weeks of compensation	Amount of compensation	Total cases	Weeks of compensation	Amount of compensation
All types of disability	99	8,414	$141,379	69	6,390	$78,239
Death or permanent total disability	[1] 3	3,000	[2] 37,517	3	3,000	20,817
Permanent partial disability	3	2,321	53,272	3	1,411	21,471
Temporary disability	93	3,093	50,590	63	1,979	35,951

[1] Includes 1 case of permanent total disability.
[2] Present value of compensation awarded.

In the State of Ohio the number of cases reported under the workmen's compensation act since 1928 and amount paid as compensation were as follows:

	Cases		Cases		Cases
1928	180	1931	114	1934	162
1929	183	1932	148	1935	102
1930	134	1933	134	1936	112

As the above statement shows, the total number of cases of lead poisoning in Ohio during the 9 years, 1928–36, was 1,269. Of these, 77 terminated fatally, equivalent to a rate of 1.3 per million of population. The statement below lists the lead-poisoning cases in Ohio in 1935 and 1936, classified according to the principal occupation of the worker:

	1935	1936
Painters	16	30
Foundry workers	9	23
Storage-battery factory workers	23	18
Sanitary-ware enamelers	13	12
Lead workers	7	8
Printers, electrotypers, and lithographers	5	5
Potters (clay workers)	6	2
Miscellaneous occupations	23	14
Total	102	112

In the State of New Jersey, 1929–35, the number of cases of lead poisoning and amount paid as compensation were as follows:

TABLE 6.—*Cases of Lead Poisoning and Compensation Paid in New Jersey, 1929 to 1935*

Year	Cases of lead poisoning					Compensation paid			
	Total	Deaths	Permanent total disability	Permanent partial disability	Temporary disability	Total	Death or permanent total disability	Permanent partial disability	Temporary disability
Total	962	14	6	502	440	$677,468	$53,790	$477,449	$54,729
1929	124	4	2	40	78	91,490			
1930	169	2	1	61	105	105,593	11,829	74,963	18,801
1931	227	3	1	152	71	217,814	16,946	188,900	11,968
1932	180	1	2	121	56	126,838	17,223	99,790	9,825
1933	128	1		67	60	60,121	1,500	51,124	7,497
1934	70	1		40	29	49,358	1,600	44,933	2,825
1935	64	2		21	41	26,254	4,692	17,739	3,823

In addition to compensation awarded, there were 242 cases in New Jersey in the period covered by the above table in which medical costs, to the amount of $35,295, were incurred. The maximum amount paid in any of these years on account of medical costs—$15,981—was reached in 1930. The proportion of compensation to medical costs indicates a decided decline in lead poisoning during recent years.

The total number of days lost (weighted) during this period was 429,435, of which 84,000 were for permanent total disability, 250,044 for permanent partial disability, and 23,109 for temporary disability.

According to information furnished by the Connecticut Bureau of Occupational Diseases, there were in that State 96 cases of lead poisoning during the 5-year period, 1931–36, as shown in table 7:

TABLE 7.—*Lead Poisoning in Connecticut, 1931–32 to 1935–36*

Year	Total cases	Cases reported by physicians	Compensated cases
Total	96	42	54
1931–32	1	1	
1932–33	26	18	8
1933–34	28	12	16
1934–35	27	8	19
1935–36	14	3	11

In Wisconsin the number of lead-poisoning cases for which compensation is paid is comparatively small. In 1934, the sum of $8,380 was paid in compensation for 13 cases of temporary disability and 1 case of permanent partial disability resulting from this cause. In 1935, $1,259 was paid in compensation for 13 cases of temporary disability. There were no compensated cases of death or permanent total disability in either year. The total number of days lost on account of lead poisoning during these 2 years was 2,287—1,837 in 1934 and only 450 in 1935.

No satisfactory compensation data are available for the State of Massachusetts. The number of cases of lead poisoning reported to the State Department of Labor during the 5 years 1931–35 was 175, with 3 deaths, equivalent to a rate of 0.1 per million of population.

International Statistics of Lead Poisoning

The data for Canada for the period 1931–35 are suggestive of a stationary condition in the frequency of lead poisoning. During 1936 there was a marked increase in the rate, or from an average of 0.8 per million to 1.6, based on 18 deaths for the year. The rates per million of population for the 5-year periods are shown in the following table:

TABLE 8.—*Fatalities From Lead Poisoning in Canada, 1921 to 1936, by 5-Year Periods*

Period	Aggregate population	Total deaths	
		Number	Rate per million
1921–25	32,833,654	25	0.8
1926–30	49,096,000	37	.8
1931–35	53,277,000	44	.8
1936	11,014,000	18	1.6

By Provinces the deaths from lead poisoning in Canada for 1936 were distributed as follows: Ontario, 11; Quebec, 5; Nova Scotia, 1; British Columbia, 1; and no deaths in Prince Edward Island, New Brunswick, Manitoba, Saskatchewan, and Alberta.

For England and Wales data are available since 1911, obtained from the reports of the Registrar General. These data, amplified by statistics on lead poisoning under the Factory Acts, derived from the annual reports of the chief inspector of factories, are shown in table 9.

TABLE 9.—*Cases of Lead Poisoning in England and Wales, by 5-Year Periods*

Period	Aggregate population	Fatalities among general population				Cases under Factory Acts	
		Occupational		Nonoccupational			
		Number	Rate per million	Number	Rate per million	Total	Fatalities
1911–15	181,287,000	444	2.5	46	0.25	2,617	157
1916–20	175,537,000	251	1.4	14	.08	1,259	102
1921–25	192,084,000	241	1.3	13	.07	1,626	119
1926–30	197,252,000	231	1.2	11	.06	1,424	169
1931–35	201,506,000	148	.7	13	.06	884	105
1936	40,600,000	23	.6	4	.10	163	13

The above statistics do not include cases of lead poisoning in house painters and plumbers not employed under the acts. These have been included in the total number of cases given as 1,990 during the first

5-year period, 1,595 during the second, and 914 during the third. The number of deaths in this group was 201 in 1921–25, 206 in 1926–30, and 115 in 1931–35, while the respective fatality percentages were 10.1, 12.9, and 12.6. Of interest in connection with the foregoing is the following tabulation of cases of lead poisoning reported in the United Kingdom, by industrial groups. These statistics have been derived from the annual report of the chief inspector of factories for 1935, amplified by a communication from Dr. Bridges, chief medical inspector of factories, dated February 1, 1937.

TABLE 10.—*Lead Poisoning in the United Kingdom, 1934 to 1936*

Industrial group	All reported cases			Deaths		
	1934	1935	1936	1934	1935	1936
All groups	198	168	163	25	17	12
Smelting of metals	20	17	19	1		1
Plumbing and soldering	6	3	3	1	1	
Shipbreaking	24	10	11			
Printing	3	4	3		1	
Tinning of metals	1					
Other contact with molten lead	10	11	5			
White and red lead works	7	7	5			1
Pottery	26	18	18	8	7	1
Vitreous enameling	8	1	5			
Electric-accumulator works	12	10	15			
Paint and color works	19	21	19	1		
Coach and car painting	8	5	7	1	1	
Shipbuilding	1	3	3	1		
Paint used in other industries	1	2	4	1		1
Other industries	11	24	19	1		2
Painting of buildings	41	32	27	10	7	7

The annual report of the chief inspector of factories and workshops of the United Kingdom is an invaluable source of information regarding lead poisoning in industry, disclosing a wealth of useful information not otherwise obtainable. It is a model of its kind, and the method adopted should be followed by other countries.

The fatalities from lead poisoning, by 5-year periods, are shown for specified countries in table 11. Considerable variation in the mortality rate is evident here, but, as already indicated, the data are not entirely comparable because of the varying practice in the different countries with regard to the inclusion or exclusion of nonoccupational fatalities. All of the countries, however, exhibit a marked decline in the relative frequency of lead poisoning.

As the table indicates, lead poisoning is comparatively rare in the Irish Free State and the Netherlands. The statistics are not entirely satisfactory for certain years, since they include all forms of mineral poison under No. 77 of the international classification of the causes of death, but deaths from mineral poisoning other than lead are very infrequent. On the whole, the statistics can be relied upon as fairly representative of the whole problem. In Denmark the deaths from lead poisoning are also rare, the rate having been 0.3 per million for the period 1931–35, based on 5 deaths. However, during the single year 1936 there were also 5 deaths from this cause, equivalent to a rate of 1.3 per million.

TABLE 11.—*Deaths and Death Rate From Lead Poisoning in Specified Countries, by 5-Year Periods*

Country and period	Aggregate population	Total deaths		Country and period	Aggregate population	Total deaths	
		Number	Rate per million			Number	Rate per million
Scotland:				Netherlands:			
1911–15	23,738,306	15	0.6	1921–25	35,732,943	[1] 6	0.2
1916–20	24,101,793	16	.7	1926–30	38,427,737	[1] 3	.1
1921–25	24,462,722	13	.5	1931–34	32,762,152	[1] 3	.1
1926–30	24,411,691	5	.2	Australia:			
1931–35	24,524,490	8	.3	1926–30	31,408,493	100	3.2
1936	4,966,300	1	.2	1931–35	33,138,325	82	2.5
Irish Free State:				1936	6,777,744	10	1.5
1923–25	9,004,000	[1] 9	1.0	Victoria	1,847,841		
1926–30	14,767,000	[1] 11	.7	New South Wales	2,667,839	2	.8
1931–35	14,908,000	[1] 8	.5	Queensland	987,589	7	7.2
Switzerland:				South Australia	587,549	1	1.7
1926–30	19,948,900	23	1.2	Western Australia	450,036	0	0
1931–35	20,610,900	19	.9				
Italy:							
1928–31	163,345,671	125	.8				
1932–35	169,279,873	123	.7				

[1] Included under No. 77 (mineral poisoning) of the international classification of the causes of death.

The death rate from lead poisoning in Australia is relatively high compared with other countries, but there was a gratifying decline during the last 5 years shown in table 11. Of the 100 deaths during the first 5 years, 85 were males and 15 were females, while during the second 5 years, of the 82 deaths, 58 were males and 24 were females. The Australian situation is interesting, and many of the deaths are probably of nonindustrial origin, but no definite information is available. Of the 82 deaths during the period 1931–35, 10 were of persons under 15 years of age and 29 were persons 15 to 29 years. Because of the high concentration of deaths in Queensland, data, by sex, are shown for that State for the 2 latest 5-year periods and for 1936, in table 12.

TABLE 12.—*Lead Poisoning in Queensland, Australia, 1926 to 1936, by 5-Year Periods*

Period	Aggregate population	Total deaths		Males			Females		
					Deaths			Deaths	
		Number	Rate per million	Aggregate population	Number	Rate per million	Aggregate population	Number	Rate per million
1926–30	4,420,417	40	9.0	2,323,413	27	11.6	2,097,004	13	6.2
1931–35	4,727,636	47	9.9	2,479,421	25	10.1	2,248,215	22	9.8
1936	978,589	7	7.2	512,652	3	5.9	465,937	4	8.6

The situation in Queensland has attracted much attention because of the alleged exceptional frequency of the disease in young children contracted by sucking painted surfaces, toys, etc. It is also alleged that contaminated water supplies play an important part at the present time.

For the Dominion of New Zealand lead-poisoning returns are reported under No. 77 of the international classification, for the 7 years, 1929–35. According to these returns there were 9 deaths during this period, all males, equivalent to a rate of 0.9 per million of population.

For Germany the only data available are the workmen's compensation statistics of lead poisoning for the period 1926–34, based on information derived from the German Statistical Year Book and from correspondence with the German Statistical Office. Table 13 gives the total number of cases reported and the total cases compensated, as well as the number of deaths.

TABLE 13.—*Lead Poisoning in Germany, 1926 to 1934, by Specified Periods*

Period	Total cases reported	Total cases compensated		Deaths	
		Number	Percent	Number	Percent of compensated cases
1926–30	16,170	1,717	10.6	62	3.6
1931–34	5,630	787	14.0	39	5.0

Physical and Clinical Statistics of Lead Workers

To the foregoing discussion of the vital statistics of lead poisoning, some clinical and physical statistics of employees in lead-using industries are added, based on examinations made during the last 2 years. The statistics represent examinations in 9 different plants in Brooklyn, Philadelphia, Chicago, Atlanta, Staten Island, and Oakland, Calif. In the aggregate there were 1,623 employees, of whom 62.9 percent were born in the United States, 8.1 percent in Poland, 4.6 percent in Italy, 3.0 percent in Spain, and the remainder, or 21.4 percent, in 27 different countries.

The average age of 1,621 employees was 38.6 years, the ages ranging from 16 to 71. The largest group of employees were 24 years of age. Of the total, 74.6 percent were married, widowed, or divorced, while 25.4 percent were single. For 1,594 employees the average duration of employment was 88.2 months, or 7.5 years. The range in duration of employment was from 1 day to 509 months (42.4 years).

Table 14 shows the occupational distribution and certain data regarding the workers' previous disease history. The number of workers for whom data were obtained on each point is shown in parentheses.

TABLE 14.—*Occupational Distribution and Disease and Injury Experience of Workers in the Lead Industry*

Department, occupation, and number reporting	Employees reporting	Department, occupation, and number reporting	Employees reporting
Occupational distribution (1,439):	*Number*	Occupational distribution—Continued.	*Number*
White-lead mill	345	Power house	57
Laborers	54	Firemen	29
Packers	47	Engineers	23
Sprinklers	31	Laborers	5
Mixers	19	Oil and color department	26
Pulp-machine operators	18	Laborers	8
Roll operators	18	Fillers	4
Millwrights	12	Grinders	4
Operators, not specified	12	Mixers	3
Foremen	12	Miscellaneous occupations	7
Cylinder cleaners	11	Metal department	23
Washroom workers	11	Laborers	14
Dryer operators	10	Type pressmen	3
Miscellaneous occupations	90	Sheet-lead operators	2
Oxide department	233	Sheet-metal operators	2
Furnacemen	60	Foreman	1
Oxide handlers	24	Metal mixers	1
Packers	21		
Dumping fumes	19	Exposure to lead dust or fumes (1,608):	*Percent*
Pig-lead handlers	17	Exposed	57.8
Operators, not specified	17	Not exposed	42.2
Laborers	16	Former employment (1,612):	
Foremen	11	In lead-using industries	11.4
Miscellaneous occupations	48	Not in lead-using industries	88.6
Oil mill	217	Previous history of lead poisoning (1,617):	
Pressmen	108	None	96.5
Laborers	38	Lead poisoning	3.5
Floormen	16	Previous other diseases (1,606):	*Number*
Coopers	10	Pneumonia	23
Miscellaneous occupations	45	Rheumatism	23
Mechanical department	198	Appendicitis	19
Mechanics	60	Scarlet fever	12
Machinists	27	Diabetes	2
Repairmen	25	Tuberculosis	2
Carpenters	17	Nephritis	3
Electricians	17	Typhoid fever	9
Miscellaneous occupations	52	Other	83
Yard	178	None	1,430
Drawing-lead workers	48	Previous injuries or defects (1,602):	
Setting-lead workers	41	Scars	113
Laborers	40	Fractures	49
Pig-lead handlers	15	Fingers injured	35
Crane operators	13	Fingers missing	18
Miscellaneous occupations	21	Abnormal tonsils	8
Shipping and warehouse departments	162	Leg injuries	8
Laborers	44	Toes missing	7
Drivers and chauffeurs	37	Miscellaneous defects	69
Dock laborers	36	None	1,295
Shipping laborers	28		
Miscellaneous occupations	17		

Certain other clinical data are given in table 15.

TABLE 15.—*Clinical Data on Lead Workers*

Item and number reporting	Range	Average	Largest group
Height (1,614)—inches	52.5– 78.0	67.9	68.0
Pulse rate (1,424)	40.0– 140.0	78.6	72.0
Systolic blood pressure (1,462)	86.0– 234.0	129.6	120.0
Diastolic blood pressure (1,462)	30.0– 145.0	82.2	----------
Body temperatures (832)—degrees	94.0– 101.0	98.4	----------
Specific gravity (1,027)	1,002.0–1,040.0	1,021.0	----------
Hemoglobin (868)—percent	50.0– 140.0	83.7	----------
Chest inspiration (596)—inches	31.0– 55.0	38.0	----------
Chest expiration (596)—do	29.5– 53.3	36.0	----------

Of 1,494 employees, 221 or 14.8 percent had shown a gain in weight, 143 or 9.6 percent a loss, while in 1,130 or 75.6 percent the weight had remained stationary. The average weight of 1,613 employees was 158 pounds, the weight ranging from 100 pounds in 1 case to 284 pounds in another. The maximum group, 43, had a weight of 149 pounds, while the number of persons weighing 200 pounds or more was 46.

The condition of the mouth for 1,607 employees was reported clean in 1,054, or 65.6 percent, while for 300 pyorrhea was reported. In 76 the condition of the mouth was poor, 67 fair, 31 septic, 25 abnormal tonsils, 24 bad, 23 shrunken, and 3 cleft palate. Of 1,273 employees, 74 or 5.8 percent showed a lead line on the gums. The condition of the tongue in 1,596 employees was clean in 1,349 or 84.5 percent, and coated, fissured, or beefy in the remaining 247. The condition of the teeth in 1,603 employees was clean in 327 or 20.4 percent, satisfactory in 324 or 20.2 percent, fair in 372 or 23.2 percent, poor in 90 or 5.6 percent, and bad in 249 or 15.5 percent. Artificial teeth were used by 148 or 9.3 percent.

The condition of the veins in 1,604 employees was indicated as normal in 1,308 or 81.6 percent and fair in 169 or 10.5 percent. Varicose veins were reported for 99, enlarged veins for 19, arteriosclerosis for 8, and relaxed veins for 1, a total of 7.9 percent.

The condition of the heart in 1,615 employees was reported as normal in 1,457 or 90.2 percent. In the remainder, or 9.8 percent, the condition was reported irregular in 45, murmurs in 90, both irregular and murmurs in 8, cardiodegeneration in 5, cardiovascular disease in 2, flabby muscle in 2, poor in 2, and enlarged in 5.

The nervous system in 1,619 employees was reported as normal in 1,558 or 96.2 percent. Neuritis was observed in 24, tremors in 11, poor reflex in 11, a fair condition in 9, paresthesia in 2, nervousness in 2, and headache in 2.

The condition of the digestive system was normal in 1,564 cases, or 96.5 percent of the 1,620 for whom information on this point was obtained. Constipation was observed in 2.2 percent, hemorrhoids in 0.5 percent, a fair condition in 0.4 percent, gall-bladder trouble in 0.1 percent, and miscellaneous conditions in 0.3 percent.

Of 1,617 employees, no indication of hernia was observed in 1,384 or 85.6 percent. Right inguinal hernia was observed in 15 cases, left inguinal in 13, double inguinal in 5, not specified inguinal in 5, bilateral in 1, and others not specified in 15, a total of 3.3 percent. Varicocele was observed in 30 cases and hydrocele in 5, impulse in 124, large rings in 11, enlarged testes in 2, and miscellaneous conditions in 7.

The urinary condition of 877 employees was found to be satisfactory in 781 or 89.0 percent. Nycturia was observed in 92 cases or 10.5 percent, nephritis in 2 cases, and miscellaneous conditions in 3 cases. Chemical analysis of the urine of 1,209 employees revealed that sugar was present in 167 or 13.8 percent, while of 1,215 employees albumen was present in 76 or 6.3 percent.

Anemia was observed in 75, or 9.6 percent of 779 employees, and was not present in 704, or 90.4 percent.

The condition of the skin in 1,556 employees was reported negative in 1,345 or 86.4 percent. The complexion was ruddy in 118 or 7.6 percent, while miscellaneous conditions of minor importance were observed in the remainder.

Of 1,563 employees, 889 or 56.9 percent used respirators and 674 or 43.1 did not use them. The types of respirators used were Pulmosan 30.4 percent, Cover's 30.2 percent, Dustite 20.3 percent, Willson 15.7 percent, Diamond Disk 3.2 percent, and Approved 0.2 percent. Of 1,538 employees, 888 or 57.7 used gloves and 650 or 42.3 percent did not.

The height, weight, and circulatory conditions of the majority of those examined are shown in table 16, by age groups.

TABLE 16.—*Height, Weight, and Circulatory Conditions of Lead Workers, by Age Groups*

Age	Average height		Average weight		Relative weight		Average pulse		Systolic blood pressure		Diastolic blood pressure	
	Number reporting	Inches	Number reporting	Pounds	Number reporting	Average pounds per inch	Number reporting	Beats	Number reporting	Average mm.	Number reporting	Average mm.
Total	1,614	67.90	1,613	158.0	1,612	2.33	1,424	78.6	1,462	129.6	1,462	82.2
Under 30 years	445	69.02	444	157.2	444	2.27	406	80.7	414	124.6	414	78.3
30-39 years	442	67.85	440	157.8	441	2.32	385	79.2	409	125.3	409	81.1
40-49 years	397	67.39	398	161.1	397	2.39	342	76.8	341	130.5	341	83.5
50 years and over	328	67.05	329	156.1	328	2.32	289	77.1	296	141.4	296	87.8
Not specified	2	66.13	2	136.0	2	2.06	2	80.0	2	124.0	2	86.0

INTERNATIONAL COMPARISONS OF INDUSTRIAL ACCIDENT STATISTICS [1]

STATISTICS of workmen's accidents necessarily are based upon the provisions of the workmen's compensation laws, no matter whether the aim of the statistics is to prepare data on the frequency of accidents, on the indemnity of insured accidents, or on the prevention of accidents. And because these laws differ extensively there is a wide variation in the nature and quality of industrial accident statistics, ranging from the very best to the most elementary. Even in countries where there are similar laws, many variations are found therein; for example, they may not include identical professions, or the same categories of workers.

[1] Extracts from a paper by Dr. Alfred Manes, professor of insurance, School of Business Administration, Indiana University, at a meeting of Federal accident statisticians in October 1937.