

World War I and Tuberculosis*

A Statistical Summary and Review

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WORLD War I lasted nearly five years, from the middle of 1914 to November, 1918. The extent to which tuberculosis spread at that time involved countries ‡ all over the globe and will never be fully measured. Neutral nations as well as those at war suffered!

It is unnecessary to remind an audience of epidemiologists, health officers, and registrars that the machinery for the registration of deaths and their causes simply disappeared in areas where fighting was going on, especially at a time when even national governments were forced into exile. After all, in peacetime the current registration of cases of tuberculosis is required in but few countries in this world. However, there are at hand certain sample records which give an idea of the additional suffering caused by tuberculosis during World War I, especially during the five years of 1914 to 1918.

For the purpose I have assembled, I am afraid a bit inadequately but still significantly, such mortality figures as

could be found readily for 24 different countries and 34 large cities scattered over the globe. Onto the years 1914 to 1918, I have added for comparative purposes similar data for the pre-war year 1913 and the two post-war years of 1919 and 1920 (Tables 1 and 2).

Almost everywhere the tuberculosis death rate was highest in 1918 when influenza added its woes and hastened the deaths of many victims of tuberculosis as well as those of others. But for the purpose of ascertaining the progress of tuberculosis during the war years it is perhaps fairer to feature the rates of 1917 against those of 1913 and 1920 (Tables 3 and 4).

IN AMERICA

In the United States, in 1913, our tuberculosis death rate in the light of nowadays was still high, 148 per 100,000 population. The effect of war conditions merely delayed the decline which had been going on for years. Still, the rate went up to 150 in 1918 and in the post-war year 1920 quickly fell to 114. Even then, the deaths in this country in 1917 alone were probably between 18,000 and 20,000 more than they otherwise would have been.

We must also recall that the mortality record from tuberculosis in any one year represents never more than 40 or 50 per cent of all who are attacked by the disease, and that other victims follow in subsequent years among those infected previously.¹

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‡ In World War I, the Central Powers were Germany, Austria-Hungary, Bulgaria and Turkey; the principal Allied Nations were France, Italy, Russia, England and the United States; neutral countries, closely affected, included the Netherlands, Denmark, Norway and Sweden.

TABLE 1
World War I and Tuberculosis
Annual Mortality* from 1913 to 1920 in 24 Different Countries

Country	Population in/about 1920	Rate per Each 100,000 Inhabitants							
		1913	1914	1915	1916	1917	1918	1919	1920
United States	106,543,031	148	147	146	142	147	150	126	114
Ireland	4,480,000†	214	207	220	214	221	218	194	170
Scotland	4,882,497	169	162	164	160	159	160	131	124
England, Wales	37,524,000	135	136	°151	°153	°162	°169	°128	°113
Belgium	7,462,000	118	124	131	149	211	245	144	114
France‡	35,970,000	212	216	218	214	211	243	209	185
Italy‡	36,250,000	143	144	158	166	175	209	173	160
Spain	21,347,000	152	149	160	161	172	204	181	180
Bavaria	7,100,000	177	174	180	194	200	204	186	151
Germany	59,857,283	143	142	148	162	206	229	212	154
Austria‡	30,104,000	259	256	322	387	432	403	360	284
Hungary‡	20,792,709	328	308	354	366	383	410	388	348
Czecho-Slovakia	13,595,816	296	290	325	331	331	359	314	261
Finland†	3,364,000	261	259	269	276	261	258	216	219
Norway	2,649,000	221	221	210	232	212	201	190	190
Sweden	5,904,000	185	193	204	206	195	176	164	162
Denmark	3,218,000	126	131	125	138	158	128	114	113
Netherlands	6,965,700	142	140	144	167	182	203	174	147
Switzerland	3,880,000	202	195	190	191	207	201	200	180
Japan	55,963,053	208	211	213	221	223	248	236	224
Philippines	10,607,872	228	237	239	246	250	315	313	275
Australia	5,412,318	81	75	73	75	66	68	75	67
New Zealand	1,192,620	76	67	63	67	69	75	67	71
South Africa‡	1,519,488	51	45	44	46	50	46	45	46

* All forms of tuberculosis. † Pulmonary tuberculosis. ° Civilian population. ‡ White population. † France, 77 non-invaded departments. Italy, 1917-1920, non-invaded communes. Austria, pre-war, 1913-1918; population, in 1911, 28,649,449; in 1920, 6,476,000. Hungary, pre-war, 1913-1918; population, in 1910, 20,792,709; in 1920, 8,054,000. Compiled from *Epidemiological Reports*, Health Section, League of Nations; *Annuaire Statistique*, France; *Official Yearbooks* of certain countries listed, etc.

NOTE: Because of the difficulty of estimating population in wartimes, tuberculosis death rates mentioned by some authorities differ for certain places—though this does not alter the number of deaths themselves. In cases where original sources of information were available they have been given preference. Thus, instead of quoting rates from the reports of the League of Nations, there has been utilized for Vienna those of its Bureau of Statistics; similarly for France and Paris, the figures of the *Annuaire Statistique de France*; for Hungary, the data received directly from the State Tuberculosis Commission.

We have some measure in the records of the Veterans Administration of the incidence of tuberculosis at that time, and its problem thereafter, among members of the armed forces during World War I. Only last spring, in Chicago, at the annual meeting of the National Tuberculosis Association, Colonel Wolford,² Assistant Medical Director of the Veterans Administration, reported that "By June 30, 1922—less than four years after the armistice—compensation for 'service connected' tuberculosis had been granted to a total of 36,600 living veterans who had served in that conflict."

In 1928, ten years after the first World War, of 6,045 tuberculous

veterans in hospitals, 58 per cent were "service connected." And these figures relate only to the 4,750,000 men in military service during World War I and not to the 95,000,000 civilians.

Spillman³ brought out recently that tuberculosis during World War I has cost for the veterans alone approximately \$960,000,000 to date in compensation, vocational training, insurance, and hospitalization.

In the United States Navy and Marine Corps, according to Smiley and Raskin,⁴ the "original admission rate" to the sick list because of tuberculosis was 372 per 100,000 men in 1915, and rose to 476 in 1918.

In Canada, Miller⁵ reports, in a study published in 1939, that of

TABLE 2

World War I and Tuberculosis

Annual Mortality* from 1913 to 1920 in 34 Large Cities

City	Population in/about 1920	Rate per Each 100,000 Inhabitants							
		1913	1914	1915	1916	1917	1918	1919	1920
New York	5,683,765	199	200	196	182	188	184	152	126
Montreal	603,703	215	225	200	190	195	214	192	182
Rio-de-Janeiro	1,170,660	417	438	434	407	392	444	388	394
Sao Paulo	579,000	117	126	126	109	124	124	116	110
Sydney	955,900	82	69	62	65	55	59	75	71
Melbourne	816,800	110	109	94	104	101	101	104	98
Tokyo	2,437,503	427	409	395	397	381	430	417	352
Bombay	1,200,473	219	192	174	194	216	256	283	187
Belfast	393,000	300	282	262	269	305	319	281	243
Edinburgh	420,000	159	162	148	140	151	124	118	102
London	4,484,523	165	177	199	189	211	214	145	129
Lille	201,000	306	...	...	559	402	540	263	181
Paris	2,904,635	385	396	376	361	358	339	279	272
Madrid	751,352	301	314	327	320	337	390	384	392
Rome	691,314	224	228	241	259	281	392	301	238
Helsinki	197,848	315	263	288	300	245	263	208	204
Oslo	258,403	228	219	214	216	194	201	189	209
Stockholm	422,042	260	273	273	249	231	235	240	209
Copenhagen	561,000	142	149	143	179	197	151	128	118
Amsterdam	647,427	154	160	152	189	203	232	196	157
The Hague	353,286	147†	...	135	138	167	187	155	123
Rotterdam	510,538	147†	...	155	189	211	252	211	169
Brussels‡	775,039	198‡	...	...	...	...	252¶	...	...
Berlin	3,803,770	185	194	207	222	323	320	273	176
Vienna	1,841,326	323	315	362	407	479	476	527	405
Budapest	1,184,616	361	327	397	515	639	642	483	448
Prague	659,251	304	303	338	389	409	397	320	253
Leningrad+	1,962,443	286	299	306	319	331	355	438	504
Moscow	1,120,000	266	249	236	244	232	202	275	397
Kief	366,000	...	...	...	...	...	364	461	688
Warsaw	931,176	306	312	410	600	974	738	593	337
Lodz	447,714	...	...	...	...	1,164	775	604	...
Lwow	217,793	480	586	741	622	665	635	...	...
Cracow	178,386	487	473	480	750	908	845	616	...

* All forms of tuberculosis. † Average annual rate, four year period 1911-1914. ‡ Five year period 1911-1915; ¶ 1916-1920. + Pulmonary tuberculosis. Compiled generally from *Epidemiological Reports*, Health Section, League of Nations, or from official reports of cities listed.

Canadian pensioners of World War I—when 620,000 men enlisted—eventually 8,500 were pensioned for tuberculosis and 3,000 died from the disease. Miller further remarked that for every 100 men killed in action 6 died from tuberculosis; and, for every 100 pensioned for wounds, 25 were pensioned for tuberculosis.

IN EUROPE

In the United Kingdom, World War I not only interrupted the previous decline in the tuberculosis death rate but sent it up each year until 1919. The submarine warfare greatly reduced food supplies, especially in the great

cities of England, Scotland, and even of Ireland (Chart 1).

Whereas, in the pre-war year 1913, in England and Wales the death rate was 135 per 100,000, it rose to 162 in 1917 and to 169 in 1918. In London, in 1917 the rate was 211 and in Belfast 305. Taking as a conservative basis the tuberculosis death rate in 1914 of 136 in England and Wales and applying it to the population for the years 1915, 1916, 1917, and 1918, we find that instead of the 200,833 deaths which might be expected they actually numbered 21,327 more, or 222,160. In the single year of 1918 the number of new cases of tuberculosis notified or

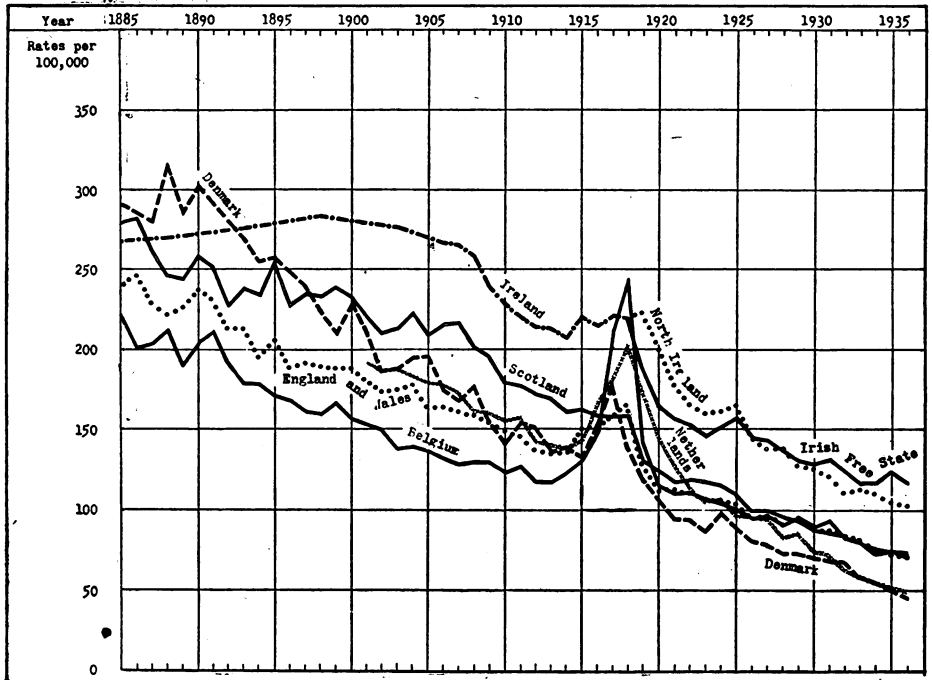


CHART 1—Tuberculosis Death Rates in Great Britain, Belgium, the Netherlands, and Denmark during Fifty Year Period 1885-1935

Based on data exclusively from *Epidemiological Reports*, Health Section, League of Nations

registered was 90,573. The war increase affected mainly the adult population 15 to 45 years of age, men more than women. Among females, the greatest increase was present in the age group 15 to 35.

In both Scotland and Ireland the effect of conditions during World War I was manifested in the maintenance of high tuberculosis rates rather than in an increase.

In France, even before World War I, high tuberculosis death rates were already prevailing. A material rise was recorded, at least in the non-invaded sections, only in 1918 when the rate was 243 per 100,000 as compared with 212 in 1913. France has always been successful in providing for most of its food requirements. We should, however, note the high tuberculosis death rate of 358 in Paris during the year

1917 when, for instance, in New York City ours was 188, or 170 points lower.

Occupied northern France, however, suffered definitely. And, while little information is available as to the tuberculosis situation then existing, we know that in the industrial city of Lille the tuberculosis death rate rose to 402 in 1917 and 540 in 1918. How abnormal this was can be realized when we notice that in 1920 the rate fell to 181.

During the four years from 1915 to 1918, in 77 departments of France tuberculosis alone caused 291,412 deaths.

Italy, which previous to World War I had a comparatively favorable tuberculosis death rate, saw its northern communes invaded by Austro-Hungarian forces and suffered a definite increase of tuberculosis. As against a death rate of 143 in 1913, the rate

rose to 175 in 1917 and 209 in 1918. And, whereas in most countries the post-war rate of 1920 was lower than the pre-war rate of 1913, here it remained at 160 compared with 143. In Rome, tuberculosis was rife and the rate in 1918 ran up to 392, or 75 per cent higher than only six years previously.

Altogether in Italy, during the four year period 1915-1918, tuberculosis deaths in the non-invaded sections totalled 254,469, or 47,095 more than would have been expected had the 1914 rate merely continued to prevail.

In war-swept Belgium, the tuberculosis death rate in 1918 was double that of 1914, 245 as compared with 124. And but for the emergency relief organized at that time conditions would

have been worse. Here, even in the rural sections, the tuberculosis rates were as high as those in crowded large cities, the rate in Brussels, 252, being only 7 points higher than that of the country as a whole.

CENTRAL POWERS

The record among the principal Central Powers in World War I—Germany, Austria-Hungary, excepting Bulgaria and Turkey for which there are no figures available here—will always remain a classic instance of tuberculosis and war conditions, especially when there are marked deficiencies of food (Chart 2). In the pre-war year of 1913, Germany was experiencing one of its lowest tuberculosis death rates in a decade. The

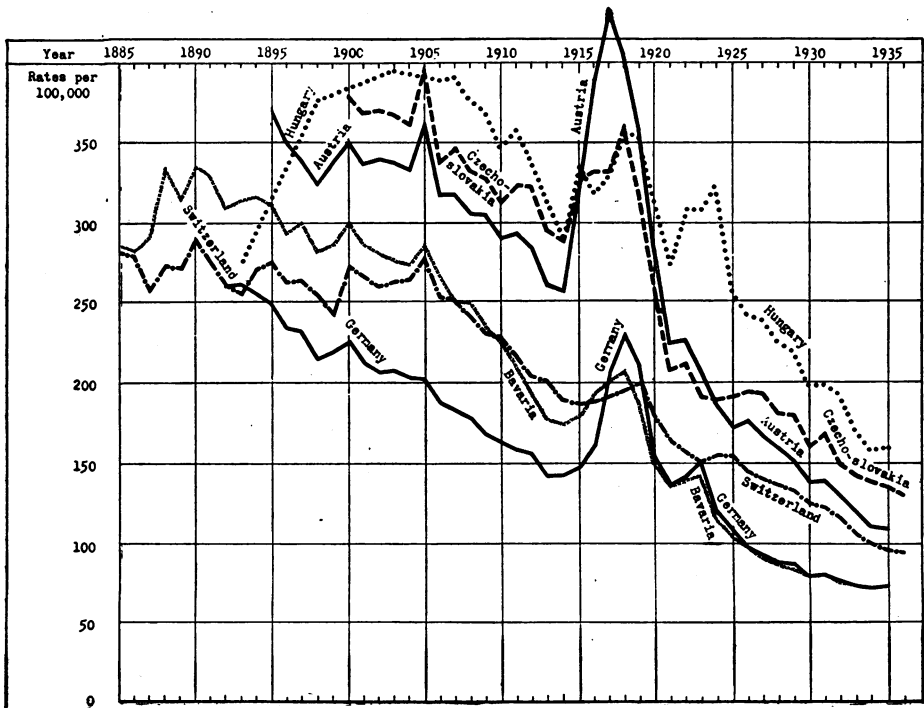


CHART 2—Tuberculosis Death Rates in Switzerland, Bavaria, Austria-Hungary, and Czechoslovakia during Fifty Year Period 1885-1935

Based on data exclusively from *Epidemiological Reports*, Health Section, League of Nations

TABLE 3

Tuberculosis Mortality in 24 Different Countries
in Pre-war, Mid-war and Post-war Years: 1913, 1917, and 1920*

Country	Pre-war 1913		Mid-war 1917		Post-war 1920	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
United States	142,838	148	150,194	147	121,459	114
Ireland	9,387	214	9,680	221	7,651	170
Scotland	8,073	169	7,680	159	6,038	124
England, Wales	49,476	135	55,934	162	42,545	113
Belgium	8,774	118	15,720	211	8,507	114
France†	84,443	212	71,247	211	66,824	185
Italy‡	52,864	143	62,167	175	57,848	160
Spain	30,116	152	35,586	172	38,425	180
Bavaria	12,479	177	14,237	200	10,800	151
Germany	94,927	143	133,223	206	92,793	154
Austria‡	75,379	259	130,049	432	18,812	284
Hungary‡	69,883	328	71,012	383	28,028	348
Czecho-Slovakia	41,434	296	45,624	331	35,555	261
Finland†	8,316	261	8,570	261	7,360	219
Norway	5,457	221	5,452	212	5,033	190
Sweden	10,428	185	11,289	195	9,564	162
Denmark	3,618	126	4,839	158	3,636	113
Netherlands	8,890	142	12,128	182	10,240	147
Switzerland	7,788	202	8,047	207	6,984	180
Japan	110,753	208	124,787	223	125,165	224
Philippines	18,392	228	22,849	250	26,474	275
Australia	3,800	81	3,364	66	3,607	67
New Zealand	812	76	755	69	851	71
South Africa‡	676	51	711	50	688	46

* All forms of tuberculosis. † Pulmonary tuberculosis. ‡ Civilian population. § White population. † France, 77 non-invaded departments. Italy, 1917-1920, non-invaded communes. Austria, pre-war, 1913-1918; population, in 1911, 28,649,449; in 1920, 6,476,000. Hungary, pre-war, 1913-1918; population, in 1910, 20,792,709; in 1920, 8,054,000. Compiled from *Epidemiological Reports*, Health Section, League of Nations; *Annuaire Statistique*. France; *Official Yearbooks* of certain countries listed, etc.

war and the blockade had first made their influence felt in 1914 by arresting progress. In 1915 the rate rose 6 points higher; in 1916, there was an increase of 12,000 deaths over the pre-war annual figures. Steadily the specter of tuberculosis rose and an increasing number of victims were taken in 1917 and 1918. In the latter year, 54,817 more deaths from tuberculosis occurred than in 1914.

The number of deaths from all forms of tuberculosis during the year ending the war, 1918, totalled 147,733 as against 92,916 in 1914. The death rate of 1918 was 229 as compared with 142 in 1914, representing a 60 per cent rise over that of four years previous. The death rate of 1920 was still higher than that of 1914, 154 against 142.

During the seven years from 1914

to 1920 inclusive, tuberculosis alone killed 800,000 people in Germany.

The 50,000,000 people of pre-war Austria-Hungary paid an even higher toll from tuberculosis than did the German people during World War I. It should first be remarked, however, that in those central sections of Europe high tuberculosis death rates were then prevailing. In 1913, the rate was 259 per 100,000 in Austria and 328 in Hungary; in the latter country, it rose to 410 in 1918. In Austria, the tuberculosis death rate of 1917, namely 432, exceeded that of 1913 by 67 per cent. In that mid-year of the war, the tuberculosis deaths in Austria numbered 130,049 as compared with 75,379 in 1913.

Everyone recalls the terror tuberculosis inspired in Vienna during the war years, the death rate going up

TABLE 4
Tuberculosis Mortality in 34 Large Cities of the World*
in Pre-war, Mid-war and Post-war Years: 1913, 1917, and 1920

City	Pre-war 1913		Mid-war 1917		Post-war 1920	
	Deaths	Rate	Deaths	Rate	Deaths	Rate
New York	10,031	199	10,142	188	7,135	126
Montreal	1,073	215	1,088	195	1,100	182
Rio-de-Janeiro	4,045	417	4,217	392	4,608	394
Sao Paulo	533	117	650	124	634	110
Sydney	784	82	526	55	787	71
Melbourne	898	110	825	101	800	98
Tokyo	8,697	427	8,959	381	8,365	352
Bombay	2,152	219	2,118	216	1,841	187
Belfast	1,188	300	1,201	305	1,008	243
Edinburgh	540	159	575	151	417	102
London	5,863	165	6,768	211	4,675	129
Lille	662	306	869	402	391	181
Paris	10,975	385	10,184	358	7,907	272
Madrid	2,262	301	2,930	390	2,945	392
Rome	1,549	224	1,943	281	1,645	238
Helsinki	623	315	485	245	404	204
Oslo	589	228	501	194	540	209
Stockholm	1,097	260	975	231	882	209
Copenhagen	796	142	1,105	197	661	118
Amsterdam	997	154	1,314	203	1,016	157
The Hague	519	147†	590	167	435	123
Rotterdam	750	147†	1,077	211	863	169
Brussels‡	1,552	198‡	1,853	252‡	...	...
Berlin	7,037	185	12,286	323	6,695	176
Vienna	6,376	323	9,084	479	7,457	405
Budapest	4,276	361	7,570	639	5,307	448
Prague	1,638	304	2,485	409	1,668	253
Leningrad†	6,122	286	7,203	331	9,891	504
Moscow	4,508	266	4,296	232	4,450	397
Kief	...	...	*1,332	364	2,445	688
Warsaw	3,315	306	9,070	974	3,138	337
Ldoz	...	...	5,097	1,164	2,704§	604§
Lwow	1,006	480	1,425	665	...	...
Cracow	778	487	1,548	908	...	...

* All forms of tuberculosis. † Average annual rate, four year period 1911-1914. ‡ Five year period 1911-1915; § 1916-1920. + Pulmonary tuberculosis. ° Year 1918. § Year 1919. Compiled generally from *Epidemiological Reports*, Health Section, League of Nations, or from official reports of cities listed.

steadily from 315 in 1914 to 362 in 1915, 407 in 1916, 479 in 1917, 476 in 1918, reaching 527 in 1919 even after the war—and this mortality was only among civilians. In addition, there were almost a third as many other tuberculosis deaths in military hospitals of the city.

But how few of us are aware that conditions were even worse in Budapest. Official reports, which appeared subsequently, revealed tuberculosis death rates in Hungary's capital of 515 in 1916, of 639 in 1917, and of 642 in 1918.

A partial estimate of the additional deaths due to tuberculosis because of

World War I conditions in Germany and Austria-Hungary alone—not to mention their allies at that time, Bulgaria and Turkey—can again be made by applying the 1914 rate to the 4 year period of 1915-1918. The expected number of deaths should have been 905,376; instead the actual number recorded was 1,228,437, an excess during four years alone of 323,061.

The magnitude of this excess mortality due to tuberculosis in Austria-Hungary can be better visualized when we recall that all the American soldiers killed or who died during World War I, namely 126,000, were less than half of the number just quoted.

RUSSIA, POLAND

Of other warring nations at that time, only the barest tuberculosis records are at hand for so large and important a country as Russia. There, war was followed by defeat at the hands of Germany, a second war with Poland, finally by revolution and famine. Conditions in Russia in 1920 were even worse than in 1917 or 1918.

Personal communications and figures which I received subsequently from Wedenskaya,⁶ of the State Tuberculosis Institute, stated that in Moscow the death rate, which was 202 in 1918, rose only two years later, namely in 1920, to 397 or by nearly 100 per cent. In Leningrad, each year of the war and for a time thereafter, an increase in tuberculosis mortality was registered. Starting in 1914 at 299, the death rate was 306 in 1915, 319 in 1916, 331 in 1917, 355 in 1918, 438 in 1919 and 504 in 1920. At Kief, in the Ukraine, according to the Health Section of the League of Nations, an even more frightful death rate prevailed in 1920, 688 per 100,000 population.

The Polish people, caught in the whirlpools of war between, and with, both Germany and Russia, suffered most from tuberculosis; partial records are available for only a few centers of population. In Warsaw, the death rate in 1917 was treble that of 1913—974 compared with 306. In Lwow, the death rate reached 741 as early as 1915. In Cracow, the tuberculosis death rate in 1917 was 908, or nearly twice that of 1913. And, in Ldoz, the incredible rate of 1,164 was attained in the mid-war year of 1917. Eleven persons out of every 1,000 living there died from tuberculosis in a single year.

NEUTRAL COUNTRIES

Neutral countries, especially those neighboring on the war zones, felt and also registered a higher tuberculosis mortality from the effects of the

blockade and interference with the flow of commodities, especially food.

In Spain, the tuberculosis death rate rose steadily until 1918 and kept higher both in 1919 and 1920 than in the pre-war year of 1913. From 152 at first it went up to 172 in 1917 and to 180 in 1920. In Madrid, as against a rate of 301 in 1913, we find one of 392 in 1920.

In the Scandinavian group of Finland, Norway, and Sweden, at some time or other, each experienced during the war years high tuberculosis death rates or some increase.

Denmark and the Netherlands also paid a toll of lives to the Moloch of tuberculosis. In 1917, the tuberculosis death rate of the Danes, 158 per 100,000 population, was 25 per cent higher than in 1913.

In Holland, at the same time, the death rate rose from 142 to 182, or by 28 per cent. In Amsterdam, Rotterdam, and The Hague, the death rates were higher than usual throughout the war. According to Prinzing,⁷ during the six years of 1915 to 1920 inclusive there were 67,639 deaths from tuberculosis in Holland among the 6,800,000 people then living in that country. In 1918, the death rate among men was 40 per cent higher than in 1914 and that of women had increased by 50 per cent.

A significant remark at that time might be quoted here: "During war-time, governments were generally careful at least to assure sufficient food for the soldiers at the front, whereas for the civilian population and the women it was limited and rationed."

Even in far-off Japan the decline of tuberculosis was delayed by World War I. Higher rates than in 1913 prevailed throughout the war years. That nation paid a high price for the hard conditions under which its people labor. In 1918, the death rate in Tokyo was 430; women suffered even

more than the men. More than half of the deaths in females occurred among girls and young women between the ages of 10 and 30.

* * *

We are told that among the armed forces of the entire British Empire in World War I, which lasted more than four years, 908,371 soldiers were killed or died. In the twenty-four countries to which we have been referring and which do not include Russia, during the single year of 1917—not the worst year which was 1918 but which I am not stressing because of the influenza pandemic—there were recorded in just twelve months 1,005,144 deaths from tuberculosis alone.

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Medical Care Versus the Draft

Testimony on June 13 before the House Committee on Postwar Military Policy in Washington related to the enactment of legislation requiring peacetime training.

According to the *New York Times*, Lewis G. Hines, speaking for the American Federation of Labor, told the committee that if health and discipline were the objectives of the proposal, then the government should provide a health program that would benefit citi-

zens before they reach military age, and that the nation should look to the family, the schools, the church and community institutions for discipline.

"We believe," he said, "that it is very important to the national welfare, especially from a military standpoint, that more adequate medical care be given to the children of the nation, in order that they may be fit to serve their nation's need upon reaching the age of maturity."