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BUREAU OF LABOR**

**CHAS. P. NEILL, Commissioner**

**CARE OF  
TUBERCULOUS WAGE EARNERS  
IN GERMANY**

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# CONTENTS.

	Page.
Introduction and summary.....	5-11
Mortality from tuberculosis in the German Empire.....	11-15
Comparative mortality from tuberculosis in Germany and in the United States.....	15-18
Estimated economic loss from tuberculosis to wage earners in the United States.....	18, 19
Estimated economic value of sanatorium treatment in Germany.....	20-22
Legal provision for treatment and care by invalidity insurance institutions.....	22, 23
Number of German wage earners receiving sanatorium treatment in 1910.....	23, 24
Cost of sanatorium treatment of German wage earners in 1910.....	24-26
Restoration of earning capacity of wage earners resulting from sanatorium treatment.....	26-32
Comparative results of institutional and noninstitutional treatment.....	32, 33
Comparative results of hospital and sanatorium treatment.....	33, 34
Organization and activities of the German Central Committee for the prevention of tuberculosis.....	34-38
Dispensaries and information bureaus.....	35, 36
Treatment and care of tuberculous children.....	36
Present status of agencies for prevention and cure of tuberculosis.....	36, 37
Conclusions in regard to work of German Central Committee.....	37, 38
Treatment of tuberculous wage earners in public institutions, 1896 to 1901.....	38-58
How cost of treatment is provided for.....	39
Age, sex, and conjugal condition of patients under treatment.....	40, 41
Proportion of indoor and outdoor workers.....	41
Dust and fumes as a predisposing cause of tuberculosis.....	41, 42
Unfavorable occupational conditions.....	42, 43
Social condition.....	43
Patients with a family history of tuberculosis.....	43, 44
Predisposing or complicating causes in tuberculosis.....	44, 45
Previous sanatorium treatment.....	45
Previous duration of disease.....	45, 46
Relation of treatment to stage of disease.....	46, 47
Condition of patients on admission.....	47, 48
Relation of treatment to gain in bodily weight.....	48, 49
Changes in condition during treatment.....	49
Cough and expectoration on admission and discharge.....	50
Tuberculous bacilli in the sputum on admission and discharge.....	50-52
Duration of treatment.....	52, 53
Medical result of treatment.....	53, 54
Economic results of treatment.....	54, 55
Importance of treatment in the incipient stage of the disease.....	55, 56
German sanatorium experience, 1896 to 1901.....	56-58
Treatment and care of tuberculous wage earners by German invalidity insurance institutions, 1897 to 1909.....	58-98
Number of patients treated, by sex.....	60, 61
Expenditures on account of treatment and care, 1897 to 1909.....	61-63
Increase in expenditures on account of treatment and care.....	63, 64
Comparison of contributions and expenditures for treatment.....	64
Expenditures during 1909.....	64, 65
Proportion of insured population treated and cared for during 1909.....	65

	Page.
Treatment and care of tuberculous wage earners by German invalidity insurance institutions, 1897 to 1909—Concluded.	
Proportion of patients treated, by selected States.....	65, 66
Notification of army recruits who were rejected on account of tuberculosis.	66
Financial aid given by invalidity insurance institutions in the campaign against tuberculosis.....	67
Family support of tuberculous wage earners in public sanatoria.....	68, 69
Methods of treatment and care.....	69-75
Per capita cost of treatment and care.....	75, 76
Financial statistics of sanatoria owned by German invalidity insurance institutions.....	76, 77
Loans provided for the erection of public sanatoria.....	77, 78
Suitable employment of tuberculous patients.....	78
Average cost and duration of treatment.....	78-80
Effect of premature discontinuance of treatment.....	81
Statistics of readmissions for treatment.....	81-83
Classification of tuberculosis according to Turban stage of disease.....	83, 84
Statistics of admission and discharge according to Turban stage of disease.	84-87
Postdischarge results of sanatorium treatment.....	87-94
Financial statistics of successful and unsuccessful sanatorium treatment..	94-96
General conclusions as to the value of institutional treatment for tuberculosis.	96-98
Administrative control of tuberculosis, with special reference to tuberculosis dispensaries, information bureaus, and housing reform.....	98-116
Limitations of sanatorium treatment.....	98, 99
German tuberculosis dispensaries and information bureaus.....	99, 100
Organization and scope of the tuberculosis dispensary.....	100, 101
Tuberculosis dispensaries in Germany in 1911.....	101, 102
Tuberculosis dispensaries in Berlin.....	102-104
Tuberculosis dispensaries in Hamburg.....	105, 106
Tuberculosis dispensary in Leipzig.....	106, 107
Tuberculosis dispensary in Munich.....	107-109
Tuberculosis dispensaries in Silesia.....	109
Tuberculosis dispensary in Augsburg.....	109, 110
Tuberculosis dispensaries in Westphalia.....	110, 111
Agricultural colony for tuberculous wage earners.....	111, 112
Control of tuberculosis through housing reform.....	112-114
Building loans by invalidity insurance institutions.....	114-116
Town planning and sanitary progress in Germany.....	116
Experience data of representative invalidity insurance institutions in the treatment and care of tuberculous wage earners in 1910.....	117-161
Berlin.....	117-125
Westphalia.....	125-130
Rhenish Prussia.....	130-136
Wurttemberg.....	136-143
Baden.....	143-149
The Hanse Towns.....	149-161
Appendix I.—Treatment of tuberculous wage earners in public institutions, 1902 to 1904.....	162-164
Appendix II.—Memorandum on tuberculosis, compiled by German Imperial Board of Health at Berlin.....	165-169
Appendix III.—Definition of German terms relating to treatment and care of tuberculous wage earners.....	169, 170
Appendix IV.—Legal provisions regarding treatment of actual or prospective invalids.....	171-173
Appendix V.—Bibliography.....	173-179

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## CARE OF TUBERCULOSIS WAGE EARNERS IN GERMANY.

BY FREDERICK L. HOFFMAN.

### INTRODUCTION AND SUMMARY.

Under the German compulsory invalidity insurance law which went into effect on January 1, 1900, provision was made that—

If an insured person is so ill that incapacity to earn a livelihood is to be apprehended as a consequence of the illness, which would constitute a claim to a pension in accordance with the laws of the Empire, the insurance institution is entitled to cause him to undergo a cure to the extent it may think desirable in order to avert this loss. The insurance institution can effect the cure by placing the sick person in a hospital or in an establishment for convalescents. If the sick person is married, if he has a household of his own, or if he is a member of the household of his people, his consent to this step is required.

Since tuberculosis of the lungs is responsible for 15 per cent of the disability annuities granted to males and for 9.5 per cent of those granted to females, extended provision has been made on the basis of the foregoing provision for the systematic treatment and care of tuberculous wage earners throughout the German Empire. The importance of tuberculosis as a cause of invalidity or wage-earning disability is better emphasized by the statement that of the annuities granted during 1896 to 1899 the proportion paid to males at ages 20 to 24 on account of tuberculosis of the lungs was 54.9 per cent; at ages 25 to 29, 50.9 per cent; at ages 30 to 34, 43.9 per cent; and at ages 35 to 39, 36.7 per cent. The proportions for females were, at ages 20 to 24, 42.6 per cent; at ages 25 to 29, 34.3 per cent; at ages 30 to 34, 25.8 per cent; and at ages 35 to 39, 20.3 per cent.

For the systematic treatment and care of tuberculous wage earners a chain of special sanatoria was gradually established by the invalidity insurance institutions. Commencing with 1 in 1895, the number of sanatoria by 1902 had increased to 15, and by 1909 to 37. In addition thereto, a number of public sanatoria were established by provincial, communal, and other authorities, largely out of funds provided at low rates of interest by the invalidity insurance institu-

tions. In 1911 there were 99 of these public sanatoria for the treatment of tuberculous wage earners in the German Empire.

Commencing with 3,334 tuberculous wage earners provided with systematic institutional treatment in public sanatoria in 1897, the number had increased to 16,489 in 1902 and to 42,232 in 1909. During the period 1897 to 1909, in the aggregate, 272,480 tuberculous wage earners were treated and cared for, and of this number 194,787 were males and 77,693 were females.

Commencing with an annual expenditure on account of tuberculous wage earners in 1897 of 1,024,507 marks (\$243,833), the amount had increased to 5,858,615 marks (\$1,394,350) in 1902 and to 16,303,618 marks (\$3,880,261) in 1909. During the period 1897 to 1909 the total amount disbursed on account of institutional treatment and care for tuberculous wage earners on the part of invalidity insurance institutions was 99,673,648 marks (\$23,722,328). The average cost of treatment on account of tuberculosis in sanatoria owned and maintained by invalidity insurance institutions was 4.60 marks (\$1.09) per patient per day. The maximum cost was 8.96 marks (\$2.13) and the minimum cost 2.97 marks (71 cents).

The 37 sanatoria owned and operated by invalidity insurance institutions in 1909 provided 3,134 beds for males and 1,289 beds for females. The cost of the ground occupied was 2,256,438 marks (\$537,032); the cost of buildings, 38,238,124 marks (\$9,100,674); and the cost of installation, 4,349,854 marks (\$1,035,265). The annual cost of maintenance during 1909 was 7,820,388 marks (\$1,861,252). The number of male patients treated was 16,593, and of female patients, 6,141.

Up to December 31, 1909, the invalidity insurance institutions had loaned 13,062,625 marks (\$3,108,905) for the building of sanatoria maintained by provincial, communal, or other authorities. Of this sum, 1,252,607 marks (\$298,120) had been repaid, leaving a net outstanding obligation of 11,810,017 marks (\$2,810,784).

The average cost of treatment per patient per annum in all institutions was 386.05 marks (\$91.88). The cost for male patients was 404.22 marks (\$96.21) and for female patients 344.97 marks (\$82.10). The average cost per patient per day was 5.41 marks (\$1.29), or 5.77 marks (\$1.33) for males and 4.29 marks (\$1.02) for females.

The average duration of treatment was 73 days, having been 70 days for males and 80 days for females.

The economic results of institutional treatment and care on account of tuberculosis of the lungs are determined by means of special inquiry for a period of five years subsequent to the patient's discharge. By economic results is meant the restored wage-earning capacity to the extent, at least, of 33.3 per cent of the patient's wage-earning ability previous to the disease. Selecting, for illustration, the male patients discharged during 1905 with their wage-earning

capacity fully restored within the meaning of the insurance laws, the proportion retaining their earning capacity to the end of 1905 was 76 per cent; to the end of 1906, 63 per cent; to the end of 1907, 54 per cent; to the end of 1908, 48 per cent; and to the end of 1909, 44 per cent. The corresponding economic results for women patients were somewhat better, having been respectively, 78 per cent for the first year, 67 per cent for the second, 60 per cent for the third, 55 per cent for the fourth, and 52 per cent for the fifth year.

The tendency is distinctly toward an improvement in the economic results as is made evident by the fact that while of the male patients treated in 1897 only 68 per cent were discharged with their earning capacity restored, the corresponding proportion for 1909 was 83 per cent. For female patients the results were exactly the same.

On account of 24,337 male patients successfully treated from an economic point of view, 10,456,400 marks (\$2,488,623) was expended during the year 1909, or an average expenditure of 429.65 marks (\$102.26). On account of 4,940 male patients unsuccessfully treated from an economic point of view during 1909, the sum of 1,378,094 marks (\$327,986) was expended, or an average expenditure of 278.97 marks (\$66.40). On account of 10,794 female patients treated successfully from an economic point of view during 1909 the sum of 3,911,657 marks (\$930,974) was expended, or an average expenditure of 362.39 marks (\$86.25). On account of 2,161 female patients unsuccessfully treated from an economic point of view the sum of 557,467 marks (\$219,912) was expended, or an average expenditure of 257.97 marks (\$61.40).

The economic and medical results of treatment are naturally more or less determined by the condition of the disease on admission. Of the 24,766 male patients admitted for treatment during 1909, the number in the first Turban stage of the disease<sup>1</sup> was 12,015, or 49 per cent; in the second stage, 9,161, or 37 per cent; and in the third stage, 3,590, or 14 per cent. Of the 20,567 male patients successfully treated and discharged with their earning capacity restored to them, 11,111 were in the first Turban stage of the disease, or 92 per cent of all admitted in that stage of the disease; the number in the second Turban stage of the disease on discharge was 7,777, or 85 per cent of those admitted in that stage; the number discharged in the third Turban stage was 1,679, or 47 per cent of those in the third Turban stage of the disease when admitted.

Of the 10,379 female patients admitted, 5,826, or 56 per cent, were in the first Turban stage of the disease; 3,399, or 33 per cent, were in the second stage; and 1,154, or 11 per cent, were in the third. Of those successfully treated, on discharge, 5,507 were in the first Turban stage of the disease, or 95 per cent of those admitted in that

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<sup>1</sup> For explanation of the term "Turban stage," see page 83.

stage. Of those discharged, 2,670 were in the second Turban stage of the disease, or 79 per cent of those admitted in that stage of the disease. Of those discharged, 385 were in the third Turban stage, or 33 per cent of those admitted in that stage of the disease.

The economic and medical results are affected by the inclusion of patients who were less than 14 days under treatment. If these are deducted, the proportion of male patients treated successfully from an economic point of view was increased from 83 to 86 per cent; and the same results were secured in the case of females.

Of every 1,000 male patients discharged, 5 required readmission for treatment during the first year of admission, 59 after one year of admission, 68 after two years, 45 after three years, and 33 after four years. Of every 1,000 female patients, 3 required readmission during the first year, 51 during the second, 48 during the third, 34 during the fourth, and 23 during the fifth year.

In addition to a large expenditure for institutional treatment and care of tuberculous wage earners through invalidity insurance institutions, considerable sums are paid out in support of the general anti-tuberculosis movement, which within recent years has made material progress throughout the German Empire. In 1909, 288,365 marks (\$68,631) was disbursed for various purposes, chiefly in support of tuberculosis dispensaries and information bureaus. The corresponding expenditure during 1908 was 248,805 marks (\$59,216). In 1910 the sum of 480,964 marks (\$114,469) was expended for aid and support of the general antituberculosis movement, and of this sum 297,941 marks (\$70,910) was in the nature of subventions to tuberculosis dispensaries and information bureaus.

There were in 1911 some 99 public sanatoria in the German Empire, and of this number, in 1910, 38<sup>1</sup> were owned and maintained by invalidity insurance institutions. There were in addition 34 private sanatoria, some of which provided for wage earners at reduced rates. For tuberculous children 22 institutions were in operation in 1911, and in addition thereto for children likely to become tuberculous or scrofulous, or otherwise in need of institutional care as a safeguard against tuberculosis, 86 institutions were in operation, providing treatment free or at very reasonable rates; the number of sanatoria for school children only was 7, and the number of forest day and night camps was 98. The number of open-air or forest schools in 1911 was 15, and two agricultural colonies had been established, one in the Province of Brandenburg and one in the Grand Duchy of Oldenburg. For far-advanced cases 96 homes for incurables were in operation, or in the form of isolation divisions of hospitals established and maintained for general purposes. For the benefit of discharged patients in need of supple-

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<sup>1</sup> Statistik der Heilbehandlung, 1905-1910, p. 69.

mentary treatment and care 17 convalescing homes were in operation, and for the study of incipient cases to determine the stage of the disease, or the actual existence of tuberculosis, there were 33 observation stations, chiefly in connection with sanatoria or general hospitals. There were also 19 polyclinics for the tuberculous, conforming probably to the tuberculosis clinic as clearly differentiated from the tuberculosis dispensary. The number of tuberculosis dispensaries and information bureaus was 528, and in addition thereto 537 dispensaries were maintained in the Grand Duchy of Baden. A large number of tuberculosis associations are in active operation, providing the means for a systematic warfare against the disease throughout the entire German Empire, the work being directed through, and if necessary sustained by the financial assistance of the German Central Committee, which is under the protection of Her Imperial Majesty the German Empress, and the presiding honorary officer of which is the imperial chancellor.<sup>1</sup>

The German Central Committee had on January 1, 1910, funds of 370,349.55 marks (\$88,143.19), receiving in membership fees 39,877 marks (\$9,490.73); in gifts, 15,000 marks (\$3,570); in interest, 16,245.28 marks (\$3,866.40); and by way of imperial subsidy, 60,000 marks (\$14,280). It expended during the year, in the form of financial aid to the establishment of sanatoria and other tuberculosis institutions, the sum of 177,300 marks (\$42,197.40). For tuberculosis museums, 33,316.68 marks (\$7,929.37); for the special campaign against lupus, 30,000 marks (\$7,140); and for all other purposes the sum of 59,880.10 marks (\$14,251.46), including 29,081.76 marks (\$6,921.46) for administration.<sup>2</sup>

It is evident from the foregoing that the antituberculosis movement throughout the German Empire is thoroughly organized and sustained by ample funds. The results of systematic treatment and institutional care have been quite satisfactory and, as far as known, sufficient to reimburse the insurance institutions by the release of funds that would otherwise have been required for the payment of disability annuities.

Largely as the result of the general movement against tuberculosis and the provision for institutional and dispensary care, the general tuberculosis death rate of German cities has progressively declined. From an average of 23.08 per 10,000 during 1895-1899 the rate for the German Empire as a whole has declined to 21.16 during 1900-1904 and 18.45 during 1905-1909. The mortality from tuberculosis of the lungs in German cities has declined from an average rate of 34.6 per 10,000 of population during 1880-1884, to 27.4

<sup>1</sup> *Bellage zum Geschäftsbericht, 1911.* Published by the German Central Committee, Berlin, 1912.

<sup>2</sup> *Annual Report of the German Central Committee for 1911.*

during 1890-1894, to 21.0 during 1900-1904, and finally to 17.9 during 1905-1909. The tuberculosis death rate of Berlin has decreased from 34.7 per 10,000 in 1880 to 17.9 in 1909; of Bremen, from 39.7 to 15.1; of Cassel, from 32.4 to 12.2; of Chemnitz, from 27.7 to 12.6; of Cologne, from 41.4 to 15.6; of Dresden, from 36.9 to 17.7; of Essen, from 40.9 to 10; of Frankfort, from 37.7 to 15.8; of Hanover, from 42.4 to 11.5; of Leipzig, from 35.5 to 16.3; of Munich, from 40.5 to 22.9; of Strassburg, from 33.5 to 19; and finally, of Stuttgart, from 23 to 16.8.

These results are unquestionably, in a large measure, due to the intelligent and well-sustained effort which has been made throughout the German Empire to reduce the mortality and morbidity, as well as the economic consequences of the formerly excessive death rate from tuberculosis. The movement has been nation-wide and has enlisted the hearty cooperation of employers and employees, the public at large, and the numerous governmental authorities—from the Empire itself to the royal, provincial, municipal, and communal governing bodies. A large number of public associations have been established and are being maintained by private subscription, which in the aggregate must amount to a very considerable sum.

Within recent years vast sums of money have been provided for building purposes by invalidity insurance institutions, as well as through provincial and communal authorities. Up to December 31, 1910, 320,000,000 marks (\$76,160,000) had been furnished in the form of loans for building purposes through invalidity insurance institutions, and the tendency is decidedly toward a gradual reconstruction of the housing accommodation of the wage-earning population. This effort is under strict governmental supervision as a first requisite for the safeguarding of the public interests against speculation and misdirected effort contrary to the common good. Extensive inquiries have fully established the direct relation between insanitary housing accommodation and the excessive mortality from tuberculosis and possibly from nontubercular lung diseases. The problem of housing reform is, therefore, one of material importance to the invalidity insurance institutions, and this explains the considerable extent to which these institutions have financially sustained the nation-wide effort to improve the living conditions of wage earners and their families.

What has been done in all of these directions has naturally reacted most favorably to the advantage of the German people as a whole. The activity of invalidity insurance institutions in the field of social betterment is obviously conditioned by the vital interests which these institutions have, perhaps not so much in a low death rate as in a low morbidity rate. Every case of tuberculosis involves a material risk to these institutions, which comprehend in their membership practically the entire wage-earning population. The position of life

insurance companies in this respect, however, is a very different one, and it should be thoroughly understood that not a single German life insurance company—all assertions to the contrary notwithstanding—has seen its way clear to undertake the treatment and care of its tuberculous policy holders in the manner which has been found possible and expedient for members of invalidity insurance institutions maintained in compliance with law by the compulsory contributions of employers and employees, plus a subsidy from the imperial Government. In other words, the payment of death claims by life insurance companies involves totally different considerations from the payment of disability annuities by the invalidity insurance institutions maintained in conformity to the principle of social insurance, which in effect is no more and no less than a method of special but direct taxation.

The marvelous results achieved in the German Empire through the intelligent coordination of public and private agencies enlisted in the effort to reduce the mortality from tuberculosis to a minimum entitles the German experiment, as the first and most successful of its kind, to the admiration of the entire civilized world. Whether what has been done has paid for itself in a strict financial sense is wholly secondary to the social results which have been achieved, and which have unquestionably conferred an infinite amount of good upon the German people engaged in German industry in successful competition with the economically more advantageously situated wage earners of many other lands. From the social, economic, and medical points of view the treatment and care of tuberculous wage earners in Germany is a subject well deserving of intelligent and sympathetic study as a distinct contribution to the civilization of the present time.

#### **MORTALITY FROM TUBERCULOSIS IN THE GERMAN EMPIRE.**

The present discussion is largely limited to what has been done in this direction during the period 1897 to 1909, but some consideration has been given to earlier years. The modern movement may be said to rest in part upon the statistical analysis of the mortality of the German Empire for 1893, when out of 268,500 deaths of persons aged 15 to 60 years, 88,654, or 33 per cent, were caused by tuberculosis of the lungs. But in some Provinces of the German Empire the proportion was as high as 43 per cent, while in others it was as low as 22 per cent. In 1899 it was ascertained by means of a special statistical inquiry that there were then 226,000 tuberculous patients in hospitals and other institutions of the German Empire, or 42.2 per 10,000 of population. Between 1892 and 1900, in 10 of the principal cities of the Empire, 1,066,722 persons died from tuberculosis of the lungs, or 24.2 per 10,000 of population. In that portion of the Kingdom

of Bavaria which lies on the left side of the Rhine, the rate was as high as 32.9 per 10,000 of population, while in East Prussia, which is almost entirely agricultural, the rate was only 14.6. For a full understanding, therefore, of the underlying reasons for the extensive and costly campaign against tuberculosis in Germany it is necessary to consider briefly the mortality data for a period of years.

The statistics for the German Empire extend only over the period 1892 to 1909, including in the last-named year 24 States with a population of nearly 63,000,000, or 98.3 per cent of the total. In this area the average death rate from tuberculosis of the lungs was 21.2 per 10,000 of population during the period 1895 to 1899, diminishing to 19.2 during 1900 to 1904, and still further to 16.0 during 1905 and 1909. There was an increase, however, in the mortality from other forms of tuberculosis from 1.9 per 10,000 during 1895 to 1899 to 2.5 during 1905 to 1909. Combining all forms of tuberculosis, the death rate declined progressively from an average of 23.1 during 1895 to 1899 to 18.5 during 1905 to 1909. The mortality from nontubercular lung diseases declined from 26.4 during the first five years under observation to 24.8 during the last five years. The evidence, therefore, is quite conclusive that the decrease in the mortality from tuberculosis of the lungs was not the result of possible changes in methods of medical diagnosis, nor was it due to an increase in the mortality from other forms of tuberculosis or from nontubercular diseases of the lungs. The details of the mortality from tuberculosis in the German Empire are given in the following table:

MORTALITY FROM TUBERCULOSIS OF THE LUNGS AND FROM OTHER LUNG DISEASES IN THE GERMAN EMPIRE, 1892 TO 1909.

Year.	Number of States in registration area.	Population.	Deaths from tuberculosis of the lungs.		Deaths from other forms of tuberculosis.		Deaths from all forms of tuberculosis.		Deaths from other lung diseases.	
			Number.	Rate per 10,000.	Number.	Rate per 10,000.	Number.	Rate per 10,000.	Number.	Rate per 10,000.
1892.....	9	41,475,116	97,599	23.53	7,051	1.70	104,650	25.23	150,241	36.22
1893.....	10	47,625,932	115,641	24.28	8,434	1.77	124,075	26.05	156,931	32.93
1894.....	11	48,684,503	115,034	23.63	8,870	1.82	123,904	25.45	135,332	27.80
1895.....	13	49,752,057	113,786	22.87	9,373	1.88	123,159	24.75	127,824	25.69
1896.....	18	50,331,987	109,659	21.79	9,452	1.88	119,111	23.67	131,930	26.21
1897.....	20	51,528,088	110,225	21.39	10,099	1.96	120,324	23.35	134,403	26.08
1898.....	20	52,084,384	109,425	19.86	10,136	1.95	113,561	21.80	132,133	25.37
1899.....	20	53,510,403	107,633	20.11	9,786	1.83	117,419	21.94	151,661	28.34
1900.....	20	54,662,484	111,904	20.45	10,244	1.87	122,048	22.33	162,413	29.71
1901.....	21	55,061,664	106,941	19.42	10,655	1.94	117,596	21.36	144,561	26.25
1902.....	21	55,061,664	105,376	19.14	10,940	1.99	116,316	21.12	151,522	27.54
1903.....	23	57,619,810	107,299	18.62	12,140	2.11	119,439	20.73	153,948	26.72
1904.....	23	58,438,671	106,708	18.26	12,237	2.09	121,946	20.36	149,199	25.53
1905.....	23	59,798,198	106,552	17.83	15,440	2.58	121,992	20.41	156,120	26.12
1906.....	24	59,912,732	85,152	16.38	15,280	2.55	113,432	18.93	142,933	23.86
1907.....	24	61,290,509	97,555	15.92	15,135	2.47	112,690	18.40	154,019	25.14
1908.....	24	62,111,705	95,402	15.36	15,200	2.45	110,602	17.81	153,526	24.72
1909.....	24	62,954,673	90,962	14.45	14,948	2.37	105,910	16.82	150,627	23.93
1895 to 1899.....		257,206,899	544,723	21.15	45,846	1.90	593,574	23.08	677,951	26.36
1900 to 1904.....		290,839,193	538,129	19.16	56,216	2.00	594,345	21.16	761,743	27.12
1905 to 1909.....		306,007,867	488,623	15.97	76,003	2.48	564,626	18.45	757,225	24.75

The statistics for Prussia extend over a much longer period, including the years 1875 to 1909, but unfortunately the mortality from the different forms of tuberculosis was not separately returned previous to 1892. Considering, therefore, only the mortality from all forms of tuberculosis, it is shown by the official returns that the death rate from this group of causes has progressively decreased from 31.8 per 10,000 during 1875 to 1879 to 25.5 during 1890 to 1894, and finally to 16.9 during 1905 to 1909. The mortality from other lung diseases in Prussia, which had been increasing up to 1893, decreased progressively from an average of 28.6 per 10,000 during 1890 to 1894 to 24.6 during 1905 to 1909. The details of the mortality from tuberculosis by single years for the Kingdom of Prussia are given in the table which follows:

MORTALITY FROM TUBERCULOSIS OF THE LUNGS AND FROM OTHER LUNG DISEASES, PRUSSIA, 1875 TO 1909.

Year.	Population.	Deaths from tuberculosis of the lungs.		Deaths from other forms of tuberculosis.		Deaths from all forms of tuberculosis.		Deaths from other lung diseases.	
		Number.	Rate per 10,000.	Number.	Rate per 10,000.	Number.	Rate per 10,000.	Number.	Rate per 10,000.
1875.....	25,742,404					82,122	31.90	42,065	16.34
1876.....	26,049,745					79,770	30.62	41,221	15.82
1877.....	26,357,086					83,769	31.75	42,595	16.16
1878.....	26,664,427					86,294	32.36	42,991	16.12
1879.....	26,971,768					87,294	32.36	44,736	16.59
1880.....	27,279,111					84,895	31.12	49,182	18.01
1881.....	27,486,983					84,363	30.69	55,602	20.23
1882.....	27,694,856					85,359	30.82	54,973	19.85
1883.....	27,902,727					88,837	31.84	61,387	22.00
1884.....	28,110,599					87,756	31.22	58,525	20.82
1885.....	28,318,470					88,056	31.09	62,745	22.16
1886.....	28,646,249					88,283	30.82	64,455	22.50
1887.....	28,974,028					84,124	29.03	63,584	21.95
1888.....	29,301,807					84,109	28.70	63,238	21.58
1889.....	29,629,586					82,528	27.85	63,708	21.50
1890.....	29,957,367					84,086	28.07	65,093	22.60
1891.....	30,336,915					80,151	26.42	78,542	25.89
1892.....	30,716,469	72,645	23.65	3,516	1.14	76,161	24.79	94,627	30.81
1893.....	31,096,020	73,428	23.61	3,549	1.14	76,977	24.75	97,921	31.49
1894.....	31,475,571	71,133	22.60	3,523	1.12	74,656	23.72	82,000	26.05
1895.....	31,855,123	70,109	22.01	3,043	1.14	73,152	23.15	80,881	25.39
1896.....	32,378,600	66,583	20.56	3,790	1.17	70,373	21.73	83,716	25.86
1897.....	32,902,077	66,400	20.18	3,980	1.21	70,380	21.39	84,308	25.62
1898.....	33,425,554	61,595	18.43	3,965	1.19	65,560	19.61	81,516	24.39
1899.....	33,949,031	64,333	18.95	4,075	1.20	68,408	20.15	95,972	28.27
1900.....	34,472,509	66,349	19.25	4,253	1.23	70,602	20.48	104,157	30.21
1901.....	35,036,672	68,065	18.00	4,380	1.25	67,445	19.25	90,702	25.89
1902.....	35,600,835	62,224	17.48	4,502	1.26	66,726	18.74	96,275	27.04
1903.....	36,164,998	64,310	17.78	5,739	1.59	70,049	19.37	96,235	26.61
1904.....	36,729,161	63,777	17.36	5,549	1.51	69,326	18.87	95,112	25.90
1905.....	37,293,324	63,767	17.10	6,556	1.76	70,323	18.86	96,170	25.79
1906.....	37,857,487	57,878	15.29	6,581	1.74	64,459	17.03	89,090	23.53
1907.....	38,421,650	58,308	15.18	6,746	1.75	65,054	16.93	97,068	25.26
1908.....	38,985,813	56,371	14.46	6,949	1.78	63,320	16.24	96,513	24.76
1909.....	39,549,976	53,934	13.64	6,937	1.75	60,871	15.39	94,258	23.83
1875 to 1879.....	131,785,430					419,249	31.81	213,608	16.21
1880 to 1884.....	138,474,275					431,210	31.14	279,669	20.20
1885 to 1889.....	144,870,140					427,101	29.41	317,730	21.93
1890 to 1894.....	153,582,345					392,031	25.46	438,783	28.67
1895 to 1899.....	164,510,385	329,020	20.00	19,453	1.18	348,473	21.18	426,393	25.92
1900 to 1904.....	178,004,175	319,725	17.96	24,423	1.37	344,143	19.33	452,491	27.11
1905 to 1909.....	192,106,280	290,288	15.11	33,769	1.76	324,027	16.86	473,099	24.63

1 Estimated.

A most useful contribution to the study of the mortality from tuberculosis in Prussia according to sex and age was made for the year 1905.<sup>1</sup> According to this analysis the proportionate mortality, by divisional periods of life, attains its maximum at ages 20 to 25 years, when of the mortality from all causes 45.7 per cent are deaths from tuberculosis. For males the proportion at this age was 44.1 per cent and for females 47.6 per cent. It requires no further analysis to emphasize the economic importance of tuberculosis prevention to a State in which practically the whole wage-earning population is insured against the risk of permanent or partial disability resulting from disease. The details of the mortality from all forms of tuberculosis in Prussia according to age and sex during 1905 and also during 1910 are given in the table which follows:

MORTALITY FROM TUBERCULOSIS, PRUSSIA, ACCORDING TO SEX AND AGE, 1905 AND 1910.

[From Das Gesundheitswesen des Preussischen Staats, for 1905, p. 259, and for 1910, p. 198. Published by Richard Schoetz, Berlin, 1907 and 1912.]

1905.

Age at death.	Deaths from tuberculosis.			Proportionate mortality by divisional periods of life.			Mortality rate (per 10,000) from tuberculosis according to age.		
	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.
0 to 1 year.....	3,365	1,833	1,532	1.37	1.35	1.40	31.42	23.81	28.96
1 to 2 years.....	2,093	1,097	996	4.55	4.64	4.47	21.71	22.71	20.70
2 to 3 years.....	1,129	561	568	7.02	6.85	7.18	11.52	11.43	11.62
3 to 5 years.....	1,379	649	730	8.01	7.43	8.61	7.27	6.81	7.73
5 to 10 years.....	2,240	1,006	1,234	11.94	10.96	12.98	5.24	4.70	5.79
10 to 15 years.....	2,757	912	1,845	25.04	17.75	31.43	7.03	4.63	9.45
15 to 20 years.....	5,788	2,649	3,139	40.37	34.85	46.60	17.16	15.54	18.81
20 to 25 years.....	7,306	3,745	3,561	45.74	44.10	47.59	22.11	22.94	21.30
25 to 30 years.....	7,258	3,442	3,816	42.79	41.41	44.12	24.96	23.65	26.27
30 to 40 years.....	11,476	5,755	5,721	33.84	33.35	34.35	23.84	24.04	23.63
40 to 50 years.....	9,473	5,647	3,826	23.22	23.71	22.52	25.33	30.91	20.01
50 to 60 years.....	8,126	4,985	3,141	15.04	16.48	13.20	29.75	38.98	21.63
60 to 70 years.....	5,974	3,350	2,624	7.77	8.69	6.84	33.17	40.94	26.71
70 to 80 years.....	1,764	897	867	2.26	2.49	2.07	22.32	25.86	19.55
80 years and over.....	190	96	94	.47	.55	.41	10.09	12.08	8.66
Unknown.....	5	2	3	1.95	1.05	4.55	5.15	3.62	7.17
Total.....	70,323	36,626	33,697	9.68	9.66	9.70	19.13	20.21	18.08

1910.

0 to 1 year.....	2,267	1,269	998	1.18	1.19	1.17	20.92	23.10	18.68
1 to 2 years.....	1,526	825	701	4.38	4.62	4.13	15.09	16.15	14.00
2 to 3 years.....	920	495	425	7.24	7.50	6.95	9.38	10.03	8.72
3 to 5 years.....	1,199	554	645	6.68	6.23	9.17	5.98	5.79	6.17
5 to 10 years.....	2,001	890	1,111	12.52	11.14	13.91	4.33	3.83	4.82
10 to 15 years.....	2,307	852	1,455	24.14	18.93	29.65	5.46	4.02	6.92
15 to 20 years.....	5,188	2,340	2,848	39.35	33.14	46.51	13.44	12.05	14.86
20 to 25 years.....	6,702	3,331	3,371	44.20	41.69	47.00	20.56	20.51	20.61
25 to 30 years.....	6,289	2,944	3,345	41.89	39.98	43.73	19.32	18.10	20.53
30 to 40 years.....	10,814	5,242	5,572	32.91	32.24	33.57	20.43	19.80	21.05
40 to 50 years.....	8,327	4,894	3,433	21.73	22.31	20.94	20.33	24.40	16.42
50 to 60 years.....	6,732	4,172	2,560	12.87	14.90	11.06	23.47	30.84	16.89
60 to 70 years.....	4,597	2,494	2,103	6.18	6.76	5.61	23.66	28.54	19.67
70 to 80 years.....	1,454	684	770	1.85	1.92	1.80	17.24	18.59	16.20
80 years and over.....	155	73	82	.40	.44	.36	7.75	8.80	7.01
Unknown.....	1	1	.....	.36	.50	.....	.....	.....	.....
Total.....	60,479	31,099	29,389	9.48	9.42	9.54	15.29	15.92	14.68

<sup>1</sup>The information for 1910 also is given in the table shown on this page. The table brings out the considerable decline in the death rate at every period of life.

Since the mortality from tuberculosis of the lungs is largely an urban disease, although there are important exceptions to this rule, it has seemed advisable to include in this discussion a table of the combined mortality from the disease in large German cities for the period 1880 to 1909. The table will afford a means of convenient comparison with the corresponding mortality of American cities, which will subsequently be referred to. The average death rate from tuberculosis of the lungs in the principal German cities decreased from 34.6 per 10,000 during the five years ending with 1884 to 17.9 per 10,000 during the five years ending with 1909. The maximum rate during the period prevailed during 1883 and 1884, when it attained to 35.2 per 10,000. The minimum rate prevailed during 1909, when it was only 16.6 per 10,000 of population. The details, by single years, are given in the table which follows.

Most of the data used in this table have been derived from volume 33, Part I, of *Statistique Démographique des Grandes Villes du Monde*, published by the Bureau of Municipal Statistics of Amsterdam, Holland.

MORTALITY FROM TUBERCULOSIS OF THE LUNGS, LARGE GERMAN CITIES, 1880 TO 1909.

Year.	Number of cities.	Population.	Deaths.	Rate per 10,000.	Year.	Number of cities.	Population.	Deaths.	Rate per 10,000.
1880.....	22	3,516,914	12,101	34.4	1896.....	27	7,186,841	15,347	21.4
1881.....	22	3,613,925	12,220	33.8	1899.....	27	7,392,110	16,594	22.4
1882.....	22	3,672,844	12,556	34.2	1900.....	27	7,713,337	18,137	23.5
1883.....	22	3,762,762	13,254	35.2	1901.....	27	7,913,348	16,959	21.4
1884.....	22	3,856,565	13,578	35.2	1902.....	27	8,071,776	16,484	20.4
1885.....	23	4,014,728	14,098	35.1	1903.....	27	8,319,696	16,446	19.8
1886.....	24	4,231,059	14,527	34.3	1904.....	27	8,588,195	17,169	20.0
1887.....	24	4,367,468	13,682	31.3	1905.....	27	8,865,649	17,889	20.2
1888.....	24	4,509,999	13,845	30.7	1906.....	27	9,102,099	16,507	18.1
1889.....	24	4,797,278	14,681	30.6	1907.....	27	9,342,122	16,823	17.7
1890.....	27	5,775,419	16,906	29.3	1908.....	27	9,544,315	16,338	17.1
1891.....	27	6,019,151	17,448	29.0	1909.....	26	9,487,821	15,704	16.6
1892.....	27	6,157,442	16,338	26.5	1880 to 1884.....	.....	18,423,010	63,709	34.6
1893.....	27	6,287,590	17,195	27.3	1885 to 1889.....	.....	21,920,532	70,833	32.3
1894.....	27	6,422,002	16,200	25.2	1890 to 1894.....	.....	30,661,604	84,087	27.4
1895.....	27	6,532,664	16,323	24.8	1895 to 1899.....	.....	34,905,723	79,909	23.6
1896.....	27	6,760,450	15,906	23.5	1900 to 1904.....	.....	40,606,352	85,195	21.0
1897.....	27	6,983,658	15,739	22.5	1905 to 1909.....	.....	46,342,006	82,961	17.9

COMPARATIVE MORTALITY FROM TUBERCULOSIS IN GERMANY AND IN THE UNITED STATES.

When the foregoing data relating to the mortality from tuberculosis of the lungs in the German Empire are compared with the corresponding data for the registration area of the United States, it is shown that while during the earlier years the mortality was much higher in Germany, the rate has fallen more rapidly, particularly during recent years, until the position of the German Empire is now more favorable than the corresponding position of the United States. A comparison, for illustration, shows that the rate for German cities in 1880 to 1884 was 34.6 per 10,000, and the corre-

sponding rate for American cities was 32.1. During the five years ended with 1909 the rate for German cities was only 17.9 per 10,000, against a rate of 18.5 for American cities. While, therefore, during the first five years the mortality from tuberculosis of the lungs in German cities was 2.5 per 10,000 in excess of the corresponding mortality in American cities, it is shown that during the last five years under review the mortality from tuberculosis of the lungs in American cities was 0.6 per 10,000 in excess of the corresponding mortality in German cities. The positions, therefore, have been reversed, and as will subsequently be shown, there are strong reasons for believing that the German advance in this direction has been largely because of the systematic and effective treatment and care of tuberculous wage earners in special institutions or sanatoria established for the purpose, and many collateral institutions and efforts contributory thereto. The details regarding the mortality from tuberculosis of the lungs in the registration area of the United States and American cities are given in the two tables which follow:

**MORTALITY FROM TUBERCULOSIS OF THE LUNGS IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1909.**

*Pulmonary tuberculosis.*

Years and periods.	Males.			Females.			Total.		
	Population.	Deaths.		Population.	Deaths.		Population.	Deaths.	
		Number.	Rate per 10,000.		Number.	Rate per 10,000.		Number.	Rate per 10,000.
1900.....	15,758,235	29,372	18.64	15,019,568	26,132	17.40	30,777,803	55,504	18.03
1901.....	16,089,548	29,569	18.38	15,335,351	25,166	16.41	31,424,899	54,735	17.42
1902.....	16,461,407	28,250	17.16	15,689,779	23,829	15.19	32,151,186	52,079	16.20
1903.....	16,834,902	29,061	17.26	16,045,766	24,849	15.48	32,880,668	53,910	16.40
1904.....	17,210,033	31,833	18.50	16,403,313	26,930	16.42	33,613,346	58,763	17.43
1905.....	17,586,800	31,047	17.65	16,762,419	25,723	15.35	34,349,219	56,770	16.53
1906.....	21,382,973	36,032	16.85	20,380,647	29,309	14.38	41,763,620	65,341	15.65
1907.....	21,782,186	37,191	17.07	20,761,146	29,133	14.06	42,543,332	66,374	15.60
1908.....	23,545,009	38,055	16.16	22,441,336	29,321	13.07	45,986,345	67,376	14.65
1909.....	25,588,273	39,456	15.42	24,388,823	30,584	12.54	49,977,096	70,040	14.01
Total...	192,239,366	329,866	17.16	183,228,148	271,026	14.79	375,467,514	600,892	16.00
1900 to 1904...	82,354,125	148,085	17.98	78,493,777	126,906	16.17	160,847,902	274,991	17.10
1905 to 1909...	109,885,241	181,781	16.54	104,734,371	144,120	13.76	214,619,612	328,901	15.19

*Tuberculosis other than pulmonary.*

1900.....	15,758,235	3,558	2.26	15,019,568	3,034	2.02	30,777,803	6,592	2.14
1901.....	16,089,548	3,745	2.33	15,335,351	3,287	2.14	31,424,899	7,032	2.24
1902.....	16,461,407	3,714	2.26	15,689,779	3,290	2.10	32,151,186	7,004	2.18
1903.....	16,834,902	4,075	2.42	16,045,766	3,655	2.28	32,880,668	7,730	2.35
1904.....	17,210,033	4,313	2.51	16,403,313	3,845	2.34	33,613,346	8,158	2.43
1905.....	17,586,800	4,523	2.57	16,762,419	4,185	2.50	34,349,219	8,708	2.54
1906.....	21,382,973	5,427	2.54	20,380,647	4,880	2.39	41,763,620	10,307	2.47
1907.....	21,782,186	5,599	2.57	20,761,146	4,786	2.31	42,543,332	10,383	2.44
1908.....	23,545,009	5,926	2.52	22,441,336	5,107	2.28	45,986,345	11,033	2.40
1909.....	25,588,273	6,281	2.45	24,388,823	5,514	2.26	49,977,096	11,795	2.36
Total...	192,239,366	47,161	2.45	183,228,148	41,583	2.27	375,467,514	88,744	2.36
1900 to 1904...	82,354,125	19,405	2.36	78,493,777	17,111	2.18	160,847,902	36,516	2.27
1905 to 1909...	109,885,241	27,756	2.53	104,734,371	24,472	2.34	214,619,612	52,228	2.43

MORTALITY FROM TUBERCULOSIS OF THE LUNGS IN THE REGISTRATION AREA OF THE UNITED STATES, 1900 TO 1909—Concluded.

All forms of tuberculosis.

Years and periods.	Males.			Females.			Total.		
	Population.	Deaths.		Population.	Deaths.		Population.	Deaths.	
		Number.	Rate per 10,000.		Number.	Rate per 10,000.		Number.	Rate per 10,000.
1900.....	15,758,235	32,930	20.90	15,019,568	29,166	19.42	30,777,803	62,096	20.18
1901.....	16,089,548	33,314	20.71	15,335,351	28,453	18.55	31,424,899	61,767	19.66
1902.....	16,461,407	31,964	19.42	15,689,779	27,119	17.28	32,151,186	59,083	18.38
1903.....	16,834,902	33,136	19.68	16,045,766	28,504	17.76	32,880,668	61,640	18.75
1904.....	17,210,033	36,146	21.00	16,403,313	30,775	18.76	33,613,346	66,921	19.91
1905.....	17,586,800	35,570	20.23	16,762,419	29,908	17.84	34,349,219	65,478	19.06
1906.....	21,382,973	41,459	19.39	20,380,647	34,189	16.78	41,763,620	75,648	18.11
1907.....	21,782,186	42,790	19.64	20,761,146	33,969	16.36	42,543,332	76,759	18.04
1908.....	23,545,009	43,981	18.68	22,441,336	34,428	15.34	45,986,345	78,409	17.05
1909.....	25,588,273	45,737	17.87	24,388,823	36,098	14.80	49,977,096	81,835	16.37
<b>Total...</b>	<b>192,239,366</b>	<b>377,027</b>	<b>19.61</b>	<b>183,228,148</b>	<b>312,609</b>	<b>17.06</b>	<b>375,467,514</b>	<b>689,636</b>	<b>18.37</b>
1930 to 1904...	82,354,125	167,490	20.34	78,493,777	144,017	18.35	160,847,902	311,507	19.37
1905 to 1909...	109,885,241	209,537	19.07	104,734,371	168,592	16.10	214,619,612	378,129	17.62

MORTALITY IN AMERICAN CITIES FROM TUBERCULOSIS OF THE LUNGS, 1870 TO 1909.

Year.	Number of cities.	Population.	Deaths.	Rate per 10,000.	Year.	Number of cities.	Population.	Deaths.	Rate per 10,000.
1870.....	11	3,064,248	10,224	33.37	1894.....	61	11,188,919	25,303	22.61
1871.....	11	3,152,034	10,257	32.54	1895.....	60	11,451,786	25,923	22.64
1872.....	12	3,671,563	12,270	33.42	1896.....	62	11,870,008	25,768	21.71
1873.....	15	4,241,333	13,635	32.15	1897.....	61	12,181,994	25,253	20.73
1874.....	13	4,057,378	12,394	30.55	1898.....	60	12,436,938	25,554	20.65
1875.....	17	4,670,708	14,625	31.31	1899.....	59	13,208,505	27,358	20.71
1876.....	17	4,830,045	15,486	32.06	1900.....	58	13,129,350	26,080	19.86
1877.....	19	5,284,820	15,973	30.40	1901.....	62	14,252,940	28,758	20.18
1878.....	20	5,530,567	17,244	31.18	1902.....	60	14,500,917	27,459	18.94
1879.....	30	6,064,577	18,416	30.37	1903.....	61	14,962,711	29,220	19.53
1880.....	46	6,721,841	21,047	31.31	1904.....	61	15,325,964	31,790	20.74
1881.....	49	7,011,801	23,503	33.52	1905.....	60	15,586,747	30,349	19.47
1882.....	43	7,191,252	23,431	32.58	1906.....	62	16,170,144	30,719	19.00
1883.....	50	7,505,986	24,028	32.01	1907.....	63	16,636,665	31,514	18.94
1884.....	50	7,736,682	23,995	31.01	1908.....	63	17,064,491	30,753	18.02
1885.....	53	7,979,952	23,906	29.96	1909.....	63	17,492,509	30,091	17.20
1886.....	54	8,298,185	24,522	29.55	1870 to 1874.....	.....	18,186,555	65,790	32.32
1887.....	52	8,305,090	23,720	28.56	1875 to 1879.....	.....	26,350,717	81,744	31.02
1888.....	54	8,905,415	24,120	27.08	1880 to 1884.....	.....	36,167,562	116,003	32.07
1889.....	57	9,441,109	24,061	25.49	1885 to 1889.....	.....	42,929,751	120,329	28.03
1890.....	53	9,873,969	26,280	26.60	1890 to 1894.....	.....	53,090,525	131,320	24.46
1891.....	62	10,722,433	26,691	24.89	1895 to 1899.....	.....	61,149,231	129,861	21.24
1892.....	62	11,022,883	27,069	24.55	1900 to 1904.....	.....	72,171,882	143,307	19.96
1893.....	60	10,877,321	25,987	23.89	1905 to 1909.....	.....	82,950,556	153,426	18.50

For the purpose of convenient comparison the essential facts are summarized for large German and American cities in the table below, in which is given the total number of deaths from tuberculosis of the lungs and the rate per 10,000 of population, by quinquennial periods since 1880. It may be stated that the population of large German cities increased from 3,516,914 in 1880 to 9,487,821 in 1909, while the population for large American cities increased from 6,721,841 in 1880 to 17,492,509 in 1909. The number of large German

cities considered in the investigation of 1909 was 26, and the number of American cities was 63. It is a matter of regret that complete returns for German cities for a longer period of years are not available, but the comparison which follows will serve the present purpose to emphasize the decline in the death rate from tuberculosis of the lungs which has taken place in the case of the large cities of both countries during the last 30 years.

**SUMMARY OF MORTALITY FROM TUBERCULOSIS OF THE LUNGS IN LARGE GERMAN AND AMERICAN CITIES, BY PERIODS, 1880 TO 1909.**

Periods.	German cities.			American cities.		
	Aggregate population.	Number of deaths from tuberculosis of the lungs.	Rate per 10,000 of population.	Aggregate population.	Number of deaths from tuberculosis of the lungs.	Rate per 10,000 of population.
1880 to 1884.....	18,423,010	63,709	34.6	36,167,562	116,003	32.1
1885 to 1889.....	21,920,532	70,833	32.3	42,929,751	120,329	28.0
1890 to 1894.....	30,661,604	84,087	27.4	53,690,525	131,320	24.5
1895 to 1899.....	34,905,723	79,909	22.9	61,149,231	129,861	21.2
1900 to 1904.....	40,606,352	85,195	21.0	72,171,882	143,307	19.9
1905 to 1909.....	46,342,006	82,961	17.9	82,950,556	153,426	18.5

**ESTIMATED ECONOMIC LOSS FROM TUBERCULOSIS TO WAGE EARNERS IN THE UNITED STATES.**

The importance to the United States of the subject of tuberculosis prevention and cure is best emphasized in the statement that during 1910 there occurred in the registration area 86,309 deaths from tuberculosis, of which 73,214, or 84.8 per cent, were deaths from tuberculosis of the lungs. Since the registration area of the United States comprehends 58.3 per cent of the total population, the number of deaths from tuberculosis, for the country as a whole, may be conservatively estimated at 150,000, and the number of deaths from tuberculosis of the lungs at 125,000. Assuming, further, that there are at least five living cases of tuberculosis to every death from tuberculosis occurring during the year, the number of cases of tuberculosis in the United States is approximately 750,000. Estimating the number of wage earners in the United States of ages 15 to 64 years, inclusive, for the year 1912 at 27,313,160 males and 6,081,223 females, the proportion of such wage earners to the total population is 28.7 per cent for males and 6.4 per cent for females, respectively. Since according to the census mortality data of 1900<sup>1</sup> the mortality rate from tuberculosis of the lungs among wage earners was 2.37 per 1,000 for males and 1.73 per 1,000 for females, the probable number of deaths from tuberculosis of the lungs among wage earners in 1912 may be conservatively estimated at 75,250, or, respectively,

<sup>1</sup>No later data are at present available.

64,730 males and 10,520 females. The deaths occur chiefly at the productive period of life when its conservation, from an economic point of view, should be a matter of most serious concern to the Nation and the several States. Assuming that there are only 5 cases of tuberculosis of the lungs to every death from the disease, there would be approximately 376,250 cases or patients in the different stages of the disease, from the incipient to the far advanced. There are, however, sound reasons for believing that the actual number of cases is much larger, and that a ratio of 10 cases to every death is, perhaps, not an exaggeration. If that ratio is accepted, the number of cases of tuberculosis of the lungs among the wage earners of the United States, ages 15 to 64 years, inclusive, during 1912 would be 752,500. These estimates take no account of the mortality or morbidity from other forms of tuberculosis, which may safely be estimated at not much less than 5 per cent additional.<sup>1</sup>

For the German Empire it has been estimated that the number of cases is not less than 1,000,000, and some authorities have placed the number as high as 1,300,000. This estimate, however, is for the entire population, while the preceding estimate for the United States has reference only to the wage-earning element. In this connection it may also be stated that the average age at death from tuberculosis of the lungs in the United States during 1910 was 39.4 years for males and 36 years for females,<sup>2</sup> and since at this age the average expectations of life are approximately 27.8 and 31.8 years, respectively, the potential loss in years of life on the basis of the estimated number of 75,250 deaths of wage earners was 2,135,400 years. The economic value of a wage earner's life may be conservatively estimated at \$100 per annum as the net gain or contribution toward the national wealth resulting from products of industrial and other economic activities. When this estimate is applied to the number of years of curtailed expectation as previously given, the potential economic loss as the result of tuberculosis of the lungs in the United States is \$213,540,000. While this loss is not an actual one in the sense of wealth destruction, it is a real loss in the sense of curtailed wealth production, which would unquestionably accrue from a larger population engaged in gainful occupations, but which is prematurely destroyed in consequence of the common prevalence of a strictly preventable disease.

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<sup>1</sup> See in this connection report of the commission to investigate and report upon a system of caring for tuberculous patients by State and local authorities made to the Massachusetts Legislature under date of Nov. 1, 1910. (Senate No. 318, Boston, 1910.)

<sup>2</sup> According to an official statement by the Division of Vital Statistics of the United States Census Office for 1910 the average age at death was 39.4 years for males and 36 years for females and 38 years for both sexes combined.

**ESTIMATED ECONOMIC VALUE OF SANATORIUM TREATMENT IN GERMANY.**

An official German estimate of the economic value of sanatorium treatment is contained in a report of the imperial board of health on the statistical experience of public sanatoria for tuberculous patients, published in 1904.<sup>1</sup> In that report it is argued that if of the 90,800 deaths from tuberculosis of the lungs at ages 15 to 60 years occurring annually in the German Empire only about one-seventh or one-eighth, that is, approximately 12,000, could have received systematic and effective treatment in sanatoria established for that purpose, and if only about three-fourths of these, or 9,000, could have returned to their former occupations or industrial activity with a reasonable degree of their full earning capacity restored, and that further, if they could have maintained this gain for only three years, and assuming finally that the average earnings of wage earners of both sexes are approximately 500 marks (\$119), there would have been a gain of  $3 \times 500 \times 9,000$ , or 13,500,000 marks (\$3,213,000). This gain would have to be offset by the net expenses of about 400 marks (\$95) for each of the 12,000 patients, without reference to interest on the investment in institutions, or approximately 5,000,000 marks (\$1,190,000), or, including interest, estimated at 1,000,000 marks (\$238,000) more, there would remain as the result of sanatorium treatment a net or economic gain to the German Nation of 7,500,000 marks (\$1,785,000). This estimate does not take into account all the collateral gains to the patient, his family, and the State resulting from restored earning capacity and prolonged longevity. Granting that this estimate is partly a matter of conjecture, it is entitled to thoughtful consideration, since it was prepared as early as 1896 by an expert thoroughly familiar with the facts and was published with the sanction of the imperial health office. More recent estimates of the economic value of sanatorium treatment will subsequently be referred to, for as the entire system of treatment and care of tuberculous workmen in special sanatoria, maintained at the cost of invalidity insurance institutions, rests upon an economic principle, the pecuniary considerations of gain and loss have not been lost sight of in the discussions and debates which have been had upon the merits of the question from a public point of view.

In 1907 an address on the past results of sanatorium treatment was read before the German National Association for the Prevention of Tuberculosis, in which address the economic aspects of the disease were discussed at considerable length.<sup>2</sup> The term "restored earning

<sup>1</sup> Deutsche Heilstaetten für Lungenkranke. Geschichtliche und statistische Mitteilungen. I. Berichterstatter: Dr. Hamel, Hilfsarbeiter im Kaiserlichen Gesundheitsamte. Mit 12 Tafeln. Berlin, Verlag von Julius Springer, 1904, p. 40.

<sup>2</sup> Die bisherigen Leistungen der Heilstaetten, von Bielefeldt, May, 1907.

capacity," in an economic and legal sense, according to the practice of German invalidity insurance institutions, it was stated, requires that the patient must be able to earn at least one-third of his previous normal wages. The term "disability" is one which does not permit of exact definition, either in German or American law, but it is evident that the meaning is more broad in German experience than would be the case in English or American insurance practice. If, therefore, the definition by this authority, which apparently is in accordance with section 4 of paragraph 5 of the German invalidity insurance law, applies to the economic results achieved by German sanatoria for the treatment of tuberculosis of the lungs, it should be understood throughout this discussion that, unless otherwise stated, the term "restored earning capacity" is subject to the limitation as herein explained.

According to this authority, in 1905 the average amount of a disability annuity was about 160 marks (\$38.08) per annum. This would in five years amount to 800 marks (\$190.40), and to this period of time most of the investigations of post-discharge results of sanatorium treatment have been limited.<sup>1</sup> In 1905 the average cost per case of treatment and care on account of tuberculosis of the lungs was 363 marks (\$86.39). Assuming that the economic results of the treatment can be maintained on an average for at least five years after discharge, there would accrue a net gain to the institution of 437 marks (\$104.01) in each case; that is, by deducting the cost of treatment, 363 marks (\$86.39), from the amount which would be required as a disability annuity for five years of 800 marks (\$190.40). Making allowance for the differential duration of sustained earning capacity, it is shown that if this duration were for only four years there would be a net gain to the institution of 277 marks (\$65.93); and if for three years, of 117 marks (\$27.85). In the case, however, of patients retaining their earning capacity for only two years the loss would be 43 marks (\$10.23). Without enlarging upon the details of the calculations by which the economic gain and loss was determined it may be stated that it is estimated that for every 100 patients of the year 1901 discharged as successfully treated there was a net saving in disability annuities of 2,900 marks (\$690.20). This figure was applied to the cases discharged during 1897 to 1906, and for 159,802 patients there was calculated a net gain to the invalidity insurance institution of 4,631,300 marks (\$1,102,249.40).

It is admitted that objections may be raised against this estimate, but these are considered in detail, and the conclusion is reached that the facts warrant the assumption that the estimate of gain is probably under rather than over the actual amount realized. It is stated

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<sup>1</sup> Under the new regulations of the Imperial Insurance Office the period of observation of post-discharge results has been extended to six years.

that the average mean after-lifetime in the case of tuberculous disability annuitants is only four years for men and six years for women, or five years for both sexes combined, and that it may be safely assumed that of the 34 per cent of tuberculous patients maintaining their earning capacity up to the fifth year a considerable number would retain their earning ability subsequent to that period of time. It was also argued that vast financial gains must result to poor-law authorities and decrease the cost of public support of dependent survivors of those prematurely dying from the disease.

In addition to the financial results which it was claimed would accrue to the German invalidity insurance institutions from the successful treatment and care of tuberculous wage earners in special sanatoria erected for the purpose, it was estimated by Bielefeldt that upon the assumption of an average daily wage of only 2 marks (48 cents) (the net gain in wages earned as the result of prolonged lifetime plus restored partial or complete earning capacity), the 159,802 patients treated and cared for during the period 1897 to 1906 represent for the five years of subsequently observed experience a gain of 235,000,000 marks (\$55,930,000) in wages. It was also stated that while the cost of such treatment to the insurance institutions was 56,000,000 marks (\$13,328,000), the gross saving in disability annuities was 60,500,000 marks (\$14,399,000), or a net gain of 4,500,000 marks (\$1,071,000). To this must be added the gain to poor-law authorities and sick funds and the addition to national wealth and material well-being, approximately represented by 237,000,000 marks (\$56,406,000) in additional wages earned by those whose wage-earning capacity was restored for an average of at least five years as the result of systematic and effective treatment and care in special institutions established for that purpose.

#### **LEGAL PROVISION FOR TREATMENT AND CARE BY INVALIDITY INSURANCE INSTITUTIONS.**

The suggestion that the invalidity insurance institutions should avail themselves of the favorable opportunities offered by the special exertions of the sick funds to diminish the mortality and morbidity from tuberculosis of the lungs in cases in which the insured was capable of recovery or improvement for the purpose of lessening the burden of disability annuities originated in the imperial insurance department. The favorable experience of sanatoria previous to 1899 led to an extensive financial support of the efforts of the insurance institutions and, according to Bielefeldt, brought about the adoption in the amended invalidity insurance law of January 1, 1900, of paragraphs 18 to 23 and 47, which give legal sanction for the cooperation of invalidity insurance institutions in the treatment and care of the tuberculous wage earners insured with them.

All limitations concerning the extent or the method of treatment which might have existed according to the law of 1891 were done away with, and the invalidity insurance institutions were therefore permitted to use their own best judgment as to the amounts to be expended and the time for which they were to regard themselves as responsible in undertaking cases for the treatment of the disease.<sup>1</sup>

The insurance institutions were permitted to send the sick persons to hospitals or sanatoria for consumptives, or to health resorts or to convalescent homes or to watering places, or even into private care, and were further permitted to pay the traveling expenses to and from these places as an essential element of cost in the treatment and care of tuberculous wage earners insured with them. The treatment may not be forced upon the members, and the matter is entirely voluntary, except in so far that the refusal to undergo such treatment might be taken into account in the possible subsequent payment of disability annuities conditioned more or less by optional advantages to the family of the insured. The address already quoted concluded with the suggestive statement that—

The conviction may be expressed, after the experience of several years, that an effective battle against consumption among the working classes would have been all but impossible without the workmen's insurance of the German Empire, and by the support of their powerful pecuniary resources, and with the aid of rational social regulations, in the end we are quite certain to be victorious.

#### NUMBER OF GERMAN WAGE EARNERS RECEIVING SANATORIUM TREATMENT IN 1910.

In 1910, 46,717 patients received full institutional treatment on account of tuberculosis of the lungs, or at the rate of 3.19 per 1,000 of the population subject to the German compulsory invalidity insurance laws as determined by the occupation census of 1907. The rate of admission varied considerably from 0.67 per 1,000 for the Invalidity Insurance Institution of Mecklenburg, to 6.71 per 1,000 for the Grand Duchy of Baden and 7.17 per 1,000 for the pension fund of the imperial railways. The details of admissions for each of the 41 institutions established to carry into effect the provisions of the invalidity insurance law of 1900 are given in the table which follows:

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<sup>1</sup> Bielefeldt, *The battle against consumption as a sickness of the people*; address at the British Congress for Tuberculosis, London, 1911.

NUMBER OF PERSONS RECEIVING TREATMENT ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, ACCORDING TO TERRITORIAL INSURANCE INSTITUTION, DURING 1910.

[From Statistik der Heilbehandlung bei den Versicherungsanstalten und zugelassenen Kasseneinrichtungen der Invalidenversicherung, p. 168. Published by Behrend & Co., Berlin, 1911.]

Territorial invalidity insurance institutions.	Insured population.	Persons treated.	
		Number.	Per 1,000.
East Prussia.....	435,571	412	0.95
West Prussia.....	307,435	236	.77
Berlin.....	649,527	3,961	6.10
Brandenburg.....	945,939	2,458	2.60
Pomerania.....	375,524	264	.70
Posen.....	351,877	686	1.95
Silesia.....	1,224,366	2,727	2.23
Saxony-Anhalt.....	715,914	1,642	2.29
Schleswig-Holstein.....	375,769	540	1.44
Hanover.....	665,270	1,670	2.51
Westphalia.....	655,380	3,193	4.87
Hesse Nassau.....	449,204	1,990	4.41
Rhine Province.....	1,357,952	5,393	3.97
Upper Bavaria.....	322,224	1,859	5.77
Lower Bavaria.....	125,677	177	1.41
Pfalz.....	161,130	555	3.44
Upper Pfalz and Regensburg.....	89,938	213	2.37
Upper Franconia.....	113,668	273	2.40
Middle Franconia.....	199,633	941	4.71
Lower Franconia and Aschaffenburg.....	102,971	227	2.20
Swabia and Neuberg.....	141,418	268	1.90
Kingdom of Saxony.....	1,243,992	2,865	2.30
Wurttemberg.....	469,486	1,759	3.75
Baden.....	439,610	2,948	6.71
Hesse (Grand Duchy).....	246,735	1,278	5.18
Mecklenburg.....	194,967	131	.67
Thuringia.....	345,619	1,026	2.97
Oldenburg.....	75,897	201	2.65
Brunswick.....	130,467	396	3.04
Lübeck, Bremen, and Hamburg.....	376,441	1,461	4.60
Alsace-Lorraine.....	354,555	1,390	3.92
Prussia-Hesse Railroad Employees.....	323,613	1,427	4.41
North German Miners' Fund.....	117,147	599	5.11
Saarbrücken Miners' Association.....	48,036	72	1.50
Bavarian Traffic Employees.....	33,673	216	6.41
Saxony Railroad Employees' Fund.....	29,306	81	2.76
Saxony Miners' Fund.....	29,275	30	1.02
Baden Railroad and Salt Works Fund.....	18,353	115	6.27
Imperial Railroad Pension Fund.....	17,993	129	7.17
Bochum Miners' Union.....	299,838	596	1.99
Marine Employees' Fund.....	70,000	52	.74
Total.....	14,631,093	46,717	3.19

COST OF SANATORIUM TREATMENT OF GERMAN WAGE EARNERS IN 1910.

The cost of treatment and care per person under treatment is here only briefly referred to, since the facts are more fully discussed in another section of this report. The cost averaged 374 marks (\$89) per person treated and cared for during 1910, the cost having been lowest in the case of the Invalidity Insurance Institution of Upper Bavaria, or 154.74 marks (\$36.83), and highest in the case of the General Miners' Union of Bochum, or 714.39 marks (\$170.02). The details of the expenditures for each of the 41 institutions are given in the table which follows:

## COST OF TREATMENT OF PERSONS TREATED ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, ACCORDING TO TERRITORIAL INSURANCE INSTITUTION, DURING 1910.

[From Statistik der Heilbehandlung bei den Versicherungsanstalten und zugelassenen Kasseneinrichtungen der Invalidenversicherung, p. 183. Published by Behrend & Co., Berlin, 1911.]

Territorial invalidity insurance institutions.	Persons treated.	Cost of treatment.	
		Amount.	Per person treated.
East Prussia.....	412	\$34,035	\$82.61
West Prussia.....	236	22,089	93.60
Berlin.....	3,961	465,851	117.61
Brandenburg.....	2,458	245,736	99.97
Pomerania.....	264	25,334	95.96
Posen.....	686	61,640	89.85
Silesia.....	2,727	263,649	96.68
Saxony-Anhalt.....	1,642	153,507	93.49
Schleswig-Holstein.....	540	34,731	64.32
Hanover.....	1,670	133,369	79.86
Westphalia.....	3,193	199,541	62.49
Hesse Nassau.....	1,980	156,787	79.18
Rhine Province.....	5,393	463,142	85.88
Upper Bavaria.....	1,859	68,463	36.83
Lower Bavaria.....	177	13,613	76.91
Pfalz.....	555	47,838	86.19
Upper Pfalz and Regensburg.....	213	14,528	68.20
Upper Franconia.....	273	22,633	82.90
Middle Franconia.....	941	78,645	83.58
Lower Franconia and Aschaffenburg.....	227	23,014	101.38
Swabia and Neuberg.....	268	21,791	81.31
Kingdom of Saxony.....	2,865	275,840	96.28
Wurttemberg.....	1,759	160,969	91.51
Baden.....	2,948	269,181	91.31
Hesse (Grand Duchy).....	1,273	109,666	85.81
Mecklenburg.....	131	11,889	90.76
Thuringia.....	1,026	74,188	72.31
Oldenburg.....	201	19,833	98.67
Brunswick.....	396	24,051	60.74
Lübeck, Bremen, and Hamburg.....	1,731	165,805	95.79
Alsace-Lorraine.....	1,390	120,569	86.74
Prussia-Hesse Railroad Employees.....	1,427	143,159	100.32
North German Miners' Fund.....	599	53,449	89.23
Saarbrücken Miners' Association.....	72	3,691	51.26
Bavarian Traffic Employees.....	216	25,852	119.69
Saxony Railroad Employees' Fund.....	81	11,298	139.48
Saxony Miners' Fund.....	30	2,858	95.26
Baden Railroad and Salt Works Fund.....	115	15,724	136.73
Imperial Railroad Pension Fund.....	129	12,202	94.59
Bochum Miners' Union.....	596	101,335	170.02
Marine Employees' Fund.....	52	7,061	135.78
Total.....	46,717	4,158,555	89.02

The total amount expended for treatment and care of tuberculous wage earners in the German Empire during 1910 in special sanatoria erected for the purpose was 17,472,920 marks (\$4,158,555). In addition to this amount large expenditures have been incurred in methods of prevention and in a systematic national campaign against tuberculosis, which has had the active cooperation of insurance institutions and of the governing authorities of the Empire and of the several States, principalities, municipalities, and communes. The amount expended on account of tuberculosis prevention in the United States in 1909, according to the assistant secretary of the National Association for the Study and Prevention of Tuberculosis, was \$8,025,000, of which 53.5 per cent was from public funds. In 1910 the amount was

\$14,740,000, of which 62.6 per cent was from public funds, and in 1911 the amount expended was \$14,450,000, of which 66.2 per cent was derived from public revenues. It is extremely suggestive that the amount expended through associated effort in the United States in the campaign against tuberculosis should have progressively decreased from \$975,000 in 1909 to \$500,000 in 1911; that the amount expended on account of miscellaneous tuberculosis work should have decreased from \$1,800,000 in 1910 to \$1,300,000 in 1911, and that the amount expended on account of tuberculosis dispensaries, which constitute one of the most effective aids in the campaign against the disease, should have decreased from \$890,000 in 1910 to \$850,000 in 1911. It may further be stated that the amount expended on account of sanatoria in the United States increased from \$11,300,000 in 1910 to only \$11,800,000 in 1911, but how much of this expenditure was for the benefit of tuberculous wage earners is not a matter of record.<sup>1</sup>

The progressive increase in the amounts expended by German invalidity insurance institutions indicates that the German effort to control and slowly eradicate the disease rests upon a more secure foundation. In part this result is to be ascribed to the financial interest which German invalidity insurance institutions have in the actual reduction in the mortality and morbidity from tuberculosis, as well as in the cure of patients whose invalidity would entail a considerable economic burden upon the institutions, aside from the additional cost of support for dependent widows and orphans, either through the invalidity insurance institutions or public and private poor relief. The importance of the economic aspects of the subject warrants a somewhat more extended statement of the views and conclusions of recognized German authorities on the subject.

#### RESTORATION OF EARNING CAPACITY OF WAGE EARNERS RESULTING FROM SANATORIUM TREATMENT.

In an important statistical study of the results of sanatorium treatment for tuberculosis of the lungs, by Dr. Otto Baer,<sup>2</sup> based on the experience of 22 sanatoria, with 8,568 patients, it was ascertained that 3,932, or 45.9 per cent, were in the first stage of the disease; 2,904, or 33.9 per cent, were in the second stage; and 1,732, or 20.2 per cent, were in the third stage. It was pointed out that the results must depend largely upon the condition of the patients on admission, and that, of course, if the proportion of patients in the advanced stages of the disease is too large the results could not possibly be satisfactory. On discharge 3,850, or 44.9 per cent, had their earning capacity fully restored; 3,760, or 43.9 per cent, had their capacity

<sup>1</sup> The Survey, Jan. 20, 1912.

<sup>2</sup> Statistische Beiträge zur Beurteilung des Wertes der Heilstaettebehandlung bei Lungentuberkulose, von Dr. Otto Baer. Buchdruckerei Hermann & Otto Hallanzky, Zweibruecken, 1909.

partly restored; and only 958, or 11.2 per cent, were entirely unsuccessful cases. Taking the patients admitted in the third stage of the disease only, the results were naturally much less satisfactory, and only 5.2 per cent were discharged with their earning capacity fully restored; 46.6 per cent with their earning capacity partly restored; and 30 per cent were entirely unsuccessful cases. Even to this extent, however, it would seem that the results of the treatment were not disproportionate to the probable expense.

The same writer found that out of 2,255 patients admitted to the sanatoria at Belzig during the period 1900 to 1906, 13.1 per cent had been discharged as cured; 61.7 per cent as improved; 19.3 per cent as unchanged; 5 per cent as worse, and 0.9 per cent as having died. In the experience of the sanatoria at Marienheim 57 women patients had been under observation for nine years, and of these 78.9 per cent were still in full possession of their earning capacity, 19 per cent were partly able to earn their living, and only 1.8 per cent were entirely incapacitated.

An analysis of 1,668 cases of tuberculosis patients reexamined after they had been two years discharged from the sanatorium at Holsterhausen-Werden-by-Essen, in the Rhine Province,<sup>1</sup> where they were treated, showed that 61.2 per cent were still in possession of their full earning capacity, 17.5 per cent retained a partial capacity for work, 7.1 per cent were unable to work, and 14.2 per cent had died. Of 879 patients controlled or supervised for four years and reexamined, 53.5 per cent had retained their full earning capacity, 14.2 per cent had retained a partial earning capacity, 7.1 per cent were unable to work, and 25.2 per cent had died. These percentages, however, must be accepted with some caution, in that they apparently do not have reference to the original numbers discharged, but to the numbers for which the information could be secured. It is to be assumed, however, that the number of cases for which no information could be obtained was relatively small. In the opinion of this authority the results achieved had exceeded the expectations, but the effort would have been hopeless but for the financial and general cooperation on the part of the invalidity insurance institutions.

The same writer estimates the number of tuberculous patients in the German Empire at 800,000, for which, of course, the means do not exist to afford to each sufferer effective treatment in a sanatorium especially established for the purpose. Assuming for the present discussion that the number of such patients is as stated, the 46,717 patients provided with treatment during 1910 constituted 5.8 per cent of the total number of tuberculous patients in the German Empire, exclusive of the patients afflicted with tuberculosis other than

<sup>1</sup> Die Lungenheilstätten im Lichte der historischen Entwicklung der Tuberkulose-Bekämpfung von Chefarzt Dr. F. Köhler, Heilstätte-Holsterhausen-Werden bei Essen (Ruhr).

tuberculosis of the lungs and larynx. Of course, the German campaign against tuberculosis comprehends a vast organization subsidiary to the sanatorium treatment and care of tuberculous wage earners at the expense of the invalidity insurance institutions.

In discussing the statistical data of sanatorium treatment as subsequently considered in detail, the German Central Committee emphasizes especially the remarkable results obtained for employees through sanatorium treatment in behalf of the members of the pension fund of the Prussian-Hessian railways.<sup>1</sup> The general data of this fund for each year, 1904 to 1910, are given in tabular form as follows:

**TREATMENT AND CARE, ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, OF MEMBERS OF THE PRUSSIAN-HESSIAN RAILWAYS PENSION FUND, BY YEARS, 1904 TO 1910.**

Years.	Average membership.	Patients treated on account of tuberculosis of the lungs.	Rate per 1,000 members.	Cost of treatment and care (including family support).
1904.....	256,934	716	2.79	\$92,571.36
1905.....	272,478	810	2.97	116,635.92
1906.....	292,435	1,180	4.04	132,818.56
1907.....	324,241	955	2.95	111,556.55
1908.....	327,436	1,152	3.52	124,586.08
1909.....	314,268	1,268	4.04	132,980.42
1910.....	319,694	1,422	4.45	143,145.99

The experience of the fund since 1904 is given in detail in the following table, with the statistics for 1905 carried forward to 1910:

**ECONOMIC RESULTS OF SANATORIUM TREATMENT FOR TUBERCULOSIS OF THE LUNGS, OF EMPLOYEES OF THE PRUSSIAN-HESSIAN RAILWAYS SYSTEM, BY YEARS, 1904 TO 1910.**

Years.	Number of patients under full treatment.	Patients fully able to work after—											
		1 year.		2 years.		3 years.		4 years.		5 years.		6 years.	
		Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.	Number.	Per cent.
1904.....	716	585	81.7	534	74.6	477	66.6	451	63.0	427	59.6	.....	.....
1905.....	810	691	85.3	621	76.7	582	71.9	552	68.2	528	65.2	519	64.0
1906.....	1,180	1,013	85.8	921	78.1	861	73.0	824	69.8	815	69.0	.....	.....
1907.....	955	775	81.0	697	73.0	658	68.9	626	65.6	.....	.....	.....	.....
1908.....	1,152	951	82.6	869	75.4	866	75.2	.....	.....	.....	.....	.....	.....
1909.....	1,268	1,095	86.4	917	72.3	.....	.....	.....	.....	.....	.....	.....	.....
1910.....	1,422	1,221	85.9	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

The importance of concentrating the treatment upon patients in the second stage of the disease is emphasized by the physician in charge of the Muellrose Sanitarium,<sup>2</sup> in the belief that patients in the

<sup>1</sup> Annual report for 1911, p. 20.

<sup>2</sup> Das Krankenmaterial und die therapeutischen Leistungen der Lungenheilstaetten, von Dr. H. Ulrich, Chefarzt der Heilstaette Muellrose. Reichs-Medizinal-Anzeiger, Jahrg. 1910 (Sonderabdruck).

first stage could, to advantage, be taken care of in less expensive and less highly specialized institutions. For these he recommended convalescing homes or forest camps, except in the case of patients in the first stage with fever and who have bacilli in the sputum; such, of course, should be treated in a sanatorium. A further recommendation was made that all such patients should continue under medical observation for at least one year.

The hope was held out that the results of sanatorium treatment may be further improved and that it may safely be expected that at least in 70 per cent of the cases the earning capacity of the patients can be restored for a reasonable period of time. The actual cost of 515 marks (\$122.57) per case of successful treatment, including the expense of the unsuccessful cases, was considered as fully justified by the results.

According to the experience of Dr. Weicker, of Göbersdorf,<sup>1</sup> published in 1905, on the basis of 3,299 cases treated in his institution during the period 1895 to 1900, the conclusion seemed warranted that cases in the incipient stage of the disease did not necessarily produce the best results. The statement is made that even fairly advanced cases gave promise of successful results, provided the treatment was effected under otherwise satisfactory conditions. According to this authority, of those discharged from his institution, who, on admission, were in the second Turban stage of the disease, there were, after three years, still 51 per cent in full possession of their earning capacity, and after four years 50.9 per cent; even of those admitted in the third stage of the disease after four years there were still 17.8 per cent able to work.

The fact that the results of treatment had gradually improved and that successful cures, with a complete restoration of earning capacity, had been obtained among patients even in the third or far advanced stage of the disease was emphasized in 1904 by the director of the Friederichsheim Sanatorium.<sup>2</sup> He stated that, as a rule, incapacity for work for a more or less extensive period of time precedes the admission of patients in the second and third stages of the disease, leaving the question open whether such economic disability was very much less frequent among patients in the first Turban stage of the disease.<sup>3</sup> Of all the patients treated, 42.6 per cent were in the first stage, 21.6 per cent in the second stage, and 36.1 per cent in the third stage.<sup>4</sup> Evidently a disproportionately large number were in the

<sup>1</sup> Beiträge zur Frage der Volkshellstaetten, von Dr. Weicker, Göbersdorf. Berlin, 1905; Verlag: Medizinischer Verlag.

<sup>2</sup> Beitrag zur Bewertung der Hellstaettebehandlung Lungenkranker, von Direktor Dr. E. Rumpf, Hellstaette Friederichsheim, Separatdruck aus der Muenchener medizinischen Wochenschrift, No. 38. 1904.

<sup>3</sup> For classification of stages of tuberculosis, see p. 83.

<sup>4</sup> These are the percentages given in the original report. Since they add to 100.3, there is apparently an error, but it is not of material importance.

third or far advanced stage of the disease. According to the analysis of the patients in the first stage of the disease, there were after four years still 70 per cent in possession of their earning capacity, while the corresponding proportion of the patients who had died in the third stage of the disease was 63 per cent. In other words, nearly as large a proportion of those admitted in the third stage of the disease for treatment had died as were still at work after four years of those admitted in the first stage of the disease. The proportion retaining their earning capacity admitted in the second stage of the disease was 55 per cent and in the third stage 23 per cent. These results, it is declared, furnish conclusive evidence that the treatment and care of tuberculous wage earners in sanatoria must be considered a success, and the rule is laid down, on the basis of actual experience, that it may safely be expected that of the patients admitted in the first Turban stage of the disease three-fourths, and of those in the second stage over one-half, and of those in the third stage at least one-fourth will retain their earning capacity for from three to four full years after their discharge and to this extent relieve the invalidity insurance institutions from the payment of disability annuities.

In an extended discussion on the importance of sanatoria in the warfare against tuberculosis as a wage earners' disease, one medical authority<sup>1</sup> considers the entire available material and comes to the conclusion that the economic results in the case of patients admitted in the first stage of the disease may be placed at 72 per cent, in the second stage at 57 per cent, and in the third stage at 22 per cent; but in the event that the tuberculin method is employed the results are materially improved, with respectively 95 per cent for patients in the first stage, 82 per cent for the second stage, and 50 per cent for the third stage. The opinion is emphatically expressed that the results of sanatorium treatment, from an economic point of view, have fully justified the large expenditures incurred and that the opposite conclusions of Cornet are disproved by the facts of actual and extensive experience. With regard to the cost of treatment the author points out that the average expense per bed per day may be placed at from 5 to 7 marks (\$1.19 to \$1.67), and that the average expense per day for board and treatment may be placed at 3 marks 50 pfennigs to 4 marks (\$0.83 to \$0.95). Large institutions are not favored, but sanatoria with from 100 to 150 beds are preferred. It is pointed out that during 23 years the mortality from tuberculosis in the German Empire has been decreased about 50 per cent, and that this result, in part at least, has been through the systematic and effective treatment of patients in special sanatoria. However, the necessity for municipi-

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<sup>1</sup> Die Bedeutung der deutschen Lungenheilstätten fuer die Bekämpfung der Tuberkulose als Volkskrankheit, von Dr. med. Fr. Schürmann, Stadtassistentenarzt, Dusseldorf. Sonderabdruck aus der Vierteljahrsschrift fuer gerichtl. Medizin und oeffentliches Sanitätswesen 3. Folge. XLI. 1.

pal and rural dispensaries, as well as day camps and other institutions for the treatment of cases not suitable for sanatoria, is emphasized. In conclusion, suggestion is made as to the importance of providing suitable employment for discharged patients, and the official notification of cases of tuberculosis is regarded as absolutely essential.

The annual report of the German Central Committee for 1911 directs especial attention to the results obtained by the Hanseatic League, which is the invalidity insurance institution established for the free cities of Hamburg, Bremen, and Lübeck. According to this experience, of the male patients under treatment during the period 1895 to 1904 for a longer period than four weeks, there were at the end of 1910, of those admitted in the first stage of the disease, 63 per cent in full possession of their earning capacity; in the second stage, 52 per cent; and in the third stage, 22 per cent. The corresponding per cents for women were 66 for the first stage, 66 for the second stage, and 26 for the third stage. In addition thereto a fairly large proportion had retained a limited earning capacity. Of the male patients in the first stage, 25 per cent had died; in the second stage, 31 per cent; and in the third stage, 65 per cent. The corresponding percentages for the female patients were 11 for the first stage, 12 for the second stage, and 59 for the third stage.

In an address before the International Congress on Social Insurance, held in Vienna in 1905,<sup>1</sup> the statement was made that of 100 tuberculous male annuitants in the experience of German invalidity insurance institutions, at ages 25 to 29, there survived after one year only 17 and after four years only 4, so that in all probability the maximum duration of the disease in moderately advanced cases entitling the insured to a disability annuity would be less than five years. In contrast, it was pointed out that of every 100 nontuberculous disability annuitants, ages 25 to 29, there were, after one year, still 69 in receipt of their annuities, proving the much more serious and fatal character of tuberculosis of the lungs when contrasted with other diseases considered as a group.

In this connection it may be stated that out of 366,327 disability annuitants under observation during the period 1891 to 1899, only 5,474 had been discontinued up to 1903 as recipients of annuities on account of the recovery of their earning capacity.<sup>2</sup> In other words, when once a disability annuity is granted it is a question of remote contingency whether the same will be discontinued within a reasonable period of time on account of restored earning capacity. This, of course, in German experience, may be due to the fact that such annuities are granted only when the disease causing the disability has

<sup>1</sup> Invalidenversicherung und Volksgesundheit (Heilverfahren), von Bielefeldt. Internationaler Arbeiterversicherungs-Kongress, 17. bis 23. September. Wien, 1905.

<sup>2</sup> Amtliche Nachrichten des Reichsversicherungsamts, 1906, I Beiheft, pp. viii and ix.

been determined to be of a sufficiently serious nature, and it requires to be said that no such annuities are granted until after the sickness has continued 26 weeks, during which time the sick funds are responsible for the maintenance and medical care of the insured.

#### COMPARATIVE RESULTS OF INSTITUTIONAL AND NONINSTITUTIONAL TREATMENT.

An attempt has been made to determine the comparative results of tuberculous patients treated in sanatoria and tuberculous patients treated in their homes. From a study of the sickness records of the Leipzig Communal Sick Fund, of 188 tuberculous male patients observed during the period 1890 to 1893, when no sanatorium treatment had been in use, it was ascertained that after three years 74 per cent had died; after four years, 88 per cent; and after five years, 93 per cent.<sup>1</sup> Granting objections to the absolute accuracy of the data and admitting the probably serious or advanced condition of the patients, the facts themselves can not be set aside as irrelevant or inconclusive.

A special inquiry,<sup>2</sup> however, was made with regard to 502 patients—constituting 4.6 per cent of all the tuberculous patients under consideration by the Invalidity Insurance Institution of the Hanse Towns in 1901—who had been for various reasons rejected or considered unsuitable for treatment. These patients were carefully observed and reexamined from time to time, and it was ascertained in 1907—that is, after six years—that 41.8 per cent were drawing disability annuities, 30.3 per cent had died, and only 18.5 per cent were at work and still members of the insurance institution. Bielefeldt compares these results with 715 tuberculous members, who, in 1900, upon their own application, had been treated and cared for in the sanatoria of the Invalidity Insurance Institution of the Hanse Towns. By 1905—that is, after six years—only 11 per cent of these patients were drawing disability annuities and only 18 per cent had died, leaving 49.9 per cent in possession of their full earning capacity and 15.4 per cent without a serious impairment of their earning capacity, or 65.3 per cent of the patients after six years were not drawing any disability annuities on account of the disease for which they had been successfully treated in the sanatoria provided for that purpose. According to Bielefeldt's special investigations, after six years, of those who had not been treated and cared for in sanatoria, 72 per cent had died, against 29 per cent of those who had been treated and cared for in sanatoria during the same period of time. There was therefore a substantial saving in life and in earning capacity which may safely be considered conclusive evidence of the

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<sup>1</sup> Die bisherigen Leistungen der Heilstätten by von Bielefeldt.

<sup>2</sup> Transactions German Central Committee, Berlin, May 23, 1907.

social and economic value of systematic and effective treatment of tuberculous wage earners in special institutions provided for that purpose.

**COMPARATIVE RESULTS OF HOSPITAL AND SANATORIUM TREATMENT.**

An examination was made by Baer<sup>1</sup> into the point raised by Cornet, that similar results could have been secured in ordinary hospital practice. Making a comparison between the data of hospital treatment furnished by De la Camp of the patients admitted in 1895, only 28 per cent were in possession of their earning capacity in 1899; but according to the data furnished by Reiche for tuberculous patients treated in sanatoria, 80 per cent of those admitted in 1895 were still able to earn their living in 1899. Similar results in favor of sanatorium treatment, from an economic point of view, are given for subsequent years, so that the contention by Cornet may be considered as having been conclusively disproved. Burckhardt, among others, is quoted in the statement that—

It is self-evident that the results of sanatorium treatment are decidedly more satisfactory than those secured by other methods of treatment for tuberculosis of the lungs, but particularly in two directions, i. e., the death rate is less and the duration of continued earning capacity is much longer.

A table derived from the data of hospital treatment furnished by Stadler and the sanatorium statistics furnished by Walther, comparing the subsequent mortality of 100 patients, is given below:

**COMPARATIVE MORTALITY IN HOSPITALS AND SANATORIA OF PATIENTS TREATED FOR TUBERCULOSIS OF THE LUNGS.**

Duration.	Percentage of mortality.		Duration.	Percentage of mortality.	
	Hospital treatment (Stadler).	Sanatorium treatment (Walther).		Hospital treatment (Stadler).	Sanatorium treatment (Walther).
After 1 year.....	4.8	4.2	After 5 years.....	40.3	20.2
After 2 years.....	18.3	10.7	After 6 years.....	45.9	21.5
After 3 years.....	27.3	15.8	After 7 years.....	55.8	23.0
After 4 years.....	33.0	18.7			

The foregoing comparison seems to show conclusively the decided advantage of sanatorium over hospital treatment for tuberculosis of the lungs in so far as a material reduction in the death rate is concerned. Stadler estimates that by means of sanatorium treatment it is possible to secure at least an average duration of subsequent earning capacity of five years; and Baer states that the average annual mortality rate may be assumed to be 5 per cent. These, of course, are

<sup>1</sup> Statistical Contributions to the Tuberculosis Question, by Dr. Otto Baer. Zweibrücken, 1909.

very much better than the corresponding results secured by the usual methods of hospital treatment for tuberculosis of the lungs. Baer sums up his conclusions as follows: The sanatorium treatment unquestionably has been a success, but preference in the admission of patients should, of course, be given to those who are in the first and second stages of the disease. Patients in the third stage, with only one lung involved, may be admitted with the reasonable expectation that a fairly large proportion of successful results will be secured. Special attention is necessary in the case of patients who are treated at home on account of the liability to infect other members of the family. The duration of treatment may safely be diminished in the case of patients in the first stage of the disease, but the duration should be adjusted to the particular circumstances and no hard and fast rule should be adopted. Patients in the third stage of the disease should be treated in small hospitals or small special institutions to avoid the discouraging surroundings resulting from a large number of cases of incurables.

#### **ORGANIZATION AND ACTIVITIES OF THE GERMAN CENTRAL COMMITTEE FOR THE PREVENTION OF TUBERCULOSIS.**

The foregoing brief account has been limited to the general aspects of the tuberculosis problem in Germany so far as the prevalence of the disease is a question of public concern, with special reference to the financial burdens resulting therefrom to the invalidity insurance institutions. In addition thereto, of course, a vast amount of effort exists in connection with the administrative control of tuberculosis, and numerous philanthropic and other institutional efforts are being made to reduce the liability to the disease by various methods, which are more or less the same throughout the civilized world. The account would not be complete, however, without at least a brief explanation of the activity of the German Central Committee for the Prevention of Tuberculosis,<sup>1</sup> which has been in active operation since 1896.

Among other subjects discussed in the annual report of the committee are the questions of family support during the treatment of a patient and the care of the patient after discharge from the sanatorium; the importance of supplementary treatment is recognized, and the establishment of convalescing homes and day and night camps is advised to a much larger extent than is at present the case, although much progress has been made in this direction during recent years. It is pointed out that in all such cases it is of the utmost importance that the patient, after discharge, shall continue the sanitary, wholesome, and otherwise healthful mode of life acquired while in the

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<sup>1</sup> *Der Stand der Tuberkulose-Bekämpfung im Frühjahr 1911*, von Prof. Dr. Nietner, Generalsekretär des Zentral-Komitees. Berlin, 1911.

sanatorium, and this, of course, to a certain extent necessitates medical and other supervision for a reasonable period of time after discharge. It is properly pointed out that it serves no real economic purpose to provide adequate treatment and care in special institutions if after discharge through lack of proper care a relapse occurs. It is therefore suggested that the term "able to work" be construed with more caution, and that as far as practicable tuberculous patients discharged from public sanatoria should be provided with work suitable to their condition as a reasonable safeguard against a relapse.

In conclusion, the prevention of the disease is enlarged upon and the duty of intelligent public education in the essential factors of the problem is emphasized, with particular reference to tuberculosis exhibits. It is pointed out that tuberculosis is largely a social disease and most intimately related to housing and living conditions. It is stated also in this connection that much is being done by German invalidity insurance institutions to bring about better housing conditions for the wage-earning population, and that up to December 31, 1911, the immense sum of 318,016,000 marks (\$75,687,808) had been loaned for building purposes at rates of interest not exceeding 3.5 per cent.<sup>1</sup>

#### DISPENSARIES AND INFORMATION BUREAUS.

In the report for 1911 emphasis is laid upon the imperative necessity for more tuberculosis dispensaries, including information bureaus, which are now considered as absolutely essential in the active warfare against the disease. A special commission was authorized to promote efforts in this direction and to collect all necessary information having reference thereto. With regard to organization, the question was debated as to the sources from which income should be derived, and the best means of securing the cooperation of physicians, nurses, etc., as well as all other public and private institutions having an active interest in welfare work. The specific objects of dispensaries of this kind were stated to be (1) competent advice to and provision for the care of tuberculous patients; (2) competent medical examination of members of the patients' families; (3) education and instruction with regard to the risk of infection, the conditions of work in their relation to the disease, etc.; (4) the collection of the sputum; (5) the sanitary handling of the patients' laundry; (6) the effective isolation of the patient in the home; (7) the disinfection of homes infected by tuberculous patients; and (8) material or pecuniary assistance. In addition thereto the commission considered the best method of utilizing the scientific material obtained through establishments of this kind.

On January 1, 1911, the committee had a membership of 1,501 persons, and its income during 1910 was derived from 39,877 marks

(\$9,491.76) in membership fees, an imperial subsidy of 60,000 marks (\$14,280), a gift of 15,000 marks (\$3,570) from the Association for Welfare Stamps, and 16,245 marks (\$3,866) from other sources. It had on hand on January 1, 1911, funds to the amount of 370,349 marks (\$88,143.06), and it made during the year the following disbursements: The sum of 177,300 marks (\$42,197.40) was paid out on account of financial aid to sanatoria and other tuberculosis institutions; 30,000 marks (\$7,140) was expended on account of lupus treatment; 33,317 marks (\$7,929.45) for tuberculosis exhibits; 29,081 marks (\$6,921.28) on account of administrative expenses; and the remainder for printing, meetings, exhibits, traveling, etc.

#### **TREATMENT AND CARE OF TUBERCULOUS CHILDREN.**

The treatment and care of tuberculous children is brought forward as a rather new but most important question in the administrative control of tuberculosis, and startling evidence has been adduced to show that the disease is usually contracted in childhood but remains latent until early adolescence, when, under favorable conditions, the disease becomes active in an acute or chronic form, as the case may be. This, however, is a medical rather than an economic question, but it may be said that the imperative need of adequate medical inspection of school children and the equally important medical supervision of children and young persons at work are recognized as necessary steps toward the gradual reduction and eradication of the disease. Special emphasis, however, is placed upon the duty of employers to provide more satisfactory working conditions, particularly with regard to the prevention of industrial dust. In addition to all of the foregoing, attention is directed to the importance of personal hygiene and of outdoor exercise and light manual labor in gardens and on farms, to the prevention of infection in conveyances used for purposes of public transportation, to the prevention of spitting in public places, and to the intimate relation of tuberculosis to abuse of alcoholic drinks.

#### **PRESENT STATUS OF AGENCIES FOR PREVENTION AND CURE OF TUBERCULOSIS.**

##### **SANATORIA.**

Summarizing the status of tuberculosis prevention and cure in the German Empire in the spring of 1911, it is stated that there were then in Germany 99 public sanatoria and three other institutions for tuberculous patients in the various stages of the disease. These 102 institutions provided 6,706 beds for male patients and 4,301 for female patients, and 1,058 beds for both male patients and female patients, a total of 12,065 beds. In addition thereto 34 private sanatoria pro-

vided 2,121 beds, or a total of 14,186 beds for adult curable tuberculous patients. Therefore, on the basis of an average length of stay of three months, the bed accommodation provides for 56,700 patients. For tuberculous children there are now 22 sanatoria, with 1,000 beds; and in 86 institutions, with 8,122 beds, provision is made for tuberculous and scrofulous children, chiefly, however, during the summer months.

#### FOREST HOMES AND AGRICULTURAL COLONIES.

There are 99 forest convalescing homes or camps, chiefly open during the daytime, but in some cases also for night accommodation during the summer months. A very small number remain open during the winter months. In some of the forest homes provision is made for the education of tuberculous children receiving treatment therein. The number of such forest schools, in which a full course is provided, is at the present time 15. The number of agricultural colonies remains rather small, the experiment not having been found entirely satisfactory. Convalescing homes exist for tuberculous persons, in addition to persons suffering from other causes, but the number of such is not stated. For a careful selection of patients preliminary to admission to sanatoria, 34 observation stations or special dispensaries have been established.

#### HOMES AND INSTITUTIONS FOR ADVANCED CASES.

For tuberculous patients in the advanced stage of the disease there are 144 invalidity homes or asylums, or special sections in general hospitals. Institutions of this kind, however, have not met with much favor among wage earners, who, in the advanced stage of the disease, prefer to remain with their families. On account of this fact it has been found necessary to concentrate recent efforts upon the further establishment of tuberculosis dispensaries, clinics, and information bureaus, of which there are now 525, exclusive of 537 tuberculosis associations in the Grand Duchy of Baden, which exercise somewhat similar functions. There are also 20 polyclinics, which provide much the same accommodation and treatment as tuberculosis dispensaries, the chief point of difference being that these institutions also provide for other patients and only in rare cases for the material needs of the patients' families.

#### CONCLUSIONS IN REGARD TO WORK OF GERMAN CENTRAL COMMITTEE.

The activities of the German Central Committee are so extensive and varied that the foregoing account portrays but inadequately the work which is done through its organization in the warfare in the German Empire against tuberculosis, chiefly among the wage earners.

The organization has the active and intelligent cooperation of the numerous official bodies and authorities charged with public health or police functions, as well as a large number of philanthropic and other organizations engaged in similar efforts, though, of course, on a lesser scale than the central committee itself. Foremost among the public authorities engaged in the active warfare against tuberculosis are the imperial board of health and the health authorities of the principal States and of the larger cities and communes. It may be said, in conclusion, that the Empire itself contributes annually 100,000 marks (\$23,800) toward the campaign against tuberculosis, and that of this sum 60,000 marks (\$14,280) is paid to the German Central Committee. It is evident, therefore, that the administrative control of the disease of tuberculosis has been intelligently coordinated to the nation-wide effort to reduce, for humane, social, and economic reasons, the mortality and morbidity to a minimum. It is further made evident by the statistical account of tuberculosis frequency in the German Empire that these efforts have been quite successful. Finally, it is shown by the experience data of German invalidity insurance institutions that the expenditures incurred in the systematic and effective treatment of the disease have been justified by the economic results secured. To the extent that this has been the case the material welfare of the German Empire in general, and its wage-earning population in particular, has been substantially advanced during the last two decades, and probably more so in this respect than in any other country in the world.

#### **TREATMENT OF TUBERCULOUS WAGE EARNERS IN PUBLIC INSTITUTIONS, 1896 TO 1901.**

In 1908 the German Imperial Board of Health published a comprehensive report on the results of institutional treatment for tuberculosis, derived from the experience of 21 large public sanatoria and 12 small institutions. In addition, the investigation included the experience of 2 large and 3 small private institutions for the treatment and cure of tuberculosis. The data, derived from the experience of the years 1896 to 1901, represented 15,869 male and 4,008 female patients in public sanatoria and 833 males and 469 female patients in private sanatoria. The method of inquiry was by means of special cards provided by the imperial board of health, one being provided for each patient under systematic treatment and care, excluding all those who had undergone less than six weeks' treatment in sanatoria. A further exclusion was made of those patients in whom tuberculosis was only suspected, the investigation being limited to patients in whom the disease had been objectively established either by bacteriological or clinical methods or by means

of the tuberculin test. Since the patients in private institutions were only to a limited extent of the wage-earning class, and comparatively few in number, it would serve no useful purpose to consider the same in the present investigation, and the following discussion is therefore limited to patients in public institutions, chiefly such as were maintained by German invalidity insurance institutions.

#### HOW COST OF TREATMENT IS PROVIDED FOR.

In the case of patients in public sanatoria, the cost of treatment of 79.5 per cent of the males and of 77.9 per cent of the females was provided for by these institutions. In addition, the sick funds on their own account provided treatment for 6.1 per cent of the male patients and 1.2 per cent of the female patients, while the industrial accident associations paid for 0.6 per cent of the male patients and for 0.07 per cent of the female patients. In the aggregate, therefore, 86.2 per cent of the male patients and 79.2 per cent of the female patients had their treatment provided for in accordance with provisions of the imperial social insurance laws. Of the remainder, the cost of treatment was provided for by public authorities in the case of 2.3 per cent of the male patients and of 0.2 per cent of the female patients. Employers of labor paid for 1.1 per cent of the male patients and for 0.07 per cent of the female patients. The poor-law authorities provided for 0.2 per cent of the male patients and for 2.5 per cent for the female patients, while private benevolence paid for 1.4 per cent of the male patients and for 5.2 per cent of the female patients. The proportion of patients providing for their own institutional support or having the same provided for by their families was 8.4 per cent for males and 11.8 per cent for females. The support was derived from other sources in the case of 0.3 per cent for male patients and of 0.9 per cent for female patients.

In the private institutions, the experience of which was included in the collective investigation, the support of patients was provided for by State invalidity insurance institutions in the case of 3.8 per cent of the male patients and of 4.1 per cent of the female patients. It is, therefore, evident that nearly all the patients in public sanatoria had their expenses provided for through the State invalidity insurance institutions, the sick fund, or the industrial accident associations, all established and maintained in conformity to the imperial social insurance laws.

## AGE, SEX, AND CONJUGAL CONDITION OF PATIENTS UNDER TREATMENT.

The number of patients under treatment in public sanatoria by single years during the period 1896 to 1901, with distinction of sex, was as follows:

## NUMBER OF PATIENTS TREATED IN GERMAN PUBLIC SANATORIA FOR TUBERCULOSIS OF THE LUNGS, BY YEARS, 1896 TO 1901.

Year.	Males.		Females.		Total.
	Number.	Per cent of total.	Number.	Per cent of total.	
1896.....	377	90.4	40	9.6	417
1897.....	907	82.4	194	17.6	1,101
1898.....	1,867	85.7	310	14.3	2,167
1899.....	3,238	85.1	565	14.9	3,803
1900.....	4,762	76.3	1,476	23.7	6,238
1901.....	4,728	76.9	1,423	23.1	6,151
Total.....	15,869	79.8	4,008	20.2	19,877

According to this table the number of male patients under observation increased from 377 in 1896 to 4,728 in 1901. The number of female patients increased from 40 in 1896 to 1,423 in 1901. The age distribution of 15,770 male patients and 3,991 female patients, or 99.4 per cent and 99.6 per cent, respectively, of the total number of patients in public sanatoria was as follows:

## AGE DISTRIBUTION OF PATIENTS TREATED IN GERMAN PUBLIC SANATORIA FOR TUBERCULOSIS OF THE LUNGS, DURING THE PERIOD 1896 TO 1901.

Age.	Males.		Females.		Total.	
	Number.	Per cent of total.	Number.	Per cent of total.	Number.	Per cent of total.
Under 15 years.....	50	0.3	39	1.0	89	0.5
15 to 19 years.....	1,608	10.2	773	19.4	2,381	12.0
20 to 24 years.....	3,459	21.9	1,440	36.1	4,899	24.8
25 to 29 years.....	3,480	22.1	865	21.7	4,345	22.0
30 to 34 years.....	2,734	17.3	461	11.6	3,195	16.2
35 to 39 years.....	2,014	12.8	239	6.0	2,253	11.4
40 to 49 years.....	2,008	12.7	141	3.5	2,149	10.9
50 to 59 years.....	390	2.5	27	.7	417	2.1
60 years and over.....	27	.2	6	.2	33	.2
Total.....	15,770	100.0	3,991	100.0	19,761	100.0

Of the male patients 44.0 per cent of the cases, and of the female patients 57.8 per cent, were of the age period 20 to 29 years, inclusive. A much larger proportion of female patients were of the younger ages, or 19.4 per cent at ages 15 to 19 years, against 10.2 per cent for males. In marked contrast, the proportion of tuberculous male patients was much larger at the older ages, or, for illustration, 25.5 per cent at ages 35 to 49 years, inclusive, against only 9.5 per cent for females. These differences are partly the result of variations in

the age distribution of male and female wage earners and they are also no doubt partly due to the more health-injurious effects of male employments, particularly occupations with exposure to industrial dust.

The information as regards the conjugal condition of the patients was obtained only in the case of 13,898 males and 3,815 females. Of the males, 55.4 per cent and of the females 20.6 per cent were married. The difference is partly explained by the larger proportion of women of ages under 25 and partly by the fact that married women are to a less extent insured against the financial consequences of invalidity and, according to experience, are less readily induced to submit to a long separation from the family. The distribution of patients according to conjugal condition is, therefore, not to be considered of value as evidence whether tuberculosis of the lungs is relatively more common among the married or the unmarried.

The same conclusion applies to the proportionate distribution of patients according to occupation. The analyses of the returns do not differentiate occupations in detail, but the results are considered by groups, partly on account of the fact that the statistical material would not have been sufficient in most cases to warrant safe conclusions.

#### PROPORTION OF INDOOR AND OUTDOOR WORKERS.

The occupation was ascertained for 15,743 male patients and for 3,993 female patients. In the case of males, 53.9 per cent were indoor factory workers, 16.9 per cent were outdoor workers, 16.2 per cent were home workers, 4.2 per cent were employed underground, and 8.1 per cent were general laborers or laborers not otherwise specified. Among the specific employments mercantile occupations contributed 6.3 per cent, machinists 6.1 per cent, carpenters and joiners 5.9 per cent, printers 4.8 per cent, clerks 4.2 per cent, miners 4.1 per cent, and masons 2.7 per cent. Among female patients 42.7 per cent were home workers and 34.5 per cent were indoor factory workers. The proportion of housewives and daughters was 14.9 per cent. The proportion of outdoor workers among women was only 0.6 per cent. The specific occupations were in the proportion of 19.2 per cent among domestic servants, 7.9 per cent among seamstresses, 7.1 per cent among saleswomen, 6.6 per cent among textile workers, and 4.7 per cent among office employees; 4.6 per cent were tailoresses.

#### DUST AND FUMES AS PREDISPOSING CAUSES OF TUBERCULOSIS.

With a further regard to the health-injurious consequences of certain occupations predisposing to tuberculosis, largely because of the exposure to the inhalation of industrial dust, the report contains information for 12,284 male patients and 3,523 female patients. In the case of 3,913 male patients and of 855 female patients it is stated

that the inhalation of dust was a predisposing cause favorable to the disease, accounting for relatively 31.9 per cent of the male patients and 24.3 per cent of the female patients. Every form and kind of dust exposure is represented in the detailed analysis, but the chief forms of dust were as follows, for male patients: Metallic dust, 437 patients; and specifically, iron dust, 35 patients; lead dust, 195 patients; chalk dust, 56 patients; stone dust, 181 patients; coal dust, 65 patients; paint-colors dust, 17 patients; flour dust, 68 patients; tobacco dust, 88 patients; wood dust, 286 patients, and wool dust, 159 patients. Among female patients the only important kinds of industrial dust specifically mentioned were wool dust with 124 patients, and tobacco dust with 23 patients.

In the case of 415 male patients and of 53 female patients it would seem that the disease had been favored in its development by the inhalation of smoke, gas, vapors, or steam. The more important causes of this kind are given in the case of male patients as general smoke exposure 85, poisonous gases 77, chemical vapors 25, alkali vapors 14, acid vapors 113, and coal smoke 46.

#### UNFAVORABLE OCCUPATIONAL CONDITIONS.

Among other unfavorable occupational conditions, mention is made in the case of male patients of 128 working in badly ventilated rooms, 568 working in close rooms combined with an unfavorable bodily position, 296 cases with exposure to radiating heat and abnormal temperature, 83 working in damp rooms, 360 exposed to an unfavorable climate, and 597 subject to excessive bodily strain. Among female patients there were 26 cases of patients working in badly ventilated rooms, 262 working in close rooms combined with an unfavorable bodily position, 81 working in damp rooms, and 425 subject to excessive bodily strain. It is, therefore, shown that in the case of 52.4 per cent of the male patients and of 49.8 per cent of the female patients the development of the disease was partly, at least, attributable to unfavorable occupational conditions. In the case of only 173 male patients and only 40 female patients the occupation itself, however, was specifically mentioned as a predisposing cause of the disease. The 173 male patients included 18 miners, 17 masons, 16 tailors, 15 brickyard workers, 14 printers, 13 cigar makers, 12 paint makers, 9 stonecutters, 5 millers, and 5 weavers. Among the 40 female patients there were 9 tailoresses, 6 domestic servants, 6 printers, and 5 cigar makers. The foregoing facts would warrant the conclusion that the unfavorable occupational influences were, as a rule, incidental to the occupation rather than comprehending the entire field of occupational activity. To the extent, therefore, that the factors in industry which produce ill health, such as dust, smoke, vapors, polluted air, etc., are reduced to a minimum by effective

factory control, the predisposing causes to the disease will be correspondingly reduced. It may be pointed out in this connection as a very suggestive result of the more limited investigation into the experience of private institutions, with a much more favorably situated class of patients, that the occupation factors, as predisposing causes, were mentioned in the case of only 12 per cent of the male patients and 3.6 per cent of the female patients.

#### SOCIAL CONDITION.

The social condition of patients was ascertained for 11,858 males and 3,799 females. For males the social condition was returned as good for 51.7 per cent of the total, as medium for 36.9 per cent, and as bad for 11.5 per cent. For women patients the social condition was good in 55.9 per cent of the total, medium in 26.6 per cent, and bad in 17.5 per cent. With regard to unfavorable housing conditions the per cents were 4.2 for male patients and 9 for female patients. With regard to insufficient food the per cents were 2.5 for male patients and 6 for female patients.

#### PATIENTS WITH A FAMILY HISTORY OF TUBERCULOSIS.

Information as to probable predisposition to the disease was ascertained for 14,997 male patients and 3,927 female patients. Of this number 61.7 per cent of the males and only 50.2 per cent of the females came from presumably healthy families; that is, such as were free from a tuberculous taint. A history of tuberculosis on the father's side was traced with certainty in the case of 13.2 per cent of the male patients and of 21 per cent of the female patients, and on the mother's side in the case of 9.1 per cent of the male patients and of 15.9 per cent of the female patients. In addition to the foregoing, the proportion of cases in which both parents were tuberculous was 2.1 per cent for the male patients and 4.9 per cent for the female patients. Including brothers and sisters, as well as remote relatives, a family history of the disease was ascertained with certainty in the case of 29.1 per cent of the male patients and of 43.3 per cent of the female patients. If doubtful cases are included, the number of male patients with a family history of tuberculosis was 37.9 per cent, and in the case of female patients it was 50.5 per cent. The experience would, therefore, seem quite conclusive that a family history of tuberculosis was ascertained with certainty in about one-third of the cases of male patients treated for the disease and in about one-half of the female patients.

The foregoing information was amplified with regard to the condition of health of the members of married patients' families. It was ascertained that among 7,701 married male patients, 86.6 per cent reported their wives as being in entirely good health. In 243

cases, however, or 3.2 per cent, the wife was reported as suffering from tuberculosis, and 278, or 3.6 per cent additional, suffered from diseases of the chest. The proportion of women without children was 7.2 per cent. Of the 6,569 families with children, 82.4 per cent had entirely healthy children, but in 191 families, or 2.9 per cent, there were tuberculous children, and in 145 families, or 2.2 per cent additional, children suffered from diseases of the chest, and in 163 families, or 2.5 per cent additional, children suffered from scrofula.

Among 781 married women patients 603, or 77.2 per cent, reported their husbands as being in entirely good health. In 94 cases, or 12 per cent of the total, the husband was tuberculous, and in 44 cases, or 5.6 per cent, the husband was suffering from some disease of the chest. The proportion of childless marriages was 11.3 per cent. In 44 families, or 7.6 per cent of the 581 families having children, there were tuberculous children, and in addition 4.1 per cent had children who were suffering from some disease of the chest and 4.3 per cent had children who were suffering from scrofula. While these conclusions require to be accepted with caution, since the information was derived from the patients themselves and without further medical inquiry, it is quite clear that to a not inconsiderable extent the families of the patients were affected by the disease and particularly was this true of the husbands and children of tuberculous married women.

#### PREDISPOSING OR COMPLICATING CAUSES IN TUBERCULOSIS.

The inquiry was extended to preceding diseases favorable or contributory to the development of tuberculosis ascertained to have occurred in the case of 7,258 male patients and of 2,413 female patients, or 43.5 per cent and 53.9 per cent, respectively, of the total number of persons under observation. The information secured was neither entirely trustworthy nor conclusive, in that it was frequently impossible to ascertain whether the contributory or collateral diseases were properly to be considered predisposing or complicating causes of existing tuberculosis of the lungs. Foremost among the complicating diseases was influenza, with 1,787 cases among male patients, or 10.7 per cent of the total number under observation, and 657 cases among female patients, or 14.7 per cent. The next most important collateral or contributory disease was pneumonia, reported in the case of 1,366 male patients and of 382 female patients, or 8.2 per cent and 8.5 per cent, respectively. Pleurisy was reported in 1,177 male patients, or 7 per cent of the total, and in 253 female patients, or 5.7 per cent. Bronchial catarrh was reported in 691 of the male patients, or 4.1 per cent of the total, and in 106 of the female patients, or 2.4 per cent. Catarrh of the lungs, which, of course, is a rather indefinite term, particularly when reported by the patients themselves, was

found in the case of 537 male patients and of 96 female patients, or 3.2 per cent and 2.1 per cent, respectively. Among the remaining complications the most important among women patients was chronic anemia, returned in the case of 712 patients, or 15.9 per cent of the total. The other complications are too numerous and in most cases numerically too unimportant to require separate consideration.

In the case of 4,861 male patients and of 1,126 female patients, or respectively, 29.1 per cent and 25.2 per cent of the total patients, the existing tuberculosis of the lungs was complicated by other diseases. The information obtained was from the patients and therefore subject to the criticism of possible inaccuracy in the statement of medical facts. The principal complications were bleeding of the lungs, returned in the case of 3,535 male and 501 female patients. The next most important complication was pleurisy, accounted for in the case of 533 male and 131 female patients. Catarrh of the larynx was present in the case of 311 male and 154 female patients, and tuberculosis of the larynx in the case of 146 male and 38 female patients. These were the principal complications, but a large number of others occurred, which, however, can not be considered to be of material importance in affecting the course or the seriousness of the cases in the aggregate. In other words, the most important complications were nontubercular lung diseases, emphasizing the close relation which exists, unquestionably, between tubercular and nontubercular lung diseases.

#### PREVIOUS SANATORIUM TREATMENT.

Previous treatment in sanatoria or allied institutions was reported to have occurred in the case of 1,880 out of 15,869 male patients, or 11.8 per cent, and in the case of 383 out of 4,008 female patients, or 9.6 per cent. Among the former, 157 had been two or more times in an institution for the treatment of the disease, and 28 of the latter, or respectively, 1 per cent and 0.7 per cent of the total. In the case of 1,554 male patients and of 327 female patients the previous treatment had been at least six weeks. In the case of 326 male patients and of 56 female patients the previous treatment had been of less than six weeks' duration. The relation of such treatment to the ultimate restoration or maintenance of wage-earning capacity was not ascertainable.

#### PREVIOUS DURATION OF DISEASE.

The commencement of the disease was ascertained for 15,170 male patients and for 3,812 female patients. Of the male patients 54.4 per cent, and of the female patients 54.6 per cent, had on their admission a record of less than one year's sickness duration. The details by years and periods of years are given in the following

table, according to which it is shown that there was a previous duration of sickness of one year and over in the case of 45.6 per cent of the male patients and in the case of 45.4 per cent for the female patients.

**DURATION OF DISEASE PREVIOUS TO ADMISSION FOR TREATMENT IN GERMAN PUBLIC SANATORIA FOR TUBERCULOSIS OF THE LUNGS, BY SEX OF PATIENTS, FOR THE PERIOD 1896 TO 1901.**

Previous duration.	Males.		Females.		Total.	
	Number.	Per cent of total.	Number.	Per cent of total.	Number.	Per cent of total.
Under 1 year.....	8,251	54.4	2,082	54.6	10,333	54.4
1 to 2 years.....	2,512	16.6	682	17.9	3,194	16.8
2 to 3 years.....	1,417	9.3	361	9.5	1,778	9.4
3 to 5 years.....	1,434	9.5	367	9.6	1,801	9.5
5 to 7 years.....	630	4.2	140	3.7	770	4.1
7 to 10 years.....	476	3.1	98	2.6	574	3.0
10 to 15 years.....	298	2.0	51	1.3	349	1.8
Over 15 years.....	152	1.0	31	.8	183	1.0
Total.....	15,170	100.0	3,812	100.0	18,982	100.0

The proportion of cases with a duration of from two to five years' previous sickness was 18.8 per cent for male patients and 19.1 per cent for female patients. In a fair proportion of cases the previous disease had been of longer duration, extending in some cases to 15 years and over. Of the total male patients 10.3 per cent had a previous sickness record of over five years, the corresponding proportion for female patients being 8.4 per cent. The results of this investigation, therefore, conclusively prove that in quite a number of cases tuberculosis had been a preexisting disease of considerable duration previous to admission for institutional treatment. It is self-evident that as a rule the chances of recovery must be in an inverse proportion of the duration of the disease, but a satisfactory result is occasionally secured even in quite an advanced stage of the disease. It of course does not necessarily follow that the seriousness of the lung impairment is always in proportion to the duration of the disease, but the chances of recovery are decidedly in favor of incipient cases or those with a comparatively short duration of preexisting disease.

**RELATION OF TREATMENT TO STAGE OF DISEASE.**

The more complex interrelation of degree of seriousness of the disease and its duration previous to admission to institutional treatment is shown in some detail in the following table, in which the cases are grouped according to the Turban stage<sup>1</sup> of the disease on admission and by previous duration of sickness by single years and periods of years.

<sup>1</sup> For explanation of "Turban stage," see p. 83.

TURBAN STAGE OF DISEASE OF MALES AND OF FEMALES ON ADMISSION FOR TREATMENT IN GERMAN PUBLIC SANATORIA FOR TUBERCULOSIS OF THE LUNGS, BY PREVIOUS DURATION OF DISEASE, FOR THE PERIOD 1896 TO 1901.

NUMBER.

Previous duration of disease.	Male patients admitted in Turban stage—					Female patients admitted in Turban stage—				
	I.	I-II.	II.	II-III.	III.	I.	I-II.	II.	II-III.	III.
Under 1 year.....	2,588	1,767	1,758	880	1,126	689	467	424	224	251
1 year to 2 years.....	765	480	519	303	411	133	177	166	93	96
2 years to 3 years.....	466	244	282	173	234	77	79	101	49	54
3 years to 5 years.....	402	250	312	170	287	79	90	93	54	48
5 years to 7 years.....	186	101	127	82	123	28	32	33	20	25
7 years to 10 years.....	119	71	126	67	88	16	20	32	12	17
10 years to 15 years.....	87	54	51	50	53	11	6	17	10	7
Over 15 years.....	44	17	27	20	41	5	4	11	7	4
Total.....	4,657	2,984	3,202	1,745	2,363	1,043	875	877	469	502

PER CENT.

Under 1 year.....	55.6	59.2	54.9	50.4	47.7	66.1	53.4	48.3	47.8	50.0
1 year to 2 years.....	16.4	16.1	16.2	17.4	17.4	13.2	20.2	18.9	19.3	19.1
2 years to 3 years.....	10.0	8.2	8.8	9.9	9.9	7.4	9.0	11.5	10.4	10.8
3 years to 5 years.....	8.6	8.4	9.7	9.7	12.1	7.6	10.3	10.6	11.5	9.6
5 years to 7 years.....	4.0	3.4	4.0	4.7	5.2	2.7	3.7	3.8	4.3	5.0
7 years to 10 years.....	2.6	2.4	3.9	3.8	3.7	1.5	2.3	3.6	2.6	3.4
10 years to 15 years.....	1.9	1.8	1.6	2.9	2.2	1.1	.7	1.9	2.1	1.4
Over 15 years.....	.9	.6	.8	1.1	1.7	.5	.5	1.3	1.5	.8
Total.....	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The larger ratio of fatal cases in the advanced stage of the disease precludes accurate conclusions for a statistical comparison of this kind, and the table fails to fully confirm the previous observation that, as a general rule, the seriousness of the lung involvement is in proportion to the duration of the disease. For illustration, however, of 4,657 male patients in Turban stage I, the proportion having a previous disease record of over five years was 9.4 per cent, against 10.3 per cent of the 3,202 patients in Turban stage II and 12.8 per cent of the 2,363 patients in Turban stage III. The general results for female patients are about the same. Conclusions based upon these data require, however, to be applied to individual cases with extreme caution, for serious chronic cases may occur with a long previous duration of disease, and relatively light cases in an acute form may terminate fatally after a short duration, being commonly known as "galloping consumption."

CONDITION OF PATIENTS ON ADMISSION.

The general condition of the patients on admission was reported for 15,844 male and 3,863 female patients, and considered good in the case of 32.9 per cent of the former and in the case of 28.2 per cent of the latter. The condition was reported as medium in the case of 36.8 per cent of the male patients and of 31.7 per cent of the female patients and as bad in the case of 30.2 per cent of the males and of

40.1 per cent of the females. According to this analysis, the proportion of cases was about the same for male patients for the three groups, but for the female patients the proportion in bad general condition on admission was somewhat larger.

The bodily condition of the patient at the time of admission was ascertained in the case of 15,868 male patients and of 4,002 female patients. Of the male patients 17.9 per cent and of the female patients 18 per cent were stated to have been in a condition of satisfactory nutrition. In the case of 48.9 per cent of the male patients and of 44.5 per cent of the female patients the condition of nutrition on admission was reported as medium, while in the case of 33.2 per cent of the male patients and of 37.5 per cent of the female patients the condition was reported as bad. The proportion of patients of satisfactory nutrition was, therefore, relatively quite small, and the results of the analysis disclose the intimate relation which unquestionably exists between tuberculosis of the lungs and impaired or defective nutrition or malassimilation. The information with regard to nutrition is, of course, subject to the criticism that it depends more or less upon methods of medical diagnosis and that there is an element of reasonable doubt, which impairs the value of the results. The close correspondence, however, between the respective percentages for male and female patients would seem to warrant the conclusion that, in a general way, the large majority of patients on admission were in an impaired or defective state of bodily nutrition.

#### RELATION OF TREATMENT TO GAIN IN BODY WEIGHT.

The relation of treatment to body weight was ascertained in the case of 15,576 male patients and of 3,964 female patients. Of the male patients 93.6 per cent increased in weight during treatment and of the female patients 92.3 per cent. In the case of 3.4 per cent for males and of 3.7 per cent for females the weight remained the same, while in the case of 3 per cent for males and 4.1 per cent for females the weight decreased. The average increase in weight during the time of treatment was 5.9 kilograms (13 pounds) for males and 5.2 kilograms (11.6 pounds) for females. Since the normal average weight of women is less than the average weight of men, the increase in weight is proportionately about the same for both sexes. When the increase in body weight is ascertained, with a due regard to the condition of nutrition on admission, it is almost invariably found that the gain is greatest in the case of those who were most impaired in physique. In the case of male patients, for illustration, who on admission were in a good physical condition, the gain was 5.7 kilograms (12.6 pounds), in the case of those who were in a medium condition 5.9 kilograms (13 pounds), and in the case of those who were in poor physical condition 6.1 kilograms (13.4 pounds). The respective gain

in weight of females was 4.9 kilograms (10.8 pounds) for the first, 5.2 kilograms (11.6 pounds) for the second, and 5.4 kilograms (11.9 pounds) for the third class. Even in the case of patients who were in the third Turban stage of the disease, numbering 2,371 males and 509 females, a gain in weight was obtained in the case of 89.6 per cent of the former and of 83.5 per cent of the latter, the average gain in weight being 5.6 kilograms (12.3 pounds) for males and 4.4 kilograms (9.7 pounds) for females.

**CHANGES IN PHYSICAL CONDITION DURING TREATMENT.**

The changes in condition resulting from the course of systematic treatment were ascertained for 15,740 males and for 3,857 females. The results of the analysis are set forth in tabular form, as follows:

**RESULTS OF SANATORIUM TREATMENT.**

Physical condition of patient.	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Very much improved.....	3,126	19.9	1,036	26.9
Improved.....	5,929	37.7	1,237	32.1
Not improved.....	6,305	40.1	1,452	38.4
Worse.....	292	1.9	70	1.8
Very much worse.....	88	.6	32	.8

According to this table a favorable or promising medical result of treatment was secured in the case of 57.6 per cent of the male patients and of 59.0 per cent of the female patients. In further illustration of the results of treatment, it may be stated that in the case of male patients only 0.1 per cent were in very good general condition on admission, but 3.2 per cent on discharge; the proportion in good general condition on admission was 32.8 per cent, but 76.2 per cent on discharge. In contrast, the proportion of patients in medium condition on admission ranged from 36.9 per cent to 15.6 per cent on discharge; while the proportion of patients in bad general condition ranged from 30.2 per cent on admission to 4.6 per cent on discharge. The results were much the same for females; or, for illustration, 28.1 per cent were in good general condition on admission, against 71.5 per cent on discharge, and 31.7 per cent were in medium general condition on admission, against 18.6 per cent on discharge. The proportion in bad general condition was 40.1 per cent on admission, against 6.6 per cent on discharge. The general results of treatment were therefore much the same for both sexes, and throughout the marked benefits resulting from sanatorium treatment are exhibited by the much larger proportion of patients on discharge in improved general condition, with a corresponding increase in disease-resisting power, which, of course, chiefly conditions the ultimate outcome of systematic diatetic-hygienic institutional treatment.

**COUGH AND EXPECTORATION ON ADMISSION AND DISCHARGE.**

With regard to expectoration and cough on admission and discharge, the required information was ascertained for 15,838 male patients and for 3,989 female patients. Of this number 91.1 per cent of the males and 65.7 per cent of the females had cough and expectoration on admission, 4.5 per cent of the males and 18.4 per cent of the females had cough without expectoration, and 4.4 per cent of the males and 15.9 per cent of the females had neither cough nor expectoration on admission. It is therefore shown that by far the large majority of patients had cough and expectoration on admission, which conclusively proves that they were in a condition of health not only dangerous to themselves, but to the public at large. Of the patients with cough and expectoration combined, 22.8 per cent of the males and 26.2 per cent of the females improved during treatment to the extent that both cough and expectoration had disappeared, and in addition 4.7 per cent of the males and 9.6 per cent of the females on discharge were free from expectoration but retained their cough, while 72.5 per cent of the males and 64.2 per cent of the females retained both cough and expectoration at the time of their discharge. While, therefore, the treatment resulted in a material improvement in general condition, it did not, to more than a rather limited extent, result in removing the most striking physical evidences of lesions or impairment of the lungs. It is quite clear that the medical condition of most of the patients on discharge was not so favorable as would have been desirable or perhaps necessary to provide a sound physical basis as a preliminary condition for subsequently sustained wage-earning capacity. On account of the very much smaller number of patients without cough, or without cough and expectoration, it does not seem necessary to consider the details of this experience at length. In brief, of the patients with cough and expectoration on admission, about one-fourth were free from cough and expectoration on discharge. Of those with cough only, more than one-half, or 56.1 per cent, of the males, and 57.3 per cent of the females, were free from cough on discharge, and, finally, of the patients free from cough and expectoration on admission, 90.5 per cent of the males and 89.7 per cent of the females were still free therefrom on discharge.

**TUBERCULOUS BACILLI IN THE SPUTUM ON ADMISSION AND DISCHARGE.**

Even more important than the mere fact of cough and expectoration is, of course, the bacillary contents of the latter, as determined by recognized bacteriological methods. Information with regard to the results of examination of the expectoration was obtained for 14,313 male patients and for 3,296 female patients. Of these, 6.7 per cent of the males and 29.5 per cent of the females were excluded,

since throughout their stay in the institution they were free from expectoration, although unquestionably tuberculous in one of the several stages of the disease. Of the remaining patients, numbering 12,631 males and 2,265 females, the bacilli of tuberculosis were found in the sputum of 47.3 per cent of the male patients and of 41.1 per cent of the female patients. For some of these the information as to condition on discharge was not ascertained, but 3,462 of the male patients and 698 of the female patients, or 65.6 per cent and 75 per cent, respectively, of the patients having bacilli of tuberculosis in their expectoration on admission still retained the bacteriological evidence of the disease in their expectoration on discharge. The significance of these facts can hardly be overrated. It is evident that while the patients on discharge may have been in a satisfactory general condition, while they had gained in weight and were otherwise perhaps relatively free from serious physical impairment on account of the disease, they carried the bacilli of tuberculosis in their expectoration, which they retained on discharge, and to that extent, of course, they were not only a menace to themselves, on account of the risk of reinfection, but a menace to the community, and particularly other employees, on account of the risk of spreading infection by carelessness or indifference with regard to expectoration. The details of the presence of the bacilli of the disease in the expectoration according to Turban stage of the disease are given in tabular form, as follows:

NUMBER AND PER CENT OF MALE AND FEMALE TUBERCULOUS PATIENTS HAVING BACILLI IN THEIR EXPECTORATION, ACCORDING TO TURBAN STAGE OF DISEASE.

Turban stage.	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
I.....	968	30.4	79	18.0
I-II.....	909	34.3	94	21.0
II.....	1,358	49.7	180	35.1
II-III.....	1,032	64.3	227	63.9
III.....	1,765	78.6	362	77.4

This table shows that of the male patients in Turban stage I, 30.4 per cent were ascertained to have the bacilli of tuberculosis in their expectoration. The proportion of bacillary expectorations increased with the advancing stages of the disease to 49.7 per cent for stage II and 78.6 per cent for stage III. Throughout the percentages are lower for female patients, having been 18.0 per cent for Turban stage I, 35.1 per cent for stage II, and 77.4 per cent for stage III.

Under treatment the tendency is naturally for the bacilli to disappear from the sputum and this, of course, in itself is one of the most important factors in physical diagnosis. It was brought out

by the investigation that of the patients with bacilli in their sputum, but in Turban stage I of the disease, 59.3 per cent of the male patients had expectoration free from bacilli on discharge, the corresponding per cent for females being 55.1. The proportion of cases with favorable results naturally decreases with the advancing stages of the disease, and, accordingly, for males the per cent with no bacilli in their sputum in the Turban stage II was only 36.5 and in stage III 21.1. For females, the corresponding percentages were 37.1 for Turban stage II and 11.8 for stage III. Summarizing the foregoing data, which have a most important bearing upon public considerations of tuberculosis of the lungs as a labor problem, it is shown that of the 11,145 male patients with expectoration on admission 5,275, or 47.3 per cent, had bacilli of tuberculosis in their sputum, against 3,650, or 32.8 per cent, on discharge. Of the 2,265 female patients 931, or 41.1 per cent, had bacilli in their expectoration on admission, but 739, or 32.6 per cent, retained bacilli in their sputum on discharge. In other words, while a fair amount of good resulted from the treatment, it is quite evident that much too large a proportion of the patients under treatment were discharged with established evidence of the bacilli of the disease in their sputum, involving, of course, the serious risk of self-infection and the infection of others, particularly members of the family and fellow employees.

#### DURATION OF TREATMENT.

The duration of treatment, excluding those who were less than six weeks in the institution and those who died, was ascertained for 15,802 male and 3,998 female patients. The duration is given in tabular form below:

DURATION OF TREATMENT OF TUBERCULOUS PATIENTS IN GERMAN SANATORIA,  
FOR THE PERIOD 1896 to 1901, BY SEX.

Duration of treatment.	Males.		Females.	
	Number of cases.	Per cent.	Number of cases.	Per cent.
6 to 8 weeks.....	1,501	9.5	307	7.7
8 to 10 weeks.....	1,760	11.1	352	8.8
10 to 12 weeks.....	3,442	21.8	751	18.8
12 to 14 weeks.....	4,877	30.9	1,540	38.5
14 to 16 weeks.....	1,307	8.3	312	7.8
16 to 20 weeks.....	1,593	10.1	390	9.8
20 to 26 weeks.....	794	5.0	230	5.8
Over 26 weeks.....	528	3.3	116	2.9
Total.....	15,802	100.0	3,998	100.0

According to this table, in about one-third of the cases the patients underwent treatment for from 12 to 14 weeks. Most of the patients were from 10 to 14 weeks in the institution, which is chiefly due to

the fact that in the large majority of cases the treatment was provided for by invalidity insurance institutions. The average duration of treatment was 89.2 days for males and 94.4 days for females.

#### MEDICAL RESULTS OF TREATMENT.

The general medical results of institutional treatment were ascertained for 15,231 male patients and 3,921 female patients. The condition of these patients on discharge was as follows:

Entirely cured, 573 males, or 3.8 per cent of the total; and 149 females, or also 3.8 per cent of the total number discharged. By entirely cured is meant a complete restoration of the lungs to their normal condition, as determined clinically and by careful physical examination.

The number and proportion relatively cured was 1,349 male patients, or 8.9 per cent, and 450 female patients, or 11.5 per cent. By relatively cured is meant such a decided improvement in the general condition of the patient and disappearance of the cough and expectoration that only slight evidences remained of an impaired condition of the lungs.

The number and proportion of patients materially improved, including an advance from a lower to a higher Turban stage, was 5,691 males, or 37.4 per cent, and 1,320 females, or 33.7 per cent.

The number and proportion of patients who improved, but without a change from the Turban stage in which they were on admission, was 5,205, or 34.2 per cent, males and 1,051, or 26.8 per cent, females.

The number of patients with their condition remaining unchanged was 1,570 males, or 10.3 per cent, and 666 females, or 17 per cent.

The number of patients whose general condition was worse, although remaining within the same Turban stage of the disease as observed on admission, was 372 males and 116 females, and the number of patients decidedly worse, with a change to a less favorable stage of the disease, was 413 males and 160 females. The number of deaths was only 58 males and 9 females, or 0.4 per cent and 0.2 per cent, respectively. The analysis with regard to condition on discharge was made in considerable detail, which, however, is too technical and medical for the present purpose with regard to the economic results; that is, the proportion of patients discharged with their earning capacity restored within a reasonable period of time.

Considering the entirely cured and relatively cured as a group, there were 1,922 male patients of this class and 599 female patients, or, respectively, 12.7 per cent and 15.3 per cent of the total patients discharged during the period 1896 to 1901. The average duration of treatment of the cured or materially improved cases was 91.5 days for males and 100.9 days for females. The rate of recovery, as diagnosed from a medical point of view and having reference to restored

earning capacity, according to ages on admission, is shown in tabular form, as follows:

**RATE OF RECOVERY IN TUBERCULOSIS OF THE LUNGS UNDER SANATORIUM TREATMENT DURING THE PERIOD 1896 TO 1901, FOR PATIENTS OF EACH SEX.**

Ages on admission.	Males.			Females.		
	Number of patients under treatment.	Number of patients cured.	Per cent cured.	Number of patients under treatment.	Number of patients cured.	Per cent cured.
Under 15 years.....	50	16	32.0	39	8	20.5
15 to 19 years.....	1,608	251	15.6	773	132	17.1
20 to 24 years.....	3,459	504	14.6	1,440	235	16.3
25 to 29 years.....	3,430	450	12.9	865	135	15.6
30 to 34 years.....	2,734	307	11.2	461	53	11.5
35 to 39 years.....	2,014	210	10.4	239	19	7.9
40 to 49 years.....	2,008	145	7.2	141	12	8.5
50 to 59 years.....	390	27	6.9	27	2	7.4
60 years and over.....	27	-----	-----	6	2	33.3
Total.....	15,770	1,910	12.1	3,991	598	15.0

According to this table, the recovery rate was highest at the younger and lowest at the higher ages, ranging, for males, from 32 per cent at ages under 15 years to only 6.9 per cent at ages 50 to 59 years. For females, the range in the recovery rate was from 20.5 per cent at ages under 15 years to 7.4 per cent at ages 50 to 59 years. At ages 60 years and over the numbers are too small for a safe conclusion.

#### ECONOMIC RESULTS OF TREATMENT.

The economic results of treatment were ascertained in the case of 15,636 male patients and of 3,953 female patients, or, relatively, 98.5 per cent and 98.6 per cent of the total number of patients under treatment. It is pointed out that the economic results—that is, the restored earning capacity—were not in all cases determined by identical methods, but in a large majority of the institutions by full restored earning power is meant a recovered earning capacity of from 75 per cent to 100 per cent of the former earnings, while by partial recovery is meant a restored earning capacity of from 33½ to 75 per cent of the former wages. Persons able to earn less than 33½ per cent of their former earnings are considered as not having their earning capacity restored to them, or, in other words, as unsuccessful cases from an economic point of view. Excluding, therefore, from the following comparison the returns which are not strictly comparable, upon the basis of the preceding explanation, as to the terms used, the facts were utilized for 13,070 male patients, and for 2,356 female patients, as follows:

ECONOMIC RESULTS OF SANATORIUM TREATMENT FOR TUBERCULOSIS OF THE LUNGS DURING THE PERIOD 1896 TO 1901, FOR PATIENTS OF EACH SEX.

Condition on discharge.	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Earning capacity fully restored with return to usual occupation.	8,891	68.0	1,685	71.5
Earning capacity fully restored with return to another occupation.....	1,161	8.9	53	2.2
Earning capacity partly restored.....	1,745	13.4	283	12.0
Unable to work.....	1,221	9.3	329	14.0
Died.....	52	.4	6	.3
Total.....	13,070	100.0	2,356	100.0

According to this table 68.0 per cent of the male patients and 71.5 per cent of the female patients had their earning capacity fully restored and were able to take up again the occupation at which they had been employed before admission to the sanatorium. In the cases of 8.9 per cent of the male patients and of 2.2 per cent of the female patients the earning capacity was fully restored, but at a different and more suitable occupation or industry in place of the one formerly followed. The proportion of patients with their earning capacity only partially restored, within the meaning of the term, as previously defined, was 13.4 per cent for males, and 12.0 per cent for females. The proportion of entirely unsuccessful cases, from an economic point of view, was 9.3 per cent for males and 14.0 per cent for females. In addition thereto 0.4 per cent of the male patients and 0.3 per cent of the female patients had died during the course of treatment, but it requires to be recalled that all patients under six weeks' treatment were excluded from the analysis of the collective experience for the period.

IMPORTANCE OF TREATMENT IN THE INCIPIENT STAGE OF DISEASE.

The importance of early treatment, in its relation to restored earning capacity, is brought out in the following table, which shows the relation of successful treatment to the Turban stage of the disease on admission:

RELATION OF ECONOMIC RESULTS OF SANATORIUM TREATMENT FOR TUBERCULOSIS TO THE TURBAN STAGE OF THE DISEASE ON ADMISSION, DURING THE PERIOD 1896 TO 1901, FOR PATIENTS OF EACH SEX.

Turban stage of disease on admission.	Males.		Females.	
	Per cent with fully restored earning capacity.	Per cent with partly restored earning capacity.	Per cent with fully restored earning capacity.	Per cent with partly restored earning capacity.
I.....	80.7	15.6	88.2	6.9
I-II.....	78.4	17.3	84.2	9.3
II.....	69.1	22.0	72.3	14.2
II-III.....	52.5	31.9	55.4	24.9
III.....	36.3	37.0	30.6	27.2

It is shown by this table that, leaving out of consideration the minor exceptions of no material importance, the percentage of cases successfully treated, from an economic point of view, diminishes progressively with the increasing stage of seriousness of the disease, emphasizing therefore the economic importance of early treatment, when the outlook for recovery is reasonably assured.

#### GERMAN SANATORIUM EXPERIENCE, 1896 TO 1901.<sup>1</sup>

The final results of the collective investigation of 1896 to 1901 are briefly summarized as follows:

The average duration of treatment of 15,869 male and of 4,008 female patients was 89.2 and 94.4 days, respectively.

The patients were almost exclusively of the wage-earning element of the nation, or 99.4 per cent in the case of males and 85.1 per cent in the case of females.

The cost of treatment was in most cases provided for by the invalidity insurance institutions, or other institutions and funds established to carry out the German compulsory insurance laws. Of the male patients, 86.2 per cent, and of the female patients, 79.2 per cent, were provided for at the expense of compulsory social insurance institutions.

Of the male patients 44.0 per cent were of the age period 20 to 29 years, and of the female patients 57.8 per cent. Of the male patients 30.1 per cent, and of the female patients 17.6 per cent, were of the age period 30 to 39 years. The large majority therefore were admitted for treatment at a period of life when the economic and social value of health is a matter of most serious concern to the individual and to the State.

A family history of tuberculosis was established with certainty in the case of 20.2 per cent of the male and 32 per cent of the female patients, and with reasonable probability, including the previous proportion, in 26.4 per cent of the male and 36.7 per cent of the female patients. The proportion of tuberculous brothers and sisters of the patient was ascertained with certainty, or reasonable probability, in the case of 16.5 per cent of the males and of 21.2 per cent of the females.

Over one-half of the patients—that is, 54.4 per cent of the males and 54.6 per cent of the females—were admitted to treatment in the same year in which the symptoms of the disease were first recognized.

In the case of 9.8 per cent of the males and of 8.2 per cent of the females there was a record of previous treatment of at least six weeks' duration in sanatoria or some special institution for the treatment of tuberculosis of the lungs.

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<sup>1</sup> For summary account of the experience data for the period 1902-1904, see p. 162.

The bodily condition on admission, as determined by the evidence of nutrition, was good in the case of 17.9 per cent of the male and of 18 per cent of the female patients, and medium in the case of 48.9 per cent of the male and of 44.6 per cent of the female patients. The condition was bad in the case of 33.2 per cent of the males and of 37.5 per cent of the females.

The bodily condition, or nutrition, was improved, as determined by an increased weight, in the case of 93.6 per cent of the males and of 92.3 per cent of the females. The average gain in weight was 5.9 kilograms (13 pounds) and 5.2 kilograms (11.6 pounds), respectively, in the case of male and female patients.

The general condition of the patients on admission was good in the case of 32.9 per cent of the male and 28.2 per cent of the female patients. It was medium in the case of 36.8 per cent of the male and 31.7 per cent of the female patients; and, finally, it was bad in the case of 30.2 per cent of the male patients and of 40.1 per cent of the female patients. The general condition was improved during treatment in the case of 57.5 per cent of the male and 59 per cent of the female patients.

Cough and expectoration were present on admission in the case of 91.1 per cent of the male and 65.7 per cent of the female patients, but cough without expectoration was present in only 4.5 per cent of the male patients and in only 18.5 per cent of the female patients. Of the former, 22.8 per cent of the males and 26.2 per cent of the females were free from cough and expectoration on discharge, and dry cough, present on admission, disappeared in the case of 56.1 per cent of the male and 57.3 per cent of the female patients during treatment.

The sputum of patients was ascertained with certainty to contain the tubercle bacillus in the case of 45.3 per cent of the male patients and of 30 per cent of the female patients. Of this group of patients, separately considered, 34.4 per cent of the males and 25 per cent of the females were free from tubercle bacillus on discharge.

Fever was present on admission in the case of 13.8 per cent of the male and 19.4 per cent of the female patients. The fever disappeared during treatment in the case of 68.6 per cent of the male and 63.3 per cent of the female patients.

Night sweats were observed on admission in the case of 29.8 per cent of the male and 27.3 per cent of the female patients. Night sweats disappeared during treatment in the case of 90.7 per cent of the male and 85.2 per cent of the female patients.

The seriousness of the disease, or the degree of lung impairment, as determined by the Turban stage of the disease, was as follows:

Of the male patients, 31.3 per cent, and of the female patients 28.4 per cent, were in stage I of the disease, and 19.9 per cent of the males and 22.9 per cent of the females were in stage I-II of the disease. Of the patients in stage II of the disease, the proportion of males was 21.3

per cent and of the females 23.1 per cent, and in stage II-III, 11.7 per cent and 12.5 per cent, respectively. The proportion of patients in stage III, or the far-advanced stage of the disease, was 15.8 per cent for males and 13.2 per cent for females.

Only one lung was affected in the case of 25 per cent of the male and 19.7 per cent of the female patients. Of these, 62.6 per cent and 63.1 per cent, respectively, had the right lung affected, and 37.4 per cent and 36.9 per cent, respectively, had the left lung affected.

Râles were observed in the case of 93.4 per cent of the male and 87.3 per cent of the female patients, and of this group râles combined with consolidation was observed in the case of 79.8 per cent of the males and of 74.6 per cent of the females.

A cure, from a medical point of view, was obtained in the case of 12.7 per cent of the male and 15.3 per cent of the female patients. A material improvement, including the cured cases, was obtained in the case of 50 per cent of the male and 48.9 per cent of the female patients. A relative improvement was secured in the case of 34.2 per cent of the male and 26.8 per cent of the female patients, and 10.3 per cent and 17 per cent, respectively, of the patients remained unchanged. In the case of 5.1 per cent of the male and 7.1 per cent of the female patients the condition on discharge was worse than on admission, but the percentage of deaths during the period of treatment was only 0.4 for male patients and only 0.2 for female patients.

An economic result, with entire restoration of earning capacity, was obtained in the case of 76.9 per cent of the male and 73.7 per cent of the female patients, but in addition thereto 13.4 per cent of the males and 12 per cent of the females had their earning capacity partially restored to them, while only 9.3 per cent of the male patients and only 14 per cent of the female patients were unsuccessfully treated from an economic point of view.<sup>1</sup>

#### **TREATMENT AND CARE OF TUBERCULOUS WAGE EARNERS BY GERMAN INVALIDITY INSURANCE INSTITUTIONS, 1897 TO 1909.**

The combined experience data of the German territorial government invalidity insurance institutions have been published for a number of years in the form of statistical summaries, including all the essential facts emphasizing the financial, medical, and social results of institutional or other treatment for the purpose of preventing or restoring the loss of earning power through debilitating diseases of long duration. The latest available report<sup>2</sup> is for the year 1910,

<sup>1</sup> See page 162 for summary of experience, 1902-1904, published by the Imperial Board of Health in 1912.

<sup>2</sup> Amtliche Nachrichten des Reichs-Versicherungsamts 1910. 2. Beheft. Statistik der Heilbehandlung bei den Versicherungsanstalten und zugelassenen Kasseneinrichtungen der Invalidenversicherung. Berlin, 1910.

including the experience data for the period 1897 to 1909. The chief object of the statistical investigation is to ascertain from year to year the actual results of the special treatment extended to invalids, actual or prospective, undertaken at the expense of the invalidity insurance institutions for the purpose of preventing premature physical infirmity and the resulting loss of wage-earning capacity.<sup>1</sup> On account of the fact that tuberculosis of the lungs is one of the chief causes of physical impairment and resulting loss of earning power, the experience data throughout differentiate the statistics of treatment for tuberculosis of the lungs and other diseases. While in the main the sanatoria or the other special healing and curative institutions have been established for the purpose of granting special treatment in behalf of Government invalidity insurance institutions, it requires to be taken into account that under the invalidity-insurance law reasonable expenses may also be incurred by the insurance institutions in behalf of the general welfare in the furtherance of public measures and methods for the prevention of sickness, invalidity, and premature death.

In addition to the separation made in the statistical analysis of the data concerning patients treated on account of tuberculosis of the lungs and those treated on account of other diseases, a further separation of the facts is made regarding patients receiving full treatment, which in practically all cases is institutional, and of patients receiving only partial treatment, which is largely of the nature of medical consultations, prescriptions, dispensary service, dental work, etc. For the present purpose only the full treatment of patients is of practical and conclusive value, since the final results of partial treatment must in most cases be more or less a matter of conjecture. The fact also that the treatment of patients for diseases other than tuberculosis of the lungs includes a considerable variety of medical and other causes precludes the scientific utility of the data concerning this group, and that this fact has been recognized by the Imperial Insurance Office is made evident by a recent ruling, under which the subsequent effects of full or partial treatment for causes other than tuberculosis of the lungs<sup>2</sup> will not longer be observed and reported upon. Unless otherwise stated, therefore, the present discussion is limited entirely to members of Government invalidity insurance institutions receiving full and systematic treatment as patients suffering from tuberculosis of the lungs and chiefly in special institutions erected for the purpose or maintained by the insurance institutions as an essential and more or less effective step toward the prevention of premature invalidity brought about by tuberculous diseases.

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<sup>1</sup> For a full statement of the legal provisions governing the treatment and care of members of invalidity insurance institutions, see Appendix IV.

<sup>2</sup> This term as used in the discussion is always inclusive of tuberculosis of the larynx.

## NUMBER OF PATIENTS TREATED, BY SEX.

According to the report for 1910, the aggregate number of patients treated for all causes during the period 1897 to 1909 was 619,005, of whom 275,207, or 44.5 per cent, received treatment on account of tuberculosis of the lungs. The details, by years, are given in the table which follows, according to which the percentage of persons treated on account of tuberculosis of the lungs, of the total number receiving treatment for all causes, has increased from 31.9 in 1897 to 42.4 in 1909.

NUMBER OF PERSONS TREATED ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS IN BEHALF OF GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY SEX AND BY YEARS, 1897 TO 1909

Year.	Number of persons treated.		Per cent of tubercular patients of persons treated for all causes.	Males treated for tuberculosis of the lungs.	Females treated for tuberculosis of the lungs.	Per cent.	
	For all causes.	On account of tuberculosis of the lungs.				Males.	Females.
1897.....	10,564	3,374	31.9	2,625	749	77.8	22.2
1898.....	13,758	4,937	35.9	3,822	1,115	77.4	22.6
1899.....	20,039	7,759	38.7	6,074	1,685	78.3	21.7
1900.....	27,427	11,150	40.7	8,469	2,681	76.0	24.0
1901.....	32,710	14,757	45.1	10,862	3,895	73.6	26.4
1902.....	35,949	16,516	45.9	12,205	4,311	73.9	26.1
1903.....	43,593	20,171	46.3	14,956	5,215	74.1	25.9
1904.....	49,491	23,511	47.5	16,955	6,526	72.2	27.8
1905.....	56,420	26,834	47.6	19,241	7,593	71.7	28.3
1906.....	63,838	31,375	46.9	22,172	9,203	70.7	29.3
1907.....	74,023	32,543	44.0	22,557	9,986	69.3	30.7
1908.....	86,990	39,340	45.2	26,790	12,550	68.1	31.9
1909.....	101,158	42,940	42.4	29,747	13,193	69.3	30.7
Total.....	619,005	275,207	44.5	196,505	78,702	71.4	28.6

The available information concerning the general results of systematic and full treatment of German invalidity insurance institutions is limited to the period 1897 to 1909. During this period 272,480 members received full and systematic treatment on account of tuberculosis, and of this number 194,787 patients were men and 77,693 patients were women. The proportion of male patients, therefore, was 71.5 per cent. In addition, 2,727 members received temporary treatment on account of tuberculosis, and of this number 1,718 were men and 1,009 were women. The number and proportion of patients receiving temporary or partial treatment on account of tuberculosis were, therefore, relatively small. During 1909 the number of members receiving full treatment on account of tuberculosis was 42,232, and of this number 29,277, or 69.3 per cent, were males. During the same year the number of members receiving temporary or partial treatment on account of tuberculosis of the lungs was 708, and of this number 470, or 66.4 per cent, were males. Data for each year, 1897 to 1909, are given in the following table:

NUMBER (BY SEX) AND PER CENT OF TOTAL PERSONS RECEIVING FULL TREATMENT AND PARTIAL OR TEMPORARY TREATMENT ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS IN BEHALF OF GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY YEARS, 1897 TO 1909.

Year.	Persons receiving full treatment.				Persons receiving temporary or partial treatment.			
	Males.	Females.	Total.	Per cent of total number treated.	Males.	Females.	Total.	Per cent of total number treated.
1897.....	2,598	736	3,334	98.8	27	13	40	1.2
1898.....	3,806	1,104	4,910	99.5	16	11	27	.5
1899.....	6,032	1,666	7,698	99.2	42	19	61	.8
1900.....	8,442	2,652	11,094	99.5	27	29	56	.5
1901.....	10,812	3,844	14,656	99.3	50	51	101	.7
1902.....	12,187	4,302	16,489	99.8	18	9	27	.2
1903.....	14,937	5,211	20,148	99.9	19	4	23	.1
1904.....	16,957	6,520	23,477	99.9	28	6	34	.1
1905.....	19,085	7,536	26,621	99.2	156	57	213	.8
1906.....	21,959	9,063	31,022	98.9	213	140	353	1.1
1907.....	22,258	9,816	32,074	98.6	299	170	469	1.4
1908.....	26,437	12,288	38,725	98.4	353	262	615	1.6
1909.....	29,277	12,955	42,232	98.4	470	238	708	1.6
Total.....	194,787	77,663	272,450	99.0	1,718	1,009	2,727	1.0

#### EXPENDITURES ON ACCOUNT OF TREATMENT AND CARE, 1897 TO 1909.

The total cost of treatment and care for all causes for the period 1897 to 1909 was 151,217,537 marks (\$35,989,774). Of this sum 99,673,647 marks (\$23,722,328) was on account of expenses incurred for full treatment of tuberculous wage earners, and 71,480 marks (\$17,012) was paid out on account of temporary treatment for tuberculosis, making a total expenditure of 99,745,127 marks (\$23,739,340), or 66 per cent of the expenditures on account of all diseases, including tuberculosis. While the total expenses on account of treatment for all diseases have increased from 2,011,148 marks (\$478,653) in 1897 to 24,275,577 marks (\$5,777,587) in 1909, the expenses for full treatment on account of tuberculosis have increased from 1,024,507 marks (\$243,833) in 1897 to 16,303,618 marks (\$3,880,261) in 1909. The expenses on account of irregular or temporary treatment on account of tuberculosis have increased from 2,589 marks (\$616) in 1897 to 16,983 marks (\$4,042) in 1909. The details by years are given in the two tables which follow:

AMOUNTS EXPENDED ON ACCOUNT OF TREATMENT AND CARE FOR TUBERCULOSIS OF THE LUNGS IN BEHALF OF GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY YEARS, 1897 TO 1909.

Year.	Total amount expended on account of treatment for—		Per cent of total expenditure on account of treatment of tuberculosis of the lungs.	Year.	Total amount expended on account of treatment for—		Per cent of total expenditure on account of treatment of tuberculosis of the lungs.
	All causes.	Tuberculosis of the lungs.			All causes.	Tuberculosis of the lungs.	
1897.....	\$478,653.40	\$244,448.94	51.1	1905.....	\$3,438,625.19	\$2,305,233.88	67.0
1898.....	659,100.59	368,510.66	55.9	1906.....	3,965,185.93	2,734,988.26	69.0
1899.....	965,560.10	572,398.81	59.3	1907.....	4,273,220.03	2,530,847.68	66.2
1900.....	1,478,151.44	896,489.30	60.6	1908.....	5,146,960.15	3,527,141.20	68.5
1901.....	1,883,108.32	1,190,222.83	63.7	1909.....	5,777,587.33	3,884,303.04	67.2
1902.....	2,155,385.26	1,394,957.57	64.7				
1903.....	2,737,286.90	1,763,738.76	64.4	Total..	35,989,773.90	23,739,340.46	66.0
1904.....	3,030,949.25	2,017,069.55	66.5				

AMOUNTS EXPENDED ON ACCOUNT OF FULL TREATMENT AND CARE AND ON ACCOUNT OF PARTIAL OR TEMPORARY TREATMENT AND CARE FOR TUBERCULOSIS OF THE LUNGS IN BEHALF OF GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY SEX OF PATIENTS AND BY YEARS, 1897 TO 1909.

Year.	Amounts expended on account of full treatment and care.				Amounts expended on account of partial or temporary treatment and care.			
	Males.	Females.	Total.	Per cent of total expenditures for tuberculosis.	Males.	Females.	Total.	Per cent of total expenditures for tuberculosis.
1897.....	\$182,553.23	\$61,279.50	\$243,832.73	99.75	\$395.31	\$220.90	\$616.21	0.25
1898.....	278,543.68	89,584.95	368,128.63	99.90	153.20	223.87	382.07	.10
1899.....	445,459.33	126,105.12	571,564.45	99.86	573.58	230.78	804.36	.14
1900.....	683,424.86	202,663.90	886,088.77	99.96	243.83	136.70	380.54	.04
1901.....	890,977.42	301,304.17	1,192,281.60	99.92	705.34	285.89	991.23	.06
1902.....	1,044,766.99	349,563.43	1,394,330.42	99.96	513.77	93.37	607.15	.04
1903.....	1,329,012.77	434,445.98	1,763,458.75	99.98	225.04	54.97	280.01	.02
1904.....	1,509,013.60	507,865.39	2,016,878.99	99.99	102.71	77.85	180.55	.01
1905.....	1,727,466.05	576,263.18	2,303,729.23	99.93	918.91	585.74	1,504.64	.07
1906.....	2,083,071.47	699,890.58	2,782,962.05	99.93	891.27	1,134.93	2,026.20	.07
1907.....	2,056,997.59	771,892.31	2,828,889.90	99.93	1,170.25	787.54	1,957.79	.07
1908.....	2,530,635.44	993,216.13	3,523,851.56	99.91	1,770.72	1,518.92	3,289.64	.09
1909.....	2,816,609.57	1,063,651.51	3,880,261.08	99.90	2,720.34	1,321.61	4,041.95	.10
Total...	17,544,561.95	6,177,766.17	23,722,328.12	99.93	10,389.27	6,623.06	17,012.34	.07

Of the total number of male patients treated and cared for, 48.7 per cent were treated on account of tuberculosis of the lungs. The corresponding proportion for female patients was 36.5 per cent. Since 1897 the number of persons treated and cared for in special institutions owned or controlled by the State invalidity insurance institutions has increased nearly tenfold. In 1909, of all persons treated and cared for 42.4 per cent were treated on account of tuberculosis of the lungs, and of these 98.4 per cent received full, systematic, and largely indoor or special institutional treatment. The

tendency toward special institutional treatment of tuberculous members of the German State invalidity insurance institutions is explained on the ground that from a considerable amount of experience it has been shown that only by means of such treatment can the required economic results be secured. The considerable financial expenditures on this account are justified by the fact that tuberculosis of the lungs, according to the investigations of 1896 to 1899, holds the third position as the primary cause of invalidity among men, and the second position as the primary cause of invalidity among women insured with German State invalidity insurance institutions.

During the period 1897 to 1909, out of 619,005 patients treated and cared for on account of all diseases, 275,207 were treated and cared for on account of tuberculosis of the lungs, at an expense of nearly 100,000,000 marks (\$23,800,000). The total expenses for all causes, including tuberculosis, during the period were 151,217,537 marks (\$35,989,774). A portion of this expense was refunded to the invalidity insurance institutions by sick funds, industrial accident associations, local authorities, poor funds, etc. In 1909 the refunded amount was 4,948,044 marks (\$1,177,635) out of a total expense on account of all causes of 24,275,577 marks (\$5,777,587), leaving a net expense on account of treatment and care incurred by the invalidity insurance institutions during the year of 19,327,533 marks (\$4,599,953).

Summarizing the general results of the experience for the period 1897 to 1909, it is shown by the report for 1910 that the total expenses on account of treatment and care amounted to 151,217,537 marks (\$36,454,588). Of this amount the sum of 27,807,094 marks (\$6,618,088) was refunded by sick funds, industrial accident associations, local authorities, poor funds, etc., leaving a net aggregate expense paid for by the invalidity insurance institutions of 123,410,443 marks (\$29,371,685). Of this sum 16,902,514 marks (\$4,022,698) was paid for the support of dependent members of the patients' families, equivalent to 11.2 per cent of the total disbursements for all causes.

#### **INCREASE IN EXPENDITURES ON ACCOUNT OF TREATMENT AND CARE.**

The expenditures on the part of invalidity insurance institutions on account of treatment and care for diseases of all kinds have steadily risen from year to year. In 1897 the amount expended on this account was 1.6 per cent of the total amount paid in contributions by the members of the State invalidity insurance institutions, increasing gradually to 6.6 per cent in 1903, and finally reaching 10.3 per cent in 1909. The average expenditure for treatment and care during the period 1897 to 1909 was 6.3 per cent of the in-

come derived from contributions and exclusive of the income derived from interest or other sources.

#### COMPARISON OF CONTRIBUTIONS AND EXPENDITURES FOR TREATMENT.

On the basis of the annuity payments to beneficiaries of the State invalidity insurance institutions the expenditures for treatment and care were 3.4 per cent of this amount in 1897, increasing to 8.3 per cent in 1903, and to 12.2 per cent in 1909. During the period 1897 to 1909 the average expenditure for treatment and care was 8.5 per cent of the total payments made on account of disability and other annuities payable in conformity to the provisions of the compulsory invalidity insurance law.

#### EXPENDITURES DURING 1909.

While the foregoing expenditures include the treatment and care of patients for all diseases, the expenditures for particular classes of patients, with distinction of sex, but only for the year 1909, are given in the table below:

#### EXPENDITURES FOR TREATMENT AND CARE OF INVALID MEMBERS OF GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS DURING 1909, BY SEX.

Expenditures on account of—	Amount.	Per cent.
<b>Tuberculosis of the lungs, full treatment:</b>		
Males.....	\$2,816,610	48.75
Females.....	1,063,652	18.41
<b>Tuberculosis, temporary or partial treatment:</b>		
Males.....	2,720	.05
Females.....	1,322	.02
<b>All other diseases, full treatment:</b>		
Males.....	1,098,034	19.00
Females.....	612,943	10.61
<b>All other diseases, temporary or partial treatment:</b>		
Males.....	97,384	1.69
Females.....	84,923	1.47
Total on account of tuberculosis.....	3,884,304	67.23
Total on account of other causes and diseases.....	1,893,284	32.77
Total expenditures for all causes.....	5,777,588	100.00

According to this table, the total expenditures for treatment and care for all diseases and causes during 1909 amounted to 24,275,577 marks (\$5,777,588). Of this expenditure 67.23 per cent was on account of tuberculosis of the lungs and 32.77 per cent on account of other diseases and causes. On account of male patients receiving full treatment and care for tuberculosis of the lungs 11,834,494 marks (\$2,816,610) was expended during the year, or 48.75 per cent of the total expenditures for all diseases and causes. The expenditure on account of female patients treated and cared for during the year was 4,469,124 marks (\$1,063,652), or 18.41 per cent of the total expenditures for all diseases and causes. The expenditures on account of tuberculosis of the lungs for temporary or partial treatment are only a minor consideration. The analysis clearly shows that over two-

thirds of the expenditures on account of treatment and care were incurred on account of tuberculosis of the lungs. It, of course, is well known that the membership of invalidity insurance institutions constitutes practically the total active wage-earning population of the German Empire. Whatever, therefore, is done in this respect, or in this direction, is primarily for the uplift, protection, and care of the men and women engaged in German industry at the present time.

**PROPORTION OF INSURED POPULATION TREATED AND CARED FOR  
DURING 1909.**

In 1907<sup>1</sup> the population liable to insurance in conformity to the compulsory invalidity insurance laws was ascertained to be 14,631,390. Since the total number of persons receiving treatment and care on account of tuberculosis of the lungs in 1909 was 42,940, the rate of persons receiving treatment and care on account of this disease was 29.35 per 10,000. For purposes of comparison it may be stated that the number of persons receiving treatment on account of diseases and causes other than tuberculosis of the lungs was 58,218, or at the rate of 39.79 per 10,000 of population within the scope of the compulsory insurance laws. The total number of persons receiving treatment for all causes was 101,158 during 1909, or at the rate of 69.14 per 10,000 of insurable population. In marked contrast are the results for 1897, when the population subject to the insurance laws was ascertained to be 11,813,259, and the total number of persons receiving treatment and care for all causes was only 10,564, or at the rate of 8.94 per 10,000 of insurable population. The actual number of persons receiving treatment for all causes has, therefore, increased 857.6 per cent between 1897 and 1909, while the rate per 10,000 of insurable population has increased 673.4 per cent.

**PROPORTION OF PATIENTS TREATED, BY SELECTED STATES.**

The foregoing estimate applies to the German Empire as a whole. The rate varies considerably for the different States or territorial divisions of the Empire, primarily, of course, because of the greater or lesser proportion of the population within the scope of the insurance laws. In Berlin, for illustration, in 1909 the ratio of total persons receiving treatment for all causes was 171 per 10,000 of insurable population, for Upper Bavaria the rate was 153, for Baden 144, and for the Thuringian States 127. The lowest rate was 14 per 10,000 for Mecklenburg, which is almost exclusively an agricultural section. It is hardly necessary to emphasize in this discussion that tuberculosis, as well as many other diseases, is generally much

<sup>1</sup>The date of the last industrial census.

more common among the industrial than among the agricultural population and more common among the population of cities with congested districts than among the population of rural districts.<sup>1</sup> These conditions largely govern the relative proportion of insured members receiving treatment in special institutions, the range being, as stated, between a minimum of 14 and a maximum of 171 per 10,000. These rates have no reference to the membership of supplementary associations or institutions within the scope of the compulsory invalidity insurance laws, limited practically to railways and mines, and for which the rates of members treated and cared for have ranged from 4 to 208 per 10,000 employees.

#### **NOTIFICATION OF ARMY RECRUITS WHO WERE REJECTED ON ACCOUNT OF TUBERCULOSIS.**

For the purpose of securing the earliest possible information concerning incipient cases of tuberculosis of the lungs, a regulation was adopted in 1907, under which information concerning army recruits rejected on account of tuberculosis of the lungs was required to be communicated to the State invalidity insurance institutions of which they were members. In 1909 notifications of 575 cases of incipient tuberculosis, and of 587 recruits otherwise diseased, were communicated to the insurance institutions for the purpose of providing, if advisable, the required treatment in anticipation of a cure. Of this number, however, only 218 of the tuberculous subjects received institutional treatment, and of these 180, or 82.6 per cent, were subsequently discharged as cured, in conformity to section 4, paragraph 5, of the invalidity insurance law [art. 1255, par. 2, of the Workmen's Insurance Code of July 19, 1911]. In the case of those not treated, the reasons for declining action on the part of the insurance institutions were chiefly the probability of noneffectiveness of the treatment, or noneligibility to treatment on the part of the insurance institutions. In some cases the disease had advanced too far, and in some others it was of too incipient a nature to warrant the anticipation of invalidity within a reasonable period of time. In a general way it would appear that while much had been expected from this cooperation between the military authorities and the insurance institutions, the actual results have not been as satisfactory as had been assumed would be the case. While the number of cases may seem relatively small, it requires to be considered that every case of invalidity involves a serious possibility of material expense on the part of the insurance institutions, aside from the humanitarian considerations, which make it of the utmost importance that every case of incipient tuberculosis shall, if practicable, be treated systematically and effectively from the earliest stage of the disease.

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<sup>1</sup> There are, however, exceptions to the rule, which have no bearing upon the present

**FINANCIAL AID GIVEN BY INVALIDITY INSURANCE INSTITUTIONS IN THE CAMPAIGN AGAINST TUBERCULOSIS.**

In common with other civilized countries there are throughout Germany to-day a large number of voluntary associations for aid and assistance of wage earners and others in the event of sickness, but there are also many institutions other than those maintained by charitable or philanthropic contributions, supplementary to the institutions maintained by the State insurance funds. As an encouragement and aid in the campaign against tuberculosis, the State invalidity insurance institutions during 1909 paid out 288,365 marks (\$68,631), against 248,805 marks (\$59,216) in 1908. Of the expenditures during 1909 the sum of 116,175 marks (\$27,650) was for contributions and aid to societies, committees, etc., organized for the establishment of day camps, forest convalescing homes, etc. The sum of 159,265 marks (\$37,905) was paid out for the establishment or maintenance of bureaus of information and dispensaries for the benefit of persons afflicted with tuberculosis, while 12,925 marks (\$3,076) was paid out in grants for miscellaneous similar purposes. While these amounts are relatively not very large, the aid rendered is often substantial and practically indispensable to the furtherance of the aims and objects of the general campaign or warfare against tuberculosis. For illustration, the Invalidity Insurance Institution of Berlin, in 1909, paid out 40,550 marks (\$9,651), of which 30,000 marks (\$7,140) was paid to the central committee for instruction and care of tuberculous persons in Berlin and vicinity; 50 marks (\$11.90) to the German Central Committee for the establishment of institutions, day camps, etc., for tuberculous persons; 500 marks (\$119) for the Provincial Antituberculosis Association of Brandenburg; and 10,000 marks (\$2,380) to the Red Cross Society for the establishment of public sanatoria. Some of the other territorial insurance institutions make even more varied contributions, partly for educational purposes, but largely in aid of direct efforts to combat the disease by the institutional segregation and treatment of patients and their effective, systematic care.

In addition to the foregoing, the invalidity insurance institutions make grants of variable sums to communities in aid of the establishment or maintenance of dispensaries, hospitals, district nursing associations, etc. During 1909 the sum of 288,449 marks (\$68,651) was paid out on this account by all of the State invalidity insurance institutions, against 214,093 marks (\$50,954) paid out in 1908. The major portion of this sum was in behalf of the campaign against tuberculosis and on account of cases not suitable for institutional treatment.

**FAMILY SUPPORT OF TUBERCULOUS WAGE EARNERS IN PUBLIC SANATORIA.**

To encourage invalid members to make use of institutions for the treatment and cure of tuberculosis of the lungs the invalidity insurance law provides for grants of financial aid to dependent members of the patient's family in excess of the amount payable in conformity to the sickness insurance laws. The use which is made of this authority varies considerably with different insurance institutions. The institution of East Prussia, for illustration, grants double the amount of legal aid to dependents in the event of sickness, while Berlin and Brandenburg provide, on the consideration of cases on their individual merits, to the extent of three times the minimum legal aid. Hanover provides in individual cases supplementary aid to dependents to a maximum amount of 15 marks (\$3.57) a week, but in most cases the aid is limited to double the amount receivable in the event of ordinary sickness, the supplementary assistance being granted as an inducement for those in apparent need to make use at the earliest possible moment of the institutions providing for the effective treatment of diseases, chiefly tuberculosis of the lungs. As has been previously stated, during 1909, 3,221,957 marks (\$766,826) was paid out by invalidity insurance institutions on account of the support of dependent members of the patients' families—that is, on account of patients treated for all diseases and causes, including tuberculosis of the lungs—the expense being considered necessary, and in fact indispensable, to induce patients in the incipient stage of the disease to seek treatment when the outlook is most favorable.

With further reference to the amounts disbursed in aid of dependents of tuberculous patients it was brought out by the investigation of 1909 that during that year, on account of 4,456 patients under treatment for tuberculosis of the lungs the sum of 122,985 marks (\$29,270) was paid as supplementary aid to dependent members of the families, in addition to the aid provided in conformity to the sickness insurance laws. The particular importance attached to this form of support in behalf of effective measures against tuberculosis is brought out by the fact that for all other diseases dealt with by State invalidity insurance institutions during 1909 on account of 1,993 patients, only 25,152 marks (\$5,986) was paid out in aid of dependent members of the patients' families.

Summarizing the special expenditures on account of treatment and care of invalid members of State invalidity insurance institutions it has been shown that the amount paid on this account to local authorities for general sick aid was 288,449 marks (\$68,651); in behalf of the general warfare against tuberculosis, 288,365 marks (\$68,631); on account of disinfection of premises, 3,770 marks (\$897); and for increased aid for dependent members of the patients' families.

122,985 marks (\$29,270). Out of 17,024,170 marks (\$4,051,752) paid for treatment and care on account of tuberculous patients in State invalidity insurance institutions 703,569 marks (\$167,449), or 4.1 per cent, was paid for special purposes in behalf of the general campaign against tuberculosis or in behalf of other measures and means for effective treatment and the reduction of the death rate.

Efforts have been made within recent years to enforce the general laws and local regulations providing for the disinfection of rooms occupied by tuberculous patients, and particularly rooms in which deaths from tuberculosis have occurred. The State invalidity insurance institutions extend financial aid in behalf of this movement in special cases, and in 1909 the amount of 3,770 marks (\$897) was expended on this account. As a general rule the expenses of disinfection are paid for by the local authorities, under police supervision.

#### METHODS OF TREATMENT AND CARE.

The methods of treatment and care naturally vary more or less with the different territorial State invalidity insurance institutions, but the general principle of the so-called hygienic-dietetic treatment has been almost universally adopted. This method affords abundant fresh air and nutritious diet, systematic care of the skin, and a wholesome mode of life generally. The use of mineral baths or spas is rather limited, and during 1909 the number of tuberculous patients making use of this form of treatment was only 3,374. The use of baths, however, is increasing, as is shown by the fact that in 1905 the number of tuberculous patients at baths was only 1,457. Of the total number of 42,232 tuberculous patients receiving treatment and care during 1909, as many as 36,785, or 87.1 per cent, received such treatment in sanatoria or other special institutions especially established for the most effective and systematic treatment of tuberculosis of the lungs. As has been previously stated, the number of tuberculous patients treated at baths during 1909 was 3,374, or 8 per cent. In addition, 1,298, or 3.1 per cent, were treated at day camps or convalescing homes; 757, or 1.8 per cent, in general and special hospitals and clinics, and 13 in private homes or on farms; for 5 the method of treatment was not obtainable. It is evident, therefore, that the large majority of tuberculous patients treated or cared for in behalf of German State invalidity insurance institutions receive such treatment and care in special institutions established for the most effective and systematic treatment of the disease. The foregoing numbers, however, have reference only to such tuberculous patients as received a full and systematic treatment, and they have no reference to the relatively small number of patients who received temporary or partial treatment, chiefly in the form of medical consultations, dispensary treatment, etc.

The information is shown in detail for each territorial insurance institution in the table which follows:

NUMBER OF PERSONS RECEIVING FULL TREATMENT AND CARE ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, IN TERRITORIAL AND EMPLOYEES' INSURANCE INSTITUTIONS DURING 1909, BY KIND OR METHOD OF TREATMENT.

Territorial and employees' insurance institutions.	In general or special hospitals.	In institutions for the treatment of tuberculosis.		In convalescent homes, day camps, etc.	At baths, spas, etc.	In private homes, etc.	Not specified.	Total.
		Number.	Per cent.					
East Prussia.....	20	357	92.0	11	.....	.....	.....	388
West Prussia.....	7	159	92.4	.....	.....	1	5	172
Berlin.....	.....	3,890	100.0	.....	.....	.....	.....	3,890
Brandenburg.....	84	1,707	83.8	.....	245	.....	.....	2,036
Pomerania.....	49	1,179	71.3	17	6	.....	.....	251
Posen.....	1	730	99.9	.....	.....	.....	.....	731
Silesia.....	37	1,728	66.0	343	9	.....	.....	2,617
Saxony-Anhalt.....	.....	1,554	99.7	2	1	1	.....	1,558
Schleswig-Holstein.....	15	219	42.4	1	277	5	.....	517
Hanover.....	9	1,201	99.2	.....	.....	1	.....	1,301
Westphalia.....	3	1,935	68.4	.....	886	.....	.....	2,827
Hesse Nassau.....	29	1,138	61.2	93	599	1	.....	1,860
Rhine Province.....	323	3,968	76.9	.....	869	.....	.....	5,160
Upper Bavaria.....	14	1,319	83.2	250	2	.....	.....	1,585
Lower Bavaria.....	28	122	79.2	4	.....	.....	.....	154
Palz.....	.....	508	100.0	.....	.....	.....	.....	508
Upper Palz and Regensburg.....	.....	110	93.2	7	.....	1	.....	118
Upper Franconia.....	.....	251	100.0	.....	.....	.....	.....	251
Middle Franconia.....	.....	823	100.0	.....	.....	.....	.....	823
Lower Franconia and Aschaffenburg.....	.....	209	100.0	.....	.....	.....	.....	209
Swabia and Neuburg.....	1	281	99.6	.....	.....	.....	.....	282
Kingdom of Saxony.....	2	2,428	96.6	.....	82	2	.....	2,614
Württemberg.....	11	1,610	99.3	.....	.....	.....	.....	1,621
Baden.....	110	2,429	95.7	.....	.....	.....	.....	2,539
Hesse (Grand Duchy).....	.....	1,071	99.8	.....	2	.....	.....	1,073
Mecklenburg.....	.....	108	99.1	.....	.....	1	.....	109
Thuringia.....	1	775	97.6	.....	18	.....	.....	794
Oldenburg.....	.....	204	100.0	.....	.....	.....	.....	204
Brunswick.....	.....	397	100.0	.....	.....	.....	.....	397
Lübeck, Bremen, and Hamburg.....	9	1,302	81.9	69	210	.....	.....	1,580
Alsace-Lorraine.....	.....	1,316	100.0	.....	.....	.....	.....	1,316
Prussia-Hesse railroad employees.....	2	1,126	88.8	.....	140	.....	.....	1,266
North German miners' fund.....	.....	531	100.0	.....	.....	.....	.....	531
Saarbrücken Miners' Association.....	.....	8	100.0	.....	.....	.....	.....	8
Bavarian traffic employees.....	.....	157	99.4	1	.....	.....	.....	158
Saxony railroad employees' fund.....	.....	59	100.0	.....	.....	.....	.....	59
Saxony miners' fund.....	.....	16	100.0	.....	.....	.....	.....	16
Baden railroad and salt works fund.....	.....	132	100.0	.....	.....	.....	.....	132
Imperial railroad pension fund.....	.....	154	100.0	.....	.....	.....	.....	154
Bochum Miners' Union.....	1	443	94.5	.....	25	.....	.....	469
Marine employees' fund.....	1	41	97.6	.....	.....	.....	.....	42
Total.....	757	36,785	87.1	1,298	3,374	13	5	42,232

There are throughout Germany a number of forest and air cure establishments, which are made use of jointly by members of sick funds, industrial accident associations, and State invalidity insurance institutions. The exact number of tuberculous patients at these establishments is not known, but the aggregate number of persons receiving treatment, either on account of tuberculosis or on account of other diseases, in 1909 was 1,481 males and 1,330 females. The former received 46,381 days' treatment and the latter 40,856 days. The average number of days' treatment per patient, therefore, was 31.3 for males and 30.7 for females. The total expenditure on account of these establishments was 100,500 marks (\$23,919) for males and

65,747 marks (\$15,648) for females. The increasing use which is made of them is illustrated by the fact that the corresponding expenditures for 1907 were only 66,579 marks (\$15,846) for males and 26,997 marks (\$6,425) for females.

For the treatment and care of tuberculous patients in the advanced stages of the disease, unfit on account of their condition for treatment in sanatoria or other special institutions, so-called invalid homes are maintained by many of the State invalidity insurance institutions. The treatment is more in the nature of a humane consideration for the well-being and comfort of hopeless cases than for the economic object of restoring the wage-earning capacity of afflicted members. During 1909 the number of tuberculous patients taken care of in institutions of this kind was 1,047 males and 300 females. Of this number 229 males and 77 females died during the year, proving conclusively that these patients were in an advanced stage of the disease when admitted. At the end of 1909 the number remaining under treatment and care was 294 males and 108 females, against 196 males and 82 females receiving care and treatment at the end of 1908. The use of these institutions is therefore increasing.

The treatment and care of tuberculous members of German State invalidity insurance institutions is largely confined to sanatoria, hospitals, etc., owned, maintained, and managed by the insurance institutions themselves. The number of owned sanatoria, etc., for the treatment of tuberculosis of the lungs has increased from 1 in 1895 to 18 in 1903 and 37 in 1909, as is shown in the following table:

NUMBER OF SPECIAL INSTITUTIONS FOR THE TREATMENT AND CARE OF INVALID MEMBERS, OWNED BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY YEARS, 1895 TO 1909.

Year.	Institutions for the treatment of tuberculosis.	General hospitals and convalescent homes.	Total.	Year.	Institutions for the treatment of tuberculosis.	General hospitals and convalescent homes.	Total.
1895.....	1		1	1903.....	18	17	35
1896.....	1		1	1904.....	22	19	41
1897.....	3		3	1905.....	26	21	47
1898.....	5	1	6	1906.....	26	25	51
1899.....	8	2	10	1907.....	30	26	56
1900.....	9	5	14	1908.....	36	29	65
1901.....	11	7	18	1909.....	37	34	71
1902.....	15	12	27				

The first institution owned by an invalidity insurance fund was the sanatorium of Hanover, opened for the treatment of patients on May 1, 1895. These institutions are not necessarily located within the territorial boundaries of the State insurance institutions, but they are often located where the topography, natural drainage, forest environment, climate, etc., are most suitable. The insurance institution of Berlin owns also a tuberculin station, which is utilized to a

limited extent by other insurance institutions. Full details concerning the accommodation of the principal institutions in active operation at the present time, together with the most important financial and other statistics, are set forth in the table which follows:

FINANCIAL AND OTHER STATISTICS OF INSTITUTIONS FOR THE TREATMENT OF TUBERCULOSIS OF THE LUNGS, OWNED BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, 1909.

Number of insurance institution.	Name of hospital or sanatorium.	Date of establishment.	Number of beds for—		Land area occupied (acres).	Cost of ground. <sup>1</sup>
			Males.	Females.		
3	Beelitz.....	1902	196	73	346.0	\$95,788.10
	Beelitz annex.....	1907	204	283		
	Tuberculosis station.....	1908	20			
4	Cottbus.....	1900		110	40.5	22,597.15
6	Crown Prince William.....	1903	100		33.6	9,064.47
8	Schiele.....	1905	143		81.9	28,384.83
10	Königsberg bei Goslar.....	1895	70		18.1	4,093.60
	Schwarzenbach bei Clausthal.....	1899	70		36.8	5,331.20
	Erbsprinzenanne bei Zellerfeld.....	1898		63	36.3	11,233.60
	Andreasheim bei St. Andreasberg.....	1903		45	29.8	(2)
13	Stübbeckshorn bei Soitau.....	1902	65		73.8	(2)
16	Ronsdorf.....	1909	138		91.5	29,585.78
21	Pfälzische Sanatorium in Ramberg.....	1905	61		64.0	14,125.06
22	Wasach bei Obertiefenbach.....				68.2	19,168.28
23	Hohwald bei Neustadt.....	1905	260		56.0	17,046.75
24	Wilhelmsheim bei Oppenweiler.....	1904	177		18.4	8,752.45
	Überruh bei Bolsternang.....	1908		180	75.6	15,654.21
	Friedrichsheim bei Marzell.....	1899	234		53.9	6,323.66
25	Luisenheim bei Marzell.....	1905		199	37.7	14,267.15
	Nordrach Colony.....	1908	110		45.5	26,180.00
27	Ernst-Ludwig Sanatorium.....	1901	132		27.4	14,596.31
	Rönnhild.....	1902		80	8.2	1,214.28
29	Sophia Sanatorium.....	1908	120		232.5	68,091.80
	Albrechtshaus bei Stiege.....	1897	86		3.6	(2)
	Marie Home.....	1899		36	1.6	(2)
30	Oderberg-Gebhardsheim.....	1897	180		144.8	13,621.45
	Glückauf in St. Andreasberg.....	1901		100	11.4	4,163.10
	Gross-Hansdorf.....	1908	32		56.2	18,271.02
31	Leopoldinenheim.....	1903		92	10.6	14,756.00
	Tannenberg.....	1907	140		25.9	5,950.00
32	Stadtwald bei Meisungen.....	1904	120		42.1	17,124.34
	Moltkefels.....	1904	104		53.2	16,833.94
33	Miners Sanatorium—Sülzhayn.....	1898	130		23.5	7,273.04
38	Frederick-Hilda Sanatorium.....	1907	59	30	24.2	13,140.60
40	August-Victoria Sanatorium.....	1904	118		456.4	14,280.00

<sup>1</sup> To Dec. 31, 1909.

<sup>2</sup> Leased.

## FINANCIAL AND OTHER STATISTICS OF INSTITUTIONS FOR THE TREATMENT OF TUBERCULOSIS OF THE LUNGS, OWNED BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, 1909—Continued.

Number of insurance institution.	Name of hospital or sanatorium.	Cost of—		Expenditures during 1909.	
		Buildings. <sup>1</sup>	Interior furnishings, etc. <sup>1</sup>	Total.	For food and drink.
3	Beelitz.....	\$2,471,433.41	\$261,272.35	\$586,509.11	\$121,133.91
	Beelitz annex.....	1,364,826.95	134,835.57		
	Tuberculosis station.....		1,767.39	9,769.90	2,671.79
4	Cottbus.....	128,792.99	40,554.01	30,869.31	12,900.31
6	Crown Prince William.....	140,398.58	16,254.45	34,725.39	16,122.83
8	Schielo.....	196,368.80	21,950.74	52,136.28	28,894.50
	Königsberg bei Goslar.....	64,902.60	13,328.00	16,780.67	7,167.37
	Schwarzenbach bei Clausthal.....	67,330.20	13,827.80	9,663.28	4,278.76
10	Erbprinzentanne bei Zellerfeld.....	55,573.00	16,112.60	14,978.77	5,228.86
	Andreasheim bei St. Andreasberg.....	18,159.40	8,896.44	11,350.92	3,526.92
	Stübbeckshorn bei Soltau.....	41,792.80	17,069.00	17,696.25	7,490.57
13	Ronsdorf.....	138,040.00	13,000.00	54,205.69	25,278.69
16	Palätsche Sanatorium in Ramberg.....	192,193.81	17,058.89	24,674.65	9,622.58
21	Wasach bei Obertiefenbach.....	2,323.12			
22	Hohwald bei Neustadt.....	467,067.15	46,418.33	89,055.78	30,417.11
23	Wilhelmsheim bei Oppenweiler.....	251,069.77	30,964.28	59,957.44	28,793.95
	Überruh bei Bolstermang.....	426,162.80	41,520.37	61,238.11	21,172.48
	Friedrichsheim bei Marzell.....	336,592.65	42,092.92	86,539.89	46,690.36
24	Luisenheim bei Marzell.....	259,749.63	27,013.24	50,428.39	25,334.15
	Nordrach Colony.....	65,130.37	20,855.70	60,229.71	24,991.19
25	Ernst-Ludwig Sanatorium.....	205,961.19	43,956.70	46,895.28	18,975.50
27	Römhild.....	111,738.36	10,545.30	20,879.26	7,956.82
	Sophia Sanatorium.....	69,328.21	7,140.00	31,491.92	15,039.46
29	Albrechtshaus bei Stiege.....	44,684.50	7,665.74	17,432.79	10,689.53
	Marie Home.....	20,334.70	4,059.80	6,644.01	3,651.63
	Oderberg-Gebhardsheim.....	292,176.18	34,124.44	79,249.48	31,912.94
30	Glück auf in St. Andreasberg.....	138,400.09	12,110.89	37,163.70	12,490.72
	Gross-Hansdorf.....	45,901.24	6,270.82	13,111.18	5,902.64
	Leopoldinenheim.....	62,545.21	9,864.86	27,975.95	15,112.52
31	Tannenberg.....	134,487.85	24,664.42	58,106.27	27,885.51
32	Stadtwald bei Melsungen.....	219,476.46	17,808.47	51,641.72	22,550.74
	Moltkefels.....	181,292.93	15,811.53	48,590.32	19,924.41
33	Miners Sanatorium—Sülzhayn.....	206,004.71	16,660.00	44,075.46	18,165.11
38	Frederick-Hilda Sanatorium.....	103,099.93	13,969.41	27,702.49	14,205.74
40	August-Victoria Sanatorium.....	460,233.93	25,331.29	79,422.98	23,719.08

<sup>1</sup> To Dec. 31, 1909.

FINANCIAL AND OTHER STATISTICS OF INSTITUTIONS FOR THE TREATMENT OF  
TUBERCULOSIS OF THE LUNGS, OWNED BY GERMAN STATE INVALIDITY INSUR-  
ANCE INSTITUTIONS, 1909—Concluded.

Number of insurance institution.	Name of hospital or sanatorium.	Patients.		Employees.		Total days of treatment and support and days of support.	Per capita cost per day of food and drink.		
		Number.	Days of treatment and support.	Number.	Days of support.		Treatment and support.	Patients only.	Patients and employees.
3	Beelitz.....	4,478	301,224	166	60,296	361,520	\$1.42	\$0.40	\$0.34
	Beelitz annex.....								
	Tuberculosis station.....	493	6,669	8	2,320	8,989	1.47	.40	.30
4	Cottbus.....	496	40,000	21	7,537	47,537	.77	.32	.27
6	Crown Prince William.....	560	34,415	21	7,591	42,006	1.01	.47	.38
8	Schielo.....	640	51,250	27	9,355	60,605	1.02	.41	.35
	Königsberg bei Goslar.....	330	21,278	10	3,403	24,681	.79	.34	.29
	Schwarzenbach bei Clausthal.....	187	11,139	10	2,511	13,650	.87	.38	.31
10	Erbprinzentanne bei Zellerfeld.....	279	18,730	10	3,758	22,488	.80	.28	.23
	Andreasheim bei St. Andreasberg.....	158	12,906	8	2,558	15,464	.88	.27	.23
	Stübbeckshorn bei Soltau.....	272	18,908	12	4,204	23,112	.94	.40	.32
13	Ronsdorf.....	669	47,254	30	10,751	58,005	1.15	.54	.44
16	Pfälzische Sanatorium in Ramberg.....	329	22,175	16	5,530	27,705	1.11	.43	.35
21	Wasach bei Obertiefenbach.....								
22	Howald bei Neustadt.....	1,388	77,209	44	14,756	91,965	1.15	.40	.33
	Wilhelmshelm bei Oppenweiler.....	1,064	59,579	37	13,650	73,229	1.01	.48	.39
23	Ueberruh bei Bolsternang.....	809	63,272	41	13,721	76,993	.97	.34	.28
	Friedrichshelm bei Marzell.....	1,233	81,892	42	19,056	100,948	1.06	.57	.46
24	Luisenheim bei Marzell.....	970	71,452	27	11,290	82,742	.71	.35	.31
	Nordrach Colony.....	565	37,033	32	11,076	48,109	1.63	.67	.52
25	Ermst-Ludwig Sanatorium.....	727	45,043	25	5,860	50,903	1.04	.42	.37
27	Römhild.....	372	24,949	16	6,021	30,970	.84	.32	.26
	Sophia Sanatorium.....	548	34,449	17	6,367	40,816	.91	.44	.37
	Albrechtshaus bei Steige.....	361	22,370	10	4,302	26,672	.78	.48	.40
29	Marie Home.....	136	8,718	7	2,742	11,460	.76	.42	.32
	Oderberg-Gebhardsheim.....	905	51,243	43	13,413	64,661	1.55	.62	.49
30	Glück auf in St. Andreasberg.....	433	31,316	20	5,744	37,060	1.19	.40	.34
	Gross-Hansdorf.....	383	9,462	10	3,136	12,598	1.39	.62	.47
	Teopoldinenheim.....	491	29,435	18	5,701	35,136	.95	.51	.43
31	Tannenberg.....	838	50,231	20	7,084	57,315	1.16	.55	.49
32	Stadtwald bei Melsungen.....	703	44,431	25	9,830	54,171	1.16	.51	.42
	Moltkefels.....	537	38,503	25	9,531	48,034	1.26	.52	.41
33	Miners Sanatorium—Sülzhayn.....	556	37,699	32	10,156	47,855	1.17	.48	.38
38	Frederick-Hilda Sanatorium.....	299	24,967	19	6,868	31,825	1.11	.57	.45
40	August-Victoria Sanatorium.....	465	37,224	37	11,431	48,655	2.13	.64	.49

For purpose of illustration, mention may here be made of the sanatorium at Beelitz, maintained by the Berlin Invalidity Insurance Institution, established in 1902, with an accommodation of 196 beds for men and 73 beds for women. By December 31, 1909, the cost of the land had been 402,471 marks (\$95,788), the cost of buildings 10,384,174 marks (\$2,471,433), and the cost of installation, furniture, etc., 1,097,783 marks (\$261,272). This institution was enlarged by an annex in 1907, providing 294 more beds for men and 283 more beds for women, at an additional cost for buildings of 5,734,567 marks (\$1,364,827) and an additional cost of installation of 566,536 marks (\$134,836). The cost of maintenance for all purposes in 1909 was 2,464,324 marks (\$586,509), of which 508,966 marks (\$121,134), or 20.6 per cent, was on account of the board and other personal maintenance of the patients. The number of male patients treated at the institution, including the annex, during 1909 was 2,659, and the num-

ber of female patients was 1,819, or a total of 4,478. The number of days' treatment and care received by these patients was 301,224. The number of attendants and other employees in 1909 was 45 males and 121 females, who received 60,296 days of personal support. The total number of days' board or support and care, therefore, was 361,520 for the year 1909. The per capita cost per day for all purposes was 5.96 marks (\$1.42), but considering expenditures for food and other personal needs only, the cost was 1.41 marks (34 cents) per capita per day, and excluding employees and other attendants, 1.69 marks (40 cents) for patients only. Since full details concerning the per capita cost per day of treatment and of other important financial items are given in the table, it is not necessary to further enlarge upon this subject.

#### PER CAPITA COST OF TREATMENT AND CARE.

The per capita cost of treatment is necessarily higher in the case of tuberculous patients than in the case of patients generally who are treated for other diseases, and the same is true of the length of treatment, which in the case of tuberculosis exceeds considerably the average for other diseases considered as a group. The average cost of treatment per patient per day in German sanatoria for the treatment and care of tuberculous patients ranged from 3 to 5 marks (71 cents to \$1.19), against a range of 2.50 to 4.50 marks (60 cents to \$1.07) in the case of institutions, hospitals, etc., treating diseases other than tuberculosis of the lungs. The expense per patient per day for board in the case of patients treated in institutions for the treatment and care of tuberculous persons ranged between 1 mark and 2.50 marks (23.8 cents and 60 cents). An analysis of the total expenditures of 33 sanatoria for the treatment of tuberculosis shows that the maximum expenditure per day per patient was 8.96 marks (\$2.13), the minimum 2.97 marks (71 cents), and the average 4.60 marks (\$1.09). The corresponding expenditures for patients receiving treatment other than for tuberculosis of the lungs in 29 institutions ranged from 6.11 marks (\$1.45) maximum to 2.06 marks (49 cents) minimum. The average was 4.04 marks (96 cents). The average expenditure for board on account of tuberculous patients only, and excluding attendants, was 1.90 marks (45 cents) per patient per day, the maximum having been 2.83 marks (67 cents) and the minimum 1.15 marks (27 cents). Including attendants, the average cost for board was 1.55 marks (37 cents) per patient per day, the maximum having been 2.18 marks (52 cents) and the minimum 96 pfennigs (23 cents). The average expenditure on account of patients only in institutions treating diseases other than tuberculosis was 1.57 marks (37 cents), and including attendants, it was 1.25 marks (30 cents) per patient per day.

The following table gives data for 33 institutions operated by the German State invalidity insurance institutions:

**AVERAGE DAILY EXPENDITURES OF SPECIAL INSTITUTIONS FOR TREATMENT, SUPPORT, AND MAINTENANCE ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, DURING 1909.**

	Number of institutions.	Aggregate expenditures.	Expenditures for food and drink of—	
			Patients only.	Patients and employees.
Maximum cost per capita per day.....	33	\$2. 13	\$0. 67	\$0. 52
Minimum cost per capita per day.....	33	. 71	. 27	. 23
Average cost per capita per day.....	33	1. 09	. 45	. 37

**FINANCIAL STATISTICS OF SANATORIA OWNED BY GERMAN INVALIDITY INSURANCE INSTITUTIONS.**

In 1909 there were 37 institutions owned or maintained, or in course of construction, in behalf of State invalidity insurance institutions, providing an accommodation of 3,134 beds for men and 1,289 for women. The cost of the ground owned was 2,256,438 marks (\$537,032); the cost of buildings occupied, 38,238,124 marks (\$9,100,674); and the cost of installation, 4,349,854 marks (\$1,035,265). All of these items show a substantial increase over 1908. The annual cost for maintenance and board was 7,820,388 marks (\$1,861,252) for 1909 against 7,251,910 marks (\$1,725,955) in 1908. The number of patients receiving treatment during 1909 was 16,593 males and 6,141 females. These statistics have reference only to sanatoria providing systematic treatment for tuberculosis of the lungs and have no reference to convalescing homes, hospitals, etc., provided for other purposes, numbering in 1909 thirty-four, and providing 1,754 beds for men and 1,117 for women and accommodating 13,804 male patients and 6,940 female patients at an annual expenditure of 2,726,692 marks (\$648,953). To what extent this method of treatment includes cases of tuberculosis of the lungs is not accurately known.

In the table which follows financial data are given relative to sanatoria belonging to the German State invalidity insurance institutions and which provide systematic treatment for tuberculosis of the lungs:

GENERAL, FINANCIAL, AND OTHER STATISTICS OF THE SANATORIA OWNED BY GERMAN INVALIDITY INSURANCE INSTITUTIONS.

	1908	1909	Increase during 1909.	
			Actual.	Per cent.
Number of institutions.....	36	37	1	2.8
Number of beds:				
For men.....	2,985	3,134	149	5.0
For women.....	1,276	1,289	13	1.0
Area of land occupied (acres).....	2,145.6	2,329.2	183.6	8.6
Cost of—				
Land.....	\$468,630.57	\$537,032.24	\$68,401.67	14.6
Buildings.....	\$8,747,025.50	\$9,100,673.51	\$353,648.01	4.0
Furnishings.....	\$991,566.07	\$1,035,285.25	\$43,699.18	4.4
Expenditures for all purposes during year.....	\$1,725,954.53	\$1,861,252.34	\$135,297.76	7.8
Number of patients:				
Males.....	14,352	16,593	2,241	15.6
Females.....	5,306	6,141	835	15.7
Total.....	19,658	22,734	3,076	15.6
Percent of male patients.....	73.0	73.0		

LOANS PROVIDED FOR THE ERECTION OF PUBLIC SANATORIA.

In conformity to the provisions of the invalidity insurance laws, the State invalidity insurance institutions may advance loans for the building of sanatoria for the treatment of tuberculosis of the lungs, to be maintained by associations, trade guilds, etc. Up to the end of 1909 the amounts lent out for this purpose reached 13,062,625 marks (\$3,108,905), of which 1,252,607.27 marks (\$298,121.06) had been repaid, leaving an outstanding amount of loans on December 31, 1909, of 11,810,017.73 marks (\$2,810,784.22). The rate of interest paid varies from a minimum of 1.5 per cent to a maximum of 4 per cent, but the average rate is between 3 per cent and 3.5 per cent. Under the revised regulations of the Imperial Insurance Office, loans are no longer permitted to be made at a lower rate than 3.5 per cent, except in cases of special merit and subject to the approval of the Imperial Insurance Office. The largest amount of outstanding loans is provided for by the State Invalidity Insurance Institution of Rhenish Prussia, amounting to 2,645,257.63 marks (\$629,571.32) lent at a uniform rate of 3 per cent. The next largest amount outstanding is in the case of the State Invalidity Insurance Institution of Westphalia, amounting to 1,515,054.47 marks (\$360,582.96) lent out at an interest rate of from 3.25 per cent to 3.75 per cent. The State Invalidity Insurance Institution of Alsace-Lorraine has lent 400,000 marks (\$95,200) at 1.5 per cent. Of the 11,810,017.73 marks (\$2,810,784.22) outstanding in the form of loans provided by 41 invalidity insurance institutions and workmen's pension funds,

1,860,929.02 marks (\$442,901.11), or 15.8 per cent, was not secured in conformity to the requirements applicable to orphans' and minors' trust funds.

#### **SUITABLE EMPLOYMENT OF TUBERCULOUS PATIENTS.**

In the treatment and care of patients an increasing amount of attention is being given to their suitable employment, partly for the purpose of meeting the cost of treatment, but largely with the object of improving the chances of complete restoration of earning capacity. Labor is required of patients able to perform light and suitable duties in the case of a few establishments, but as a general principle the question of employment is optional. Compulsory labor is the rule in five institutions, under medical supervision, the labor being considered an important factor in the effort to secure a permanent cure. In all of the institutions preference is given to outdoor labor, chiefly agricultural, horticultural, or gardening. Domestic labor is required or expected of women patients in suitable cases, and to a very limited extent labor is performed in workshops, provided for the purpose. The time of labor varies in the different institutions, ranging from a maximum of about five hours to a minimum of half an hour per day. The working time of women is, on the average, less than that of men. A small compensation is paid in some cases—about 10 pfennigs (2.4 cents) per hour. In a few instances patients have been dismissed on account of refusal to perform suitable duties under medical supervision and at medical request.

#### **AVERAGE COST AND DURATION OF TREATMENT.**

The average cost and duration of treatment are partly determined by the provisions of the invalidity insurance laws. As a general rule the limit of treatment is 90 days, but this may be varied in the discretion of the insurance institution, and many exceptions are made where the individual merits of the case seem to require that this should be done. It is open to question whether, in the ascertainment of the average cost of treatment per case per annum all the items of expense properly chargeable are included. In the nature of the case there must be a considerable number of items of general expense connected with the administration of the State invalidity insurance institutions which can not be taken into account in the ascertainment of the cost of treatment in sanatoria, hospitals, or other institutions. It may be safely assumed, however, that if the items of expense, probably not included, had been taken into account the reported cost would not be materially increased. The present discussion is confined to the experience data of average cost and duration of treatment for the period 1897 to 1909. The details, by single years, are fully set forth in the table on page 80. According to this table the average cost of treatment for male and female patients

combined increased from 307.29 marks (\$73.14) in 1897 to 367.75 marks (\$87.52) in 1903 and to 386.05 marks (\$91.88) in 1909. The cost of treatment per person for male patients increased from 295.24 marks (\$70.27) in 1897 to 373.84 marks (\$88.97) in 1903 and to 404.22 marks (\$96.20) in 1909. The corresponding averages for women patients do not indicate the same tendency toward an increase, possibly because the number of women patients during the early years was rather small. In 1897 the cost of treatment per person for women patients was 349.83 marks (\$83.26), changing to 350.30 marks (\$83.37) in 1903, and diminishing to 344.97 marks (\$82.10) in 1909. It is therefore shown that the per capita cost of treatment was higher for male patients than for female patients, and this difference has been maintained during each of the 10 last years of the experience under review.

The per capita cost of treatment per day for both sexes combined increased from 4.05 marks (96 cents) in 1897 to 4.81 marks (\$1.14) in 1903 and to 5.41 marks (\$1.29) in 1909. Comparing the last year with the first, there has been an increase of 34.4 per cent in the per capita cost of treatment per day for men and women combined. Considering male patients only, the per capita cost of treatment per day has increased from 4.05 marks (96 cents) in 1897 to 5.77 marks (\$1.37) in 1909. The corresponding cost of treatment per capita per day for women patients has increased from 4.04 marks (96 cents) to 4.29 marks (\$1.02).

The average duration of treatment has undergone only slight changes, having decreased from 76 days for men and women patients combined during 1897 to 73 days during 1909. For male patients the average duration of treatment has decreased from 73 days in 1897 to 70 days in 1909, and for female patients from 87 days in 1897 to 80 days in 1909. The tendency, therefore, appears to be toward a slight reduction in the average duration of treatment, but the reasons for this reduction are obscure and somewhat difficult to determine from the available published information. For medical reasons a sufficient length of treatment is of primary importance, and the causes of relapses or ultimately unfavorable results are often directly traceable to a curtailed stay in the sanatorium. If the average reduction in treatment is the result of economic reasons, partly because of the higher cost of per capita support at the present time than in former years, it does not appear that the slightly shorter treatment has had injurious effects on the after results since the proportion of patients retaining their earning power after five years is more favorable with patients discharged during recent years than with patients discharged during the earlier years of public sanatoria experience.

The following table shows the number of days of treatment and cost per person treated and cost per day of treatment of persons re-

ceiving full treatment and care on account of tuberculosis of the lungs by German State invalidity insurance institutions:

NUMBER OF DAYS OF TREATMENT, COST PER DAY OF TREATMENT, AND COST PER PERSON TREATED, FOR PATIENTS RECEIVING FULL TREATMENT AND CARE, ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY SEX OF PATIENTS, 1897 TO 1909.

Year.	Number of days treated.			Cost per day of treatment.			Cost per person treated.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1897.....	73	87	76	\$0.96	\$0.96	\$0.96	\$70.27	\$83.26	\$73.14
1898.....	73	83	75	1.00	.98	.99	73.19	81.15	74.97
1899.....	73	79	74	1.01	.96	1.00	73.85	75.69	74.25
1900.....	72	80	74	1.14	.95	1.09	82.14	76.43	80.77
1901.....	72	82	75	1.15	.96	1.09	82.96	78.38	81.76
1902.....	74	82	76	1.16	1.00	1.12	85.73	81.26	84.56
1903.....	74	83	76	1.20	1.01	1.14	88.97	83.37	87.52
1904.....	75	80	76	1.19	.98	1.13	88.99	77.89	85.91
1905.....	73	79	75	1.24	.97	1.16	90.51	76.47	86.54
1906.....	72	80	75	1.28	.96	1.18	92.58	77.22	88.10
1907.....	71	81	74	1.30	.97	1.19	92.42	78.64	88.20
1908.....	71	78	73	1.35	1.03	1.24	95.72	80.83	91.00
1909.....	70	80	73	1.37	1.02	1.29	96.20	82.10	91.88

All of the foregoing observations have reference only to patients receiving full institutional treatment and care. In addition to full treatment a comparatively small number of patients receive occasional or irregular treatment, chiefly outside of institutions, more or less in the nature of expert medical advice, dispensary aid, etc. The average cost of such treatment and care has decreased from 64.73 marks (\$15.41) per capita per annum in 1897 for male and female patients combined, to 23.99 marks (\$5.71) per annum in 1909. The amounts vary for the different years, but the tendency has been toward a reduction in the expense. It requires to be considered that the number of such patients is relatively quite small, and as an element in the general campaign against tuberculosis the irregular or occasional treatment is not a matter of material importance. The details, by single years, are given in the following table, according to which the cost of such treatment per person has decreased in the case of male patients from 61.52 marks (\$14.64) in 1897 to 24.32 marks (\$5.79) in 1909. The corresponding reduction in expenses for females has been from 71.40 marks (\$16.99) in 1897 to 23.33 marks (\$5.55) in 1909.

COST OF TEMPORARY OR PARTIAL TREATMENT PER PERSON ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY SEX OF PATIENTS, 1897 TO 1909.

Year.	Males.	Females.	Total.	Year.	Males.	Females.	Total.
1897.....	\$14.64	\$16.99	\$15.41	1904.....	\$3.67	\$12.97	\$5.31
1898.....	9.89	20.35	14.15	1905.....	5.89	10.28	7.06
1899.....	13.66	12.15	13.19	1906.....	4.18	8.11	5.74
1900.....	9.03	4.71	6.79	1907.....	3.91	4.63	4.17
1901.....	14.11	4.62	9.32	1908.....	5.02	5.80	5.35
1902.....	28.54	10.37	22.49	1909.....	5.79	5.55	5.71
1903.....	11.85	13.74	12.17				

**EFFECT OF PREMATURE DISCONTINUANCE OF TREATMENT.**

An important question in connection with sanatorium treatment on account of tuberculosis of the lungs and larynx is the probable effect of premature discontinuance of treatment on the general results. In the German experience of 1909 out of 29,277 males receiving full treatment on account of tuberculosis of the lungs and larynx 1,063, or 3.6 per cent, discontinued the treatment or were discharged for various reasons from the sanatoria to which they had been admitted during the first 14 days of their stay. While the proportion of patients treated successfully from an economic point of view, as shown by the table on page 88, was 83 per cent for all patients, it was increased to 86 per cent after eliminating those who had been discharged from the institutions during the first 14 days of their stay. In the case of women patients, out of 12,955 the number who had discontinued the treatment during the first 14 days of their stay in the institutions was 358, or 2.8 per cent. The economic results of treatment were identically the same on the percentage basis as in the case of males; that is, there were 83 per cent of successful cases, including those who remained less than 14 days in the institutions, and 86 per cent after eliminating those discharged or dismissed during that period of time.

**STATISTICS OF READMISSIONS FOR TREATMENT.**

The important question as to the proportion of cases requiring readmission to the sanatorium for further treatment is dealt with at some length in the report for 1909, including, however, only the experience from 1905 to 1909. The aggregate number of male patients under treatment during this period was 97,392, of which 510, or 0.5 per cent, were readmitted to institutional treatment during the year of first admission. Of the number under observation one year after discharge, or 73,055, the number readmitted for treatment was 4,335, or 5.9 per cent. During the second year the number of discharged patients under observation was 51,587, of which 3,502 required readmission or further treatment, equivalent to 6.8 per cent of the total number under observation. Of the patients under observation for three years after original discharge, numbering 33,517, the number readmitted for treatment was 1,515, or 4.5 per cent. The number under observation during the fourth year after discharge was 15,516, of which 506, or 3.3 per cent, were readmitted. It is shown, therefore, that the proportion of readmissions was highest during the second year following the original discharge, and that throughout the five-year period the proportion of readmissions of the number remaining under observation ranged from 3.3 per cent to 6.8 per cent.

The results for women were about the same, but the percentage of readmissions was less. Out of 43,542 women patients during 1905 to

1909, 145, or 0.3 per cent, were readmitted for treatment during the first year of treatment. During the first year subsequent to the year of original admission, out of 32,748 discharged patients, the number requiring readmission was 1,654, or 5.1 per cent. During the second year, out of 22,237, the number readmitted was 1,078, or 4.8 per cent. During the third year, out of 14,020 patients, the number readmitted was 472, or 3.4 per cent. During the fourth year, out of 6,272 patients, 145, or 2.3 per cent, were readmitted. The range in readmissions subsequent to the first year of treatment was, therefore, from 2.3 to 5.1 per cent.

When the foregoing results concerning readmissions on account of tuberculosis of the lungs are compared with readmissions on account of treatment for other diseases, it appears that the necessity for subsequent treatment is much greater in the case of tuberculosis of the lungs than in the case of any other disease. The details regarding readmissions are set forth in the following tables, including a comparison of the period 1905 to 1909. The data are self-explanatory and do not require extended consideration. It may be said, however, that against the 17.7 per cent of readmissions of all male patients under observation during the five-year period ending with 1905, the corresponding percentage of readmissions during the five years ending with 1909 was 21.0. For females the percentage of readmissions increased from 14 during the first period to 15.9 during the last. In this connection it may also be pointed out that the readmission rate for male patients for treatment on account of other diseases than tuberculosis of the lungs was 15 per cent for the five years ended with 1909, against 13.1 per cent for females.

READMISSIONS FOR TREATMENT OF PATIENTS ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, BY SEX AND BY YEARS, 1905 TO 1909.

Sex and year.	Number of patients discharged.	Number of discharged patients readmitted for treatment during—				
		Year of discharge.	First year after discharge.	Second year after discharge.	Third year after discharge.	Fourth year after discharge.
<b>MALES.</b>						
1905.....	15,516	111	888	958	654	506
1906.....	13,001	67	1,037	1,285	861	.....
1907.....	13,070	65	1,179	1,269	.....	.....
1908.....	21,468	94	1,231	.....	.....	.....
1909.....	24,337	173	.....	.....	.....	.....
1905 to 1909.....	97,392	510	4,335	3,502	1,515	506
<b>FEMALES.</b>						
1905.....	6,272	24	333	288	212	145
1906.....	7,748	21	357	390	260	.....
1907.....	8,217	26	449	400	.....	.....
1908.....	10,511	27	515	.....	.....	.....
1909.....	10,794	47	.....	.....	.....	.....
1905 to 1909.....	43,542	145	1,654	1,078	472	145
<b>TOTAL.</b>						
1905.....	21,788	135	1,221	1,246	866	651
1906.....	25,749	88	1,394	1,675	1,121	.....
1907.....	26,287	91	1,628	1,659	.....	.....
1908.....	31,979	121	1,746	.....	.....	.....
1909.....	35,131	220	.....	.....	.....	.....
1905 to 1909.....	140,934	655	5,989	4,580	1,987	651

## COMPARATIVE STATISTICS OF READMISSIONS FOR TREATMENT ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, BY SEX OF PATIENTS, 1901 TO 1909.

Period of first treatment.	Per cent of discharged male patients readmitted for treatment during—					Per cent of discharged female patients readmitted for treatment during—				
	Year of discharge.	First year after discharge.	Second year after discharge.	Third year after discharge.	Fourth year after discharge.	Year of discharge.	First year after discharge.	Second year after discharge.	Third year after discharge.	Fourth year after discharge.
1901 to 1905.....	0.7	7.1	4.9	3.2	1.8	0.4	6.0	4.0	2.2	1.4
1902 to 1906.....	.6	6.6	5.1	3.2	1.8	.4	5.7	4.1	2.3	1.6
1903 to 1907.....	.5	6.2	5.4	3.4	2.3	.4	5.2	4.3	2.3	1.9
1904 to 1908.....	.5	6.0	6.3	3.9	3.1	.3	5.2	4.6	3.0	2.6
1905 to 1909.....	.5	5.9	6.8	4.5	3.3	.3	5.1	4.8	3.4	2.3

## CLASSIFICATION OF TUBERCULOSIS ACCORDING TO TURBAN STAGE OF DISEASE.

The classification of patients treated in the sanatoria maintained by German invalidity insurance institutions is in conformity to the Turban-Gerhardt (Imperial Board of Health) method, which has been quite generally adopted throughout the world and, with slight modification, by the National Association for the Study and Prevention of Tuberculosis in the United States. The classification rests on an anatomical basis and differentiates three stages, which, in a general way, correspond to the incipient, the moderately advanced, and the far-advanced conditions of the disease as determined by the usual methods of physical diagnosis. The following is the most generally adopted English translation of the Turban-Gerhardt classification of tuberculous patients:

## INTERNATIONAL STATISTICS ON TUBERCULOSIS (MORBIDITY) CLASSIFICATION TURBAN-GERHARDT (IMPERIAL GERMAN BOARD OF HEALTH).

R=Right.

L=Left.

1. Disease of slight severity, limited to small areas of one lobe, that, for instance, in case of infection of both apices, does not extend beyond the spine of scapula and the clavicle, or, in case of affection of one apex, frontal, beyond the second rib.

2. Disease of slight severity, more extensive than 1, but affecting, at most, the volume of one lobe, or, severe disease, extending, at most, to the volume of one-half lobe.

3. All cases extending beyond 2, and all such with considerable cavities.

By disease of slight severity is to be understood disseminated foci manifested by slight dullness, unclear, rough, or weak vesicular, vesico-bronchial, or broncho-vesicular breathing and fine and medium râles.

By severe disease: Compact infiltration recognized by great dullness, very weak (indeterminate) broncho-vesicular or bronchial indefinite breathing with or without râles.

Considerable cavities to be recognized by tympanitic sound, amphoric breathing, and extensive, coarse, consonating râles, come under

stage 3

Pleuritic dullness if only of a few centimeters extent is to be left out of account; if it is considerable, pleuritis should be specially mentioned under tuberculous complications.

The stage of disease is to be indicated for each side separately. The case, as a whole, is to be classified according to the more diseased side; for example, R2 L1—Stage 2.<sup>1</sup>

**STATISTICS OF ADMISSION AND DISCHARGE ACCORDING TO TURBAN  
STAGE OF DISEASE.**

During 1909 the 41 institutions established for the administration of the invalidity insurance law treated 29,277 male patients and 12,955 female patients, or a total of 42,232 persons, on account of tuberculosis of the lungs. Of this number, for 2,434 males and 1,456 females the Turban stage of the disease was not ascertained, either at entry or discharge. It was further necessary to exclude 1,553 male and 1,064 female patients because of the fact that a different method than the Turban-Gerhardt classification was adopted. Excluding a few additional patients for other reasons, there remain 24,766 male patients and 10,379 female patients, or a total of 35,145 persons, for which the stage of the disease on admission and discharge was ascertained in conformity to the uniform method of classification approved by the Imperial Board of Health. It is obvious that one of the most certain means of determining the results of sanatorium treatment is to ascertain the stage of the disease on admission and on discharge by the same method and, if possible, by the same medical practitioner. A change from one stage of the disease to a more favorable one may be considered fairly conclusive evidence that an improvement has taken place, with a reasonable assurance that the wage-earning capacity of the patient has probably been restored and can be maintained for a considerable period of time. In cases where it is shown that the patient has changed to a more serious stage of the disease, according to the Turban classification, it is evident that the treatment has been more or less of a failure, although even this conclusion is not warranted in all cases.

Of the 24,766 male patients, 20,567, or 83 per cent, were discharged from the sanatoria with a reasonable certainty that their wage-earning capacities had been restored for a considerable period of time. Of this number 11,111 were in the first Turban stage of the disease on admission, of which 428, or 3.9 per cent, were discharged as being entirely free from every symptom of the disease, which, under the form of classification adopted, is represented by O in the tabular analysis of the collective experience. Of the patients discharged who were in the first Turban stage on admission, 10,246, or 92.2 per cent, remained in the same stage of the disease, 416 were in the second stage, and 21 were in the third stage. It is, therefore, shown that the large majority of patients, or 92.2 per cent, maintained the

most favorable stage of the disease, only a relatively unimportant proportion, or 3.9 per cent, were in a more serious, or the most serious, stage of the disease, and 3.9 per cent were entirely cured. In a general way, however, the analysis proves that for the large majority of patients admitted while in the first Turban stage of the disease the results of institutional treatment, from the medical and economic points of view, were quite favorable.

The number of male patients admitted while in the second stage of the disease and discharged with restored earning capacity was 7,777. Of this number 107, or 1.4 per cent of the total number of the patients of this group, were discharged as being entirely free from symptoms of active tuberculosis. The number discharged as being in the first Turban stage of the disease was 2,206, or 28.4 per cent; in the second stage of the disease, 5,402, or 69.5 per cent; and in the third stage of the disease, 62, or 0.8 per cent of the total number admitted to treatment while in the second stage of the disease and discharged with the earning capacity restored for a reasonable period of time. It is shown, therefore, that nearly 30 per cent of the patients in the second stage of the disease on admission were in a more favorable stage of the disease on discharge, while only about 1 per cent were in a more serious stage of the disease, or, in other words, in a condition warranting the conclusion that the treatment had been unsuccessful.

The number of male patients discharged with their earning capacity restored, who, on admission, were in the third stage of the disease, was 1,679. Of this number only 4 were entirely free from active symptoms of the disease, and only 148, or 8.8 per cent, were in the first stage of the disease on their discharge. Even this relatively small number, equivalent to not quite 10 per cent of the total, is conclusive evidence that in the advanced stages of the disease the outlook for successful treatment is not entirely hopeless. The number of patients in the second stage of the disease was 484, or 28.8 per cent of the total number in this group, while the number of patients in the third stage of the disease was 1,043, or 62.1 per cent. In other words, nearly two-thirds of the patients who, on admission, were in the third stage of the disease, but who were discharged with restored earning capacity for a reasonable period of time, had sufficiently improved to advance to a more favorable stage of the disease, warranting the conclusion that the treatment had been at least fairly successful.

It would serve no practical purpose to extend this analysis to the patients who had been unsuccessfully treated from an economic point of view; that is, those who did not have their wage-earning capacity restored on discharge; but it may be stated that in a fair proportion of these cases a more favorable stage of the disease had

been attained on discharge than had been ascertained to exist at the time of admission to institutional treatment.

The results with regard to female patients were equally favorable and so nearly like those obtained for male patients that it would serve no practical purpose to discuss the statistical results in detail. It needs only to be stated that of the 10,379 women patients treated and cared for on account of tuberculosis of the lungs, 8,562, or 82.5 per cent, were discharged with restored earning capacity for a reasonable period of time. Some additional details for both male and female patients, according to the Turban stages of the disease on admission and discharge, are contained in the table which follows:

**TURBAN STAGE OF DISEASE ON ADMISSION AND AT DISCHARGE OF PATIENTS TREATED FOR TUBERCULOSIS BY GERMAN INVALIDITY INSURANCE INSTITUTIONS DURING 1909, BY SEX.**

*Males discharged with restored earning capacity.*

Turban stage on admission.	Patients treated.	Turban stage at discharge.							
		O.		I.		II.		III.	
		Number.	Per cent of patients treated.	Number.	Per cent of patients treated.	Number.	Per cent of patients treated.	Number.	Per cent of patients treated.
I.....	11,111	428	3.9	10,246	92.2	416	3.7	21	0.2
II.....	7,777	107	1.4	2,206	28.4	5,402	69.5	62	.8
III.....	1,079	4	.2	148	8.8	484	28.8	1,043	62.1
Total.....	20,567	539	2.6	12,600	61.3	6,302	30.6	1,126	5.5

*Males discharged without restored earning capacity.*

I.....	904	18	2.0	775	85.7	71	7.9	40	4.4
II.....	1,384	6	.4	90	6.5	1,108	80.1	180	13.0
III.....	1,911	.....	.....	7	.4	107	5.6	1,797	94.0
Total.....	4,199	24	.6	872	20.8	1,286	30.6	2,017	48.0

*Total.*

I.....	12,015	446	3.7	11,021	91.7	487	4.1	61	0.5
II.....	9,161	113	1.2	2,296	25.1	6,510	71.1	242	2.6
III.....	3,590	4	.1	155	4.3	591	16.5	2,840	79.1
Total.....	24,766	563	2.3	13,472	54.4	7,588	30.6	3,143	12.7

*Females discharged with restored earning capacity.*

I.....	5,507	218	4.0	5,119	93.0	165	3.0	5	0.1
II.....	2,670	137	5.1	844	31.6	1,671	62.6	18	.7
III.....	385	3	.8	65	16.9	77	20.0	240	62.3
Total.....	8,562	358	4.2	6,028	70.4	1,913	22.3	263	3.1

*Females discharged without restored earning capacity.*

I.....	319	3	0.9	264	82.8	35	11.0	17	5.3
II.....	729	.....	.....	73	10.0	581	79.7	75	10.2
III.....	769	.....	.....	20	2.6	76	9.9	673	87.5
Total.....	1,817	3	.2	357	19.6	692	38.1	765	42.1

TURBAN STAGE OF DISEASE ON ADMISSION AND AT DISCHARGE OF PATIENTS TREATED FOR TUBERCULOSIS BY GERMAN INVALIDITY INSURANCE INSTITUTIONS DURING 1909, BY SEX—Concluded.

Total.

Turban stage on admission.	Patients treated.	Turban stage at discharge.							
		O.		I.		II.		III.	
		Number.	Per cent of patients treated.	Number.	Per cent of patients treated.	Number.	Per cent of patients treated.	Number.	Per cent of patients treated.
I.....	5,826	221	3.8	5,383	92.4	200	3.4	22	0.4
II.....	3,399	137	4.0	917	27.0	2,252	66.3	93	2.7
III.....	1,154	3	.3	85	7.4	153	13.3	913	79.1
Total.....	10,379	361	3.5	6,385	61.5	2,605	25.1	1,028	9.9

POSTDISCHARGE RESULTS OF SANATORIUM TREATMENT.

By far the most important and conclusive fact of the collective investigation is the statistical evidence regarding postdischarge results, which are observed for a period of five years to determine the extent to which earning capacity has been maintained.<sup>1</sup> Since the object of the treatment is to prevent invalidity or incapacity for work, it is obvious that the efficacy of the treatment is determined by the proportion of patients recovering their earning capacity through sanatorium treatment and maintaining the same for a reasonable period of time. The facts in the case are ascertained by careful official inquiry, which is facilitated by the permanent relation of the patients to the institutions and the cooperation of Government authorities such as the police, poor-law guardians, etc. For a certain number of patients, however, the information could not be secured because of the fact that they had moved away or that the requests for information concerning them were not complied with. Limiting the following considerations, therefore, only to such patients as furnished a record of their subsequent personal history and restored or lost wage-earning capacity, it requires further to be observed that readmissions for treatment were considered as new cases. The extent of such readmissions has been previously dealt with in detail.

For a full understanding of the method by which the after results of sanatorium treatment are calculated it is necessary to refer to the details in the table which follows (p. 88), and which contains the available facts for each of the years 1897 to 1909. According to this table, of the 2,598 male patients receiving full treatment and care on account of tuberculosis of the lungs during 1897, the number discharged as having had their earning capacity sufficiently restored to warrant the anticipation that a loss of earning power was not probable within a reasonable period of time was 1,760, or 67.7 per cent.

<sup>1</sup> Since 1909 these observations are made at two-year intervals for a total period of six years, but in the case of tuberculosis of the lungs and larynx only, and not in the case of nontubercular diseases.

ECONOMIC RESULTS OF FULL TREATMENT AND CARE ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS BY GERMAN STATE INVALIDITY INSURANCE INSTITUTIONS, BY SEX OF PATIENTS, 1897 TO 1909.

Year.	Male patients.			Female patients.			Total patients.		
	Number receiving full treatment.	Discharged with restored earning power.		Number receiving full treatment.	Discharged with restored earning power.		Number receiving full treatment.	Discharged with restored earning power.	
		Number.	Per cent.		Number.	Per cent.		Number.	Per cent.
1897.....	2,598	1,760	67.7	736	497	67.5	3,334	2,257	67.7
1898.....	3,306	2,812	73.9	1,104	811	73.5	4,910	3,623	73.8
1899.....	6,032	4,476	74.2	1,666	1,220	73.2	7,698	5,696	74.0
1900.....	8,442	6,117	72.5	2,652	1,920	72.4	11,094	8,037	72.4
1901.....	10,812	8,272	76.5	3,844	2,977	77.4	14,656	11,249	76.8
1902.....	12,187	9,437	77.4	4,302	3,448	80.1	16,489	12,885	78.1
1903.....	14,937	11,763	78.8	5,211	4,284	82.2	20,148	16,047	79.6
1904.....	16,957	13,341	78.7	6,520	5,293	81.2	23,477	18,634	79.4
1905.....	19,085	15,516	81.3	7,536	6,272	83.2	26,621	21,788	81.8
1906.....	21,959	18,001	82.0	9,063	7,748	85.5	31,022	25,749	83.0
1907.....	22,258	18,070	81.2	9,816	8,217	83.7	32,074	26,287	82.0
1908.....	26,437	21,468	81.2	12,288	10,511	85.5	38,725	31,979	82.6
1909.....	29,277	24,337	83.1	12,955	10,794	83.3	42,232	35,131	83.2

NUMBER AND PER CENT OF PATIENTS RECEIVING FULL TREATMENT WHO WERE DISCHARGED WITH RESTORED EARNING CAPACITY AND WHO RETAINED THEIR EARNING CAPACITY AT THE END OF SPECIFIED YEARS SUBSEQUENT TO THEIR DISCHARGE, BY SEX, 1897 TO 1909.

Number of males.

Year of discharge.	Discharged with restored earning power.	Retaining earning power at end of year.												
		1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
1897..	1,760	1,542	1,032	708	705	633	.....	.....	.....	.....	.....	.....	.....	.....
1898..	2,812	.....	2,529	1,438	1,355	1,157	1,043	.....	.....	.....	.....	.....	.....	.....
1899..	4,476	.....	.....	3,854	2,719	2,235	1,919	1,738	.....	.....	.....	.....	.....	.....
1900..	6,117	.....	.....	.....	5,434	3,905	3,185	2,867	2,299	.....	.....	.....	.....	.....
1901..	8,272	.....	.....	.....	.....	7,390	5,476	4,591	3,766	3,069	.....	.....	.....	.....
1902..	9,437	.....	.....	.....	.....	.....	8,574	6,601	5,547	5,190	4,665	.....	.....	.....
1903..	11,763	.....	.....	.....	.....	.....	.....	10,807	8,396	7,396	6,555	6,152	.....	.....
1904..	13,341	.....	.....	.....	.....	.....	.....	.....	11,847	9,926	8,547	7,820	7,216	.....
1905..	15,516	.....	.....	.....	.....	.....	.....	.....	.....	13,904	11,348	9,786	8,683	7,871
1906..	18,001	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,341	13,454	11,406	10,235
1907..	18,070	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	18,554	13,854	11,633
1908..	21,468	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16,528	16,528
1909..	24,337	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22,405

Per cent of males.<sup>1</sup>

1897..	67.7	61	42	29	28	25	.....	.....	.....	.....	.....	.....	.....	.....	.....
1898..	73.9	.....	67	44	37	31	28	.....	.....	.....	.....	.....	.....	.....	.....
1899..	74.2	.....	.....	67	48	39	33	30	.....	.....	.....	.....	.....	.....	.....
1900..	72.5	.....	.....	.....	66	48	40	35	30	.....	.....	.....	.....	.....	.....
1901..	76.5	.....	.....	.....	.....	70	53	45	38	32	.....	.....	.....	.....	.....
1902..	77.4	.....	.....	.....	.....	.....	72	57	48	44	40	.....	.....	.....	.....
1903..	78.8	.....	.....	.....	.....	.....	.....	73	59	51	43	43	.....	.....	.....
1904..	78.7	.....	.....	.....	.....	.....	.....	.....	59	61	53	48	44	.....	.....
1905..	81.3	.....	.....	.....	.....	.....	.....	.....	73	63	54	48	48	44	44
1906..	82.0	.....	.....	.....	.....	.....	.....	.....	.....	76	63	54	48	48	49
1907..	81.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	65	55	55	55
1908..	81.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	65	65	66
1909..	83.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	77	77	79

<sup>1</sup> In calculating the percentages of those receiving full treatment who retained their earning power to the end of the specified periods after discharge, cases lost sight of, that is, uncontrolled cases, have been deducted from the numbers representing persons receiving full treatment.

CARE OF TUBERCULOUS WAGE EARNERS IN GERMANY. 89

NUMBER AND PER CENT OF PATIENTS RECEIVING FULL TREATMENT WHO WERE DISCHARGED WITH RESTORED EARNING CAPACITY AND WHO RETAINED THEIR EARNING CAPACITY AT THE END OF SPECIFIED YEARS SUBSEQUENT TO THEIR DISCHARGE, BY SEX, 1897 TO 1909—Concluded.

Number of females.

Year of discharge.	Discharged with restored earning power.	Retaining earning power at end of year.												
		1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909
1897..	497	465	348	231	252	225	.....	.....	.....	.....	.....	.....	.....	.....
1898..	811	751	464	441	409	399	.....	.....	.....	.....	.....	.....	.....	.....
1899..	1,220	.....	1,082	801	690	636	589	.....	.....	.....	.....	.....	.....	.....
1900..	1,920	.....	.....	1,735	1,308	1,167	1,010	848	.....	.....	.....	.....	.....	.....
1901..	2,977	.....	.....	.....	2,645	2,173	1,822	1,546	1,245	.....	.....	.....	.....	.....
1902..	3,448	.....	.....	.....	.....	3,184	2,537	2,121	2,048	1,894	.....	.....	.....	.....
1903..	4,284	.....	.....	.....	.....	.....	3,892	3,171	2,854	.....	2,519	.....	.....	.....
1904..	5,293	.....	.....	.....	.....	.....	.....	4,692	4,072	3,654	3,475	3,196	.....	.....
1905..	6,272	.....	.....	.....	.....	.....	.....	5,581	4,749	4,285	3,831	3,608	.....	.....
1906..	7,748	.....	.....	.....	.....	.....	.....	.....	6,980	5,976	5,257	4,878	.....	.....
1907..	8,217	.....	.....	.....	.....	.....	.....	.....	.....	7,559	6,414	5,733	.....	.....
1908..	10,511	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,186	8,039	.....	.....
1909..	10,794	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9,749	.....	.....

Per cent of females.<sup>1</sup>

1897..	67.5	64	50	35	36	32	.....	.....	.....	.....	.....	.....	.....	.....
1898..	73.5	.....	69	49	43	39	38	.....	.....	.....	.....	.....	.....	.....
1899..	73.2	.....	.....	67	51	43	40	37	.....	.....	.....	.....	.....	.....
1900..	72.4	.....	.....	.....	67	52	46	40	35	.....	.....	.....	.....	.....
1901..	77.4	.....	.....	.....	.....	72	60	51	45	39	.....	.....	.....	.....
1902..	80.1	.....	.....	.....	.....	.....	76	62	54	50	47	.....	.....	.....
1903..	82.2	.....	.....	.....	.....	.....	.....	77	64	57	53	50	.....	.....
1904..	81.2	.....	.....	.....	.....	.....	.....	.....	76	66	59	55	51	.....
1905..	83.2	.....	.....	.....	.....	.....	.....	.....	.....	78	67	60	55	52
1906..	85.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	70	63	58
1907..	85.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80	69	62
1908..	85.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	81	72
1909..	83.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80

Total males and females.

1897..	2,257	2,007	1,380	934	957	858	.....	.....	.....	.....	.....	.....	.....	.....
1898..	3,023	.....	3,280	1,952	1,796	1,566	1,442	.....	.....	.....	.....	.....	.....	.....
1899..	5,696	.....	.....	4,936	3,520	2,925	2,552	2,327	.....	.....	.....	.....	.....	.....
1900..	8,087	.....	.....	.....	7,169	5,213	4,352	3,877	3,147	.....	.....	.....	.....	.....
1901..	11,249	.....	.....	.....	.....	10,035	7,649	6,413	5,312	4,314	.....	.....	.....	.....
1902..	12,885	.....	.....	.....	.....	.....	11,758	9,138	7,668	6,559	.....	.....	.....	.....
1903..	16,047	.....	.....	.....	.....	.....	.....	14,699	11,567	10,250	9,134	8,671	.....	.....
1904..	18,684	.....	.....	.....	.....	.....	.....	.....	16,539	13,998	12,201	11,295	10,412	.....
1905..	21,788	.....	.....	.....	.....	.....	.....	.....	.....	18,485	16,097	14,071	12,514	11,479
1906..	25,749	.....	.....	.....	.....	.....	.....	.....	.....	.....	23,321	19,427	16,663	15,113
1907..	30,287	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24,208	20,268	17,366
1908..	31,979	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	28,429	24,567
1909..	35,131	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	32,154

Per cent of total males and females.<sup>1</sup>

1897..	67.7	62	44	30	30	27	.....	.....	.....	.....	.....	.....	.....	.....
1898..	73.8	.....	68	45	38	33	31	.....	.....	.....	.....	.....	.....	.....
1899..	74.0	.....	.....	67	48	40	35	32	.....	.....	.....	.....	.....	.....
1900..	72.4	.....	.....	.....	66	49	41	37	31	.....	.....	.....	.....	.....
1901..	76.8	.....	.....	.....	.....	70	55	46	40	34	.....	.....	.....	.....
1902..	78.1	.....	.....	.....	.....	.....	73	58	50	46	42	.....	.....	.....
1903..	79.6	.....	.....	.....	.....	.....	.....	74	60	53	48	45	.....	.....
1904..	79.4	.....	.....	.....	.....	.....	.....	.....	74	62	54	50	46	.....
1905..	81.8	.....	.....	.....	.....	.....	.....	.....	.....	77	64	56	50	46
1906..	83.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	65	57	52
1907..	82.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	66	57
1908..	82.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	78	68
1909..	83.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	80

<sup>1</sup> See footnote, p. 88.

The first inquiry as to continued earning capacity was made at the end of 1897, and it was then found that of the 1,760 male patients just referred to 1,542, or 61 per cent, of the original 2,598<sup>1</sup> under treatment still maintained their earning capacity within the definition of the law governing the treatment and care of invalid members of State invalidity institutions. At the end of the second year (1898) the number of patients retaining their earning capacity was 1,032, or 42 per cent of the original number treated in 1897. By the end of 1899 this number has been further reduced to 703, or 29 per cent, with a further reduction to 25 per cent at the end of 1901. From an economic as well as a medical point of view these results for the year 1897 can not be considered very satisfactory.

The next group of cases concerns the experience of 1898, observed to the end of the year 1902. Recalling that the per cent of cases discharged as cured or with restored earning capacity was 67.7 for male patients in 1897, it is shown that for 1898 the corresponding percentage was 73.9 or somewhat more favorable. Of the 3,806 male patients receiving full treatment during 1898, there were ascertained to be in good health and with maintained earning capacity at the end of 1898, 2,529, or 67 per cent. By the end of the second year the percentage of patients with maintained earning capacity was 44, at the end of the third year 37, at the end of the fourth year 31, and at the end of the fifth year 28. There was, therefore, throughout a more favorable result for each year of subsequent experience during 1898 than during the year 1897.

Of the group of 6,032 male patients receiving full treatment during 1899, the number retaining their earning capacity at the end of the year was 3,854, or 67 per cent. During the second year the percentage retaining their earning capacity was 48, during the third year 39, during the fourth year 33, and during the fifth year 30. The results, therefore, were slightly more favorable than during 1898 and much more favorable than during 1897.

Of the group of male patients comprehending those discharged with restored earning capacity in 1900, and numbering 6,117, or 72.5 per cent of the original total, the number retaining their earning capacity at the end of the year was 5,434, or 66 per cent. At the end of the second year the percentage retaining their earning capacity was 48, at the end of the third year it was 40, at the end of the fourth year 35, and at the end of the fifth year it was 30. The results, therefore, were quite similar to those of the previous year.

During 1901, 8,272 male patients were discharged with restored earning capacity, or 76.5 per cent of the total number of patients originally under treatment. At the end of the first year 70 per cent

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<sup>1</sup> See footnote, p. 88.

retained their earning capacity, at the end of the second year 53 per cent, at the end of the third year 45 per cent, at the end of the fourth year 38 per cent, and at the end of the fifth year 32 per cent. The economic results, therefore, were much more favorable throughout than during any one of the previous four years.

During 1902 the number of male patients discharged with restored earning capacity was 9,437, or 77.4 per cent of the original number of patients under treatment. Of the number receiving full treatment 72 per cent retained their earning capacity at the end of the first year, 57 per cent at the end of the second year, 48 per cent at the end of the third year, 44 per cent at the end of the fourth year, and 40 per cent at the end of the fifth year. The results, therefore, were more favorable than during the previous year and much more so than during any one of the earlier years.

During 1903 the number of male patients discharged with restored earning capacity was 11,763, or 78.8 per cent of the total number of patients under treatment. Of the patients receiving full treatment, 73 per cent retained their earning capacity at the end of the first year, 59 per cent at the end of the second, 51 per cent at the end of the third, 46 per cent at the end of the fourth, and 43 per cent at the end of the fifth year. The results throughout, therefore, were slightly more favorable than during the previous year, and much more favorable than during any one of the earlier years.

During 1904 the number of male patients discharged with restored earning capacity was 13,341, or 78.7 per cent of the total number under treatment. Of the number of patients receiving full treatment 73 per cent retained their earning capacity at the end of the first year, 61 per cent at the end of the second, 53 per cent at the end of the third, 48 per cent at the end of the fourth, and 44 per cent at the end of the fifth year. The results, therefore, were more favorable than during 1903, and much more favorable than in any one of the earlier years of experience.

During 1905 the number of male patients discharged with restored earning capacity was 15,516, or 81.3 per cent of the total under treatment. Of the number treated, 76 per cent retained their earning capacity at the end of the first year, 63 per cent at the end of the second year, 54 per cent at the end of the third year, 48 per cent at the end of the fourth year, and 44 per cent at the end of the fifth year. The results, therefore, were slightly more favorable during the previous year, but it is evident that the results approached a point subsequent to which a material improvement is most difficult to be realized.

With the experience of 1905 the five-year periods come to an end, and the number of male patients subsequently treated have been under observation only four years, three years, two years, and one

year, respectively. Considering these briefly it appears that in 1906 the number of patients discharged with restored earning capacity was 18,001, or 82 per cent of the total number under treatment. Of the number treated and kept under observation after discharge 77 per cent retained their earning capacity at the end of the first year, 65 per cent at the end of the second year, 55 per cent at the end of the third year, and 49 per cent at the end of the fourth year.

During 1907 the number of male patients discharged with restored earning capacity was 18,070, or 81.2 per cent of the total number under treatment. Of the number treated and kept under observation 77 per cent retained their earning capacity during the first year, 65 per cent during the second year, and 55 per cent during the third year, or almost identically the same percentages as were obtained with the patients of the previous year.

During 1908 the number of male patients discharged with restored earning capacity was 21,468, or 81.2 per cent of the total number under treatment. Of the number treated and kept under observation 72.8 per cent retained their earning capacity at the end of the first year and 62.5 per cent at the end of the second year.

During 1909 the number of male patients discharged with restored earning capacity was 24,337, or 83.1 per cent of the total under treatment. At the end of the first year 79 per cent retained their earning capacity, or a larger percentage of favorable results than had been secured during any one year of experience with the patients discharged during the years 1897 to 1908.

The results of the sanatorium treatment were even more favorable in the case of female patients, and the experience exhibits the same tendency toward a material improvement from the earlier to the later years. Commencing with 1897, there were 497 women patients discharged with restored earning capacity, or 67.5 per cent of the total number under treatment. Of the number treated and kept under observation 64 per cent retained their earning capacity at the end of the first year, 50 per cent at the end of the second year, 35 per cent at the end of the third year, 36 per cent at the end of the fourth year, and 32 per cent at the end of the fifth year.

During 1898, 811 women patients were discharged with restored earning capacity, or 73.5 per cent of the total number under treatment. Of the number treated and kept under observation, 69 per cent retained their earning capacity at the end of the first year, 49 per cent at the end of the second year, 43 per cent at the end of the third year, 39 per cent at the end of the fourth year, and 38 per cent at the end of the fifth year.

During 1899 there were 1,220 women patients discharged with restored earning capacity, or 73.2 per cent of the total number

under treatment. Of the number treated and kept under observation, 67 per cent retained their earning capacity at the end of the first year, 51 per cent at the end of the second year, 43 per cent at the end of the third year, 40 per cent at the end of the fourth year, and 37 per cent at the end of the fifth year.

During 1900 there were 1,920 women patients discharged with restored earning capacity, or 72.4 per cent of the total number under treatment. Of the number treated and kept under observation, 67 per cent retained their earning capacity at the end of the first year, 52 per cent at the end of the second year, 46 per cent at the end of the third year, 40 per cent at the end of the fourth year, and 35 per cent at the end of the fifth year.

During 1901 there were 2,977 women patients discharged with restored earning capacity, or 77.4 per cent of the total number under treatment. Of the number treated and kept under observation, 72 per cent retained their earning capacity at the end of the first year, 60 per cent at the end of the second year, 51 per cent at the end of the third year, 45 per cent at the end of the fourth year, and 39 per cent at the end of the fifth year.

During 1902 there were 3,448 women patients discharged with restored earning capacity, or 80.1 per cent of the total number under treatment. Of the number treated and kept under observation, 76 per cent retained their earning capacity at the end of the first year, 62 per cent at the end of the second year, 54 per cent at the end of the third year, 50 per cent at the end of the fourth year, and 47 per cent at the end of the fifth year.

During 1903 there were 4,284 women patients discharged with restored earning capacity, or 82.2 per cent of the total number under treatment. Of the number treated and kept under observation, 77 per cent retained their earning capacity at the end of the first year, 64 per cent at the end of the second year, 57 per cent at the end of the third year, 53 per cent at the end of the fourth year, and 50 per cent at the end of the fifth year.

During 1904 there were 5,293 women patients discharged with restored earning capacity, or 81.2 per cent of the total number under treatment. Of the number treated and kept under observation, 76 per cent retained their earning capacity at the end of the first year, 66 per cent at the end of the second year, 59 per cent at the end of the third year, 55 per cent at the end of the fourth year, and 51 per cent at the end of the fifth year.

During 1905 there were 6,272 women patients discharged with restored earning capacity, or 83.2 per cent of the total number under treatment. Of the number treated and kept under observation, 78 per cent retained their earning capacity at the end of the first year,

67 per cent at the end of the second year, 60 per cent at the end of the third year, 55 per cent at the end of the fourth year, and 52 per cent at the end of the fifth year.

During 1906 there were 7,748 women patients discharged with restored earning capacity, or 85.5 per cent of the total number under treatment. Of the number treated and kept under observation, 81 per cent retained their earning capacity at the end of the first year, 70 per cent at the end of the second year, 63 per cent at the end of the third year, and 58 per cent at the end of the fourth year.

During 1907 there were 8,217 women patients discharged with restored earning capacity, or 83.7 per cent of the total number under treatment. Of the number treated and kept under observation, 80 per cent retained their earning capacity at the end of the first year, 69 per cent at the end of the second year, and 62 per cent at the end of the third year.

During 1908 there were 10,511 women patients discharged with restored earning capacity, or 85.5 per cent of the total number under treatment. Of the number treated and kept under observation, 81 per cent retained their earning capacity at the end of the first year and 72 per cent at the end of the second year.

During 1909 there were 10,794 women patients discharged with restored earning capacity, or 83.3 per cent of the total number under treatment. Of the number treated and kept under observation, 80 per cent retained their earning capacity at the end of the first year after discharge.

#### **FINANCIAL STATISTICS OF SUCCESSFUL AND UNSUCCESSFUL SANATORIUM TREATMENT.**

The economic and other results of full special treatment on account of tuberculosis of the lungs during 1909 are briefly summarized as follows:

Of the total number of male patients treated and cared for during the year, 24,337, or 83.1 per cent, were discharged with restored wage-earning capacity, in conformity to paragraph 5, Section IV, of the Invalidity Insurance Law [art. 1255, par. 2, of the Workmen's Insurance Code of July 19, 1911]. The number of days' treatment on account of this group of patients was 1,817,965, or an average of 75 days per patient successfully treated. The amount expended on account of this group was 10,456,400 marks (\$2,488,623), or 88.36 per cent of the total expenditures on account of male patients successfully and unsuccessfully treated during the year. The average expenditure per patient successfully treated was 429.65 marks (\$102.26), and the average expenditure per day of treatment was 5.75 marks (\$1.37).

The number of male patients unsuccessfully treated—that is, cases in which the wage-earning capacity was not restored—was 4,940, or 16.9 per cent of the total number of male patients treated on account of tuberculosis of the lungs during the year. The number of days' treatment received by this group of patients was 233,488. The average number of days' treatment per male patient unsuccessfully treated, from an economic point of view, was 47. The total amount expended on account of this group was 1,378,094 marks (\$327,986), or 11.64 per cent of the expenditures on account of male patients successfully and unsuccessfully treated during the year. The average expenditure per male patient unsuccessfully treated was 278.97 marks (\$66.39), and the average expenditure per day of treatment was 5.90 marks (\$1.40).

Of the total number of female patients treated and cared for during the year, 10,794, or 83.3 per cent, were discharged with restored wage-earning capacity, in conformity to paragraph 5, Section IV, of the Invalidity Insurance Law [art. 1255, par. 2, of the Workmen's Insurance Code of July 19, 1911]. The number of days' treatment on account of this group of patients was 910,929, or an average of 84 days per patient successfully treated. The amount expended was 3,911,657 marks (\$930,974), or 87.53 per cent of the total expenditures on account of female patients successfully and unsuccessfully treated during the year. The average expenditure per patient successfully treated was 362.39 marks (\$86.25), and the average expenditure per day of treatment was 4.29 marks (\$1.02).

The number of female patients unsuccessfully treated—that is, cases in which the wage-earning capacity was not restored—was 2,161, or 16.7 per cent of the total number of female patients treated on account of tuberculosis of the lungs during the year. The number of days' treatment received by this group of patients was 131,416. The average number of days' treatment per female patient unsuccessfully treated from an economic point of view was 61. The total amount expended on account of this group was 557,467 marks (\$132,677), or 12.47 per cent of the expenditures on account of female patients successfully and unsuccessfully treated during the year. The average expenditure per female patient unsuccessfully treated was 257.97 marks (\$61.40), and the average expenditure per day of treatment was 4.24 marks (\$1.01).

The data are presented in further detail in the table which follows:

**RESULTS OF SPECIAL TREATMENT OF MALES AND FEMALES, ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, COMPLETED DURING THE YEARS 1905 TO 1909.**

*Cases wherein disability was removed or arrested: Males.*

Year.	Persons treated.		Days of treatment.			Cost of treatment.			
	Number.	Per cent.	Number.	Per cent.	Per person.	Amount.	Percent.	Per person treated.	Per day of treatment.
1905.....	15,516	81.3	1,228,538	88.0	79	\$1,529,332.20	88.53	\$98.57	\$1.24
1906.....	18,001	82.0	1,394,445	88.0	77	1,791,927.02	88.14	99.55	1.29
1907.....	18,070	81.2	1,386,727	87.6	77	1,815,277.88	88.25	100.46	1.31
1908.....	21,468	81.2	1,635,793	87.4	76	2,220,147.30	87.73	103.42	1.36
1909.....	24,337	83.1	1,817,965	88.6	75	2,488,623.20	88.36	102.26	1.37
Total..	97,392	81.8	7,463,468	88.0	76	9,845,307.60	88.18	101.09	1.32

*Cases wherein disability was not removed: Males.*

1905.....	3,569	18.7	167,128	12.0	47	\$198,133.85	11.47	\$55.52	\$1.19
1906.....	3,958	18.0	189,818	12.0	48	241,144.45	11.86	60.93	1.27
1907.....	4,188	18.8	196,050	12.4	47	241,719.70	11.75	57.72	1.23
1908.....	4,969	18.8	235,987	12.6	47	310,488.14	12.37	62.48	1.32
1909.....	4,940	16.9	233,488	11.4	47	327,986.37	11.64	66.39	1.40
Total..	21,624	18.2	1,022,471	12.0	47	1,319,472.51	11.82	61.02	1.29

*Cases wherein disability was removed or arrested: Females.*

1905.....	6,272	83.2	533,430	90.0	85	\$515,794.64	89.51	\$82.24	\$0.97
1906.....	7,748	85.5	660,057	90.6	85	631,172.87	90.13	81.46	.96
1907.....	8,217	83.7	707,041	89.1	86	685,068.12	88.87	83.48	.87
1908.....	10,511	85.5	864,683	89.8	82	893,452.48	89.96	85.00	1.03
1909.....	10,794	83.3	910,929	87.4	84	930,974.37	87.53	86.25	1.02
Total..	43,542	84.3	3,676,140	89.2	84	3,657,362.48	89.10	84.00	.99

*Cases wherein disability was not removed: Females.*

1905.....	1,264	16.8	59,172	10.0	47	\$60,468.54	10.49	\$47.84	\$1.02
1906.....	1,315	14.5	68,530	9.4	52	68,717.71	9.82	52.26	1.00
1907.....	1,599	16.3	86,671	10.9	54	85,924.19	11.13	53.74	.99
1908.....	1,777	14.5	97,957	10.2	55	99,763.65	10.04	56.14	1.02
1909.....	2,161	16.7	131,416	12.6	61	132,677.15	12.47	61.40	1.01
Total..	8,116	15.7	443,746	10.8	55	447,551.24	10.90	55.14	1.01

**GENERAL CONCLUSIONS AS TO THE VALUE OF INSTITUTIONAL TREATMENT FOR TUBERCULOSIS.**

The foregoing analysis proves conclusively that in a general way the present results of sanatorium treatment are of great economic value. Assuming, as may rightfully be done, that without such systematic and effective treatment the large majority of patients would have died from the disease within two years from the date of attack, it is evident that whether such treatment was provided by insurance institutions or at public cost through direct taxation or at the personal expense of the patients, assuming ability to pay, the results are decidedly gratifying and conclusive. With-

out question an immense amount of most valuable experience has been gained for the development of the most effective methods of treatment, and comparing the results secured during recent years with those of the earlier years the proportion of men and women wage earners retaining their earning capacity, after sanatorium treatment, for a reasonable period of years is much larger now than formerly. Taking, for the purpose of further illustration, the year 1905, when at the end of the fifth year (that is, in 1909) 41.2 per cent of the male patients and 47.9 per cent of the female patients were still in possession of their earning capacity, sufficient at least to provide in part for their own support, it is self-evident that such results are of the greatest possible economic value to the State, even though under present conditions the cost of treatment may be somewhat larger than the direct financial gain to the insurance institutions on account of diminished payments in the form of disability annuities. Recalling that during 1905 the average expense per patient was 380.31 marks (\$90.51) for males and 321.29 marks (\$76.47) for females, it is clear that the after results of the 1905 experience paid largely, if not entirely, for the expenses incurred in behalf of tuberculous patients who otherwise would have died, or themselves and their dependents would have become a charge upon the community at large. Of course, the advantage to an invalidity insurance institution from such treatment is much greater than would be the case in a life insurance company or society, which, in any event, would have to pay the face value of the policy at death. The life insurance company would be interested only in the deferred payment of the amount due at death, and the expense of treatment, if incurred in its own behalf, would have to be made good by additional premium receipts for a number of years sufficient to cover the expenses.

The case is quite different with invalidity insurance institutions, which may or may not have to pay large sums, according to the degree and duration of the disability, and in the case of which preventive or curative treatment may bring about a material reduction in the liability, so that the treatment and care of patients in special institutions may prove a sound and substantial financial investment. Whether this actually has been the case with German State invalidity insurance institutions up to the present time is still open to question. Neither in the official reports nor in the general literature of the subject is there anywhere sufficient statistical or other evidence to conclusively prove that the efforts made to bring about restored earning capacity of invalid members have paid a full return on the money invested in special institutions and the annual disbursements in behalf of patients and their immediate dependents. In course of time no doubt such proof will be forthcoming, and con-

sidering that the entire plan of compulsory social insurance rests, primarily, not upon financial but upon general considerations of public welfare, it is self-evident that the efficacy and value of the system can not be tested solely by reference to the annual balance sheets of the institutions individually considered, or even on the basis of their aggregate experience.

**ADMINISTRATIVE CONTROL OF TUBERCULOSIS, WITH SPECIAL REFERENCE TO TUBERCULOSIS DISPENSARIES, INFORMATION BUREAUS, AND HOUSING REFORM.**

**LIMITATIONS OF SANATORIUM TREATMENT.**

The sanatorium treatment of tuberculosis has its inherent limitations, which, however, do not in the least detract from the far-reaching usefulness of these special institutions for the treatment of the disease. In the nature of the case, only a relatively small proportion of patients can be treated and cared for in sanatoria for the required period of time. For illustration, out of a probable number of from 600,000 to 800,000 cases of tuberculosis in the German Empire only 45,609 patients were, in 1910, provided with treatment in 99 public sanatoria<sup>1</sup> chiefly maintained by invalidity insurance institutions. Since the number of beds available for public sanatorium treatment at the present time is only about 12,000, it is self-evident that unless the accommodation is materially increased, or the duration of treatment substantially diminished, a very large proportion of tuberculous patients must be taken care of in their homes or in special institutions not established for the purpose of systematic treatment and care.

In sanatorium treatment the preference naturally is for patients in the first and second stages of the disease, although a fairly large proportion are treated and cared for while in the third or terminal stage. In 1910 out of 27,357 male patients admitted to German sanatoria 13,633, or 49.8 per cent, were in the first Turban stage; 10,256, or 37.5 per cent, were in the second; and 3,468, or 12.7 per cent, were in the third. Out of 13,905 female patients, 8,648, or 62.2 per cent, were in the first Turban stage of the disease; 4,175, or 30 per cent, were in the second; and 1,082, or 7.8 per cent, were in the third. The corresponding distribution of tuberculous wage earners in the general population is not ascertainable.

A large number and proportion of persons are at any given time in the very earliest stage of the disease, when accurate diagnosis and effective treatment are of the greatest practical importance. In due consideration, therefore, of the needs of the tuberculous population in general, and clearly differentiated from the patients in a definitely

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<sup>1</sup> There were in addition 34 private sanatoria with 2,078 endowed beds, 22 institutions for tuberculous children, and 86 institutions for scrofulous children liable to tuberculosis.

recognized stage of the disease suitable for sanatorium treatment, efforts have been made within recent years, and to an ever-increasing extent, to provide information bureaus and tuberculosis dispensaries for the rendering of competent medical advice and material assistance in cases of urgent need.

#### GERMAN TUBERCULOSIS DISPENSARIES AND INFORMATION BUREAUS.

The establishment of information bureaus and tuberculosis dispensaries dates only from 1904, when the first properly equipped institution of this kind in Germany was established in the city of Berlin.<sup>1</sup> The chief object of information bureaus and tuberculosis dispensaries is to prevent the spread of pulmonary tuberculosis, through the education of the patients and the effective utilization of approved methods and means of public or private control. The work of the dispensary is therefore intelligently coordinated to rational methods of detection or ascertainment of all serious cases of tuberculosis and the dissemination of useful information regarding the best possible means of providing for the needs of tuberculous wage earners in the different stages of the disease. The public control of tuberculosis, to be really effective, requires a thoroughly coordinated administrative organization acting intelligently in cooperation with charitable associations and medical institutions established and maintained by public or private enterprise. The chief function of the tuberculosis dispensary is to concentrate preventive and ameliorative efforts in a central station, and although methods vary in different localities and countries, the essential principles of the dispensary are well summed up in the following program of the first institution of this kind, established by Dr. R. W. Philip, in Edinburgh, in 1887:

1. The reception and examination of patients at the dispensary, the keeping a record of every case, with an account of the patient's illness, history, surroundings, and present condition, the record being added to on each subsequent visit.

2. The bacteriological examination of expectoration and other discharges.

3. The instruction of patients how to treat themselves and how to prevent or minimize the risk of infection to others.

4. The dispensing of necessary medicines, sputum bottles, disinfectants, and, where the patient's condition seemed to warrant it, foodstuffs, and the like.

5. The visitation of patients at their own homes by (1) a qualified medical man, and (2) a specially trained nurse for the double purpose of treatment and of investigation into the state of the dwelling and general conditions of life and the risk of infection to others.

6. The selection of more likely patients for hospital treatment, either of early cases for sanatoria or of late cases for incurable homes, and the supervision, when necessary, of patients after discharge from hospital.

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<sup>1</sup> There had, however, been a previous effort of this kind at Halle.

7. The guidance, generally, of tuberculous patients and their friends and for inquiries from all interested persons on every question concerning tuberculosis.

The German information bureaus and tuberculosis dispensaries, on the model of the Berlin institution, have been developed along somewhat different lines, and they preclude as a first and essential consideration the medical treatment of patients on the premises. Such treatment to be effective, it is held, should be provided by private physicians or by the physicians employed by sick funds or, as a last resort, through the poor-law authorities. According to a comparatively recent imperial statute, the acceptance by tuberculous patients of medical treatment provided by poor-law authorities does not involve a forfeiture of civil rights and privileges. The tuberculosis dispensaries are not municipal institutions, but are, as a rule, under the control of a local committee acting in cooperation with the board of health and other public authorities. Any consumptive can obtain free advice at the dispensaries, whether in an early or advanced stage of the disease and irrespective of his ability to pay for qualified advice. In the event that the applicant is found to be tuberculous all the members of his family are required to present themselves at the dispensary for the purpose of a thorough medical examination, which is also made free of charge.

#### ORGANIZATION AND SCOPE OF THE TUBERCULOSIS DISPENSARY.

The organization of the dispensary includes a bureau official, who has general charge and who must be present during office hours to give general information and advice. The attending physician has more limited office hours, during which those who apply are subjected to a medical examination, which is amplified by a bacteriological examination of the sputum, etc. Attached to every dispensary is at least one visiting nurse, who, without delay, carefully examines into the home conditions of the patients and reports her findings. The function of the medical examiner is limited to the exact determination of the condition of the lungs and the degree to which the disease has advanced, and the results of the examination are immediately communicated to the patient's own physician or to such as he may select or as may be provided for him through the sick fund of which he is a member, or, if not otherwise, through the poor-law authorities. In other words, the medical function of the dispensary is limited to the determination of the applicant's condition, and no specific medical treatment is rendered, as is the case in French, Belgian, and some English dispensaries.

The first essential function of the visiting nurse is to ascertain the home conditions of the applicant, and to determine what is necessary to prevent the infection of other members of the family. In the

event that the patient is unable to provide a room for his own needs, or even a single bed, the dispensary renders material assistance in so far as this may be absolutely necessary. To enable the family to rent an additional room, pecuniary aid is rendered, or, if that is not possible, sanitary beds are lent, which are surrounded by screens to diminish as far as practicable the risk of infection to other members of the family. The nurse further supervises the diet of the patient and, if necessary, supplies nutritious food at the expense of the dispensary. Patients to whom institutional treatment is suited are provided for in so far as this is possible, particularly at forest day and night camps, the number of which has rapidly increased during recent years. The aim is to provide such treatment near to the home of the patient and his place of work in case the disease is not too far advanced. It is held that the net cost of effective treatment at forest day and night camps need not exceed 1 mark (23.8 cents) per day, which is in marked contrast to the generally rather high average cost per day per patient—4.66 marks (\$1.11) in 1910—treated and cared for at public sanatoria.

Among other functions of the tuberculosis dispensary are the disinfection of infected premises and a general supervision of housing conditions in so far as they have reference to the possible prevention or spread of tuberculosis of the lungs.

The work of the dispensaries, in brief, is a combination of public hygiene and public nursing, and a vast amount of good has resulted. The dispensary aims to provide for every pronounced case of tuberculosis of the lungs a separate room in the home of the sufferer and to see that the family has ample protection against the danger of infection. The dispensary further aims to improve the economic position of the family in order that the patient may have the care and attention which are considered of paramount importance in the treatment of the disease. Patients in the far-advanced stage are placed in homes for incurables, but efforts in this direction have, on the whole, been rather discouraging. The patients prefer to be treated in their own homes and to die there rather than among strangers in distant institutions.

#### TUBERCULOSIS DISPENSARIES IN GERMANY IN 1911.

The remarkable development of tuberculosis dispensaries and information bureaus in the German Empire during recent years is best emphasized in the statement that while in 1908 there were only 175 of these institutions, the number by 1911 had increased to 528. In addition thereto the number of forest day and night camps increased from 82 in 1908 to 98 in 1911. There had also been established 15 forest schools for tuberculous children and 2 agricultural colonies for tuberculous wage earners. For tuberculous patients in advanced

stages of the disease adequate provision is made in a large number of hospitals and in homes for incurables. For the treatment and care of patients discharged from sanatoria in a condition making a continuation of institutional treatment advisable 17 convalescent homes exist, and in addition thereto there are 33 observation stations, chiefly, however, in the principal cities of the Province of Silesia. Finally, reference must be made to 19 polyclinics, maintained by municipalities, for the medical treatment of cases referred to them by medical practitioners or by tuberculosis dispensaries.

A large number of associations of all kinds have been established in recent years throughout Germany for the study and prevention of tuberculosis, including many which combine their activity with general welfare work, chiefly, however, for the purpose of rendering effective assistance to wage earners of the lower and more or less dependent classes. There are probably not fewer than 500 such associations, the work of which is more or less coordinated to the activity of the German Central Committee for the Prevention of Tuberculosis. The tendency is to further coordinate the work of local associations to the activities of tuberculosis dispensaries and information bureaus, which are gradually developing uniform and centralized efforts for the prevention and control of the disease. The following is a brief account of the methods and results of some of the more important tuberculosis dispensaries and information bureaus for the year 1910.

#### TUBERCULOSIS DISPENSARIES IN BERLIN.

During the four years ending with October 1, 1908, the Berlin information bureaus and tuberculosis dispensaries medically examined 82,006 persons for symptoms of tuberculosis of the lungs. The number of homes of tuberculous wage earners examined and reported upon, and placed in a more or less complete sanitary condition, was 45,583. The dispensary aims particularly at improved hygienic home conditions, and what is done in this direction is practically equivalent to a course in elementary domestic and personal hygiene. In quite a number of cases tuberculous patients were found to occupy the same bed with healthy members of the family, but in 835 such cases separate beds were provided through the dispensary. For the object of providing additional rooms for sleeping accommodation, 10,720 marks (\$2,551.36) was paid out as pecuniary aid, and in addition thereto 63,371 marks (\$15,082.30) was advanced in particularly urgent cases, chiefly, no doubt, for the purpose of furnishing a more substantial diet or other aid necessary to effect an improvement or a cure. The two items combined, amounting to 74,091 marks (\$17,633.66), were not reimbursed to the dispensary by the local poor-law authorities.

Patients in a far advanced stage of the disease and pronounced unfit for sanitary treatment, numbering 3,048, were cared for in hospitals, air-cure establishments, etc., and of this number 1,565 were subsequently discharged as materially improved. It is held that but for the intervention of the dispensaries these patients would probably have died, or would have become a serious economic burden upon the immediate family or the public at large. In addition to the foregoing, 3,231 children of tuberculous patients were provided with accommodation in sanatoria for children, and 2,787 other children were placed in various forest convalescing homes. The dispensaries also considered 1,241 applicants in a far-advanced stage of the disease, advising immediate hospital treatment, with, however, but a slight chance of improvement or cure.

The city of Berlin in 1910, with a population of 2,070,695, had six tuberculosis dispensaries and information bureaus, at which 37,415 persons received consideration, including 5,699 adult males, 10,825 females, and 20,891 children. The rapid growth of the institutions is brought out by the fact that during 1909 the number of applicants was only 20,396. It is explained in the annual report for 1910 that this increase is entirely the result of public appreciation of benefits obtained. Among the 37,415 persons considered during 1910, there were 1,100 far-advanced cases of tuberculosis, which were effectively isolated in their own homes for the purpose of diminishing the risk of infection to other members of the family. By means of such isolation the most dangerous foci of infection are brought under public control, and that measurable results have been obtained is made evident by the actual decrease in the mortality from tuberculosis, the rate having declined from 18.2 per 10,000 of population in 1908, to 17.9 in 1909, and to 17.6 in 1910.

The visiting nurses are provided with a brief outline of the essential facts which require to be brought to the attention of tuberculous patients and of those persons who are exposed to the imminent danger of infection. It is pointed out that tuberculosis can be prevented, and that the infection of healthy persons can be avoided upon recognition of the infective character of the disease. The hygiene of the home is emphasized with reference to dryness, cleanliness, sunshine, air conditions, etc., and the number as well as the position of the beds used for sleeping purposes. The danger of a consumptive sharing the bed with a healthy person is explained, and in the event that a single bed is not available, one may be provided at the expense of the dispensary. Cleanliness in toilet accommodation is insisted upon and the duty of domestic cleanliness in every other direction. Patients are warned not to kiss upon the mouth and to use only their own toothbrush, on account of the imminent risk of infection.

Sleeping by the open window is suggested, and in the event that the sputum gives positive evidence of the disease by its bacteriological contents a separate sleeping room is advised, and in extreme cases is provided at the expense of the sanatorium. Members of the patient's family are required to report for a medical examination at the dispensary. It is also advised that used laundry articles must not remain in a dry condition, and all cooking utensils employed by the patient must be cleaned immediately after use. Spitting is prohibited, and for the sputum containers must be provided with a soda or a lysol solution. Patients are warned not to share their food with other members of the family, and they are further warned against smoking, alcoholic drinks, and marriage. The premises are required to be disinfected. The economic condition of the patient is discussed with the visiting nurse, and if the aid rendered by the dispensary is inadequate the poor-law authorities are called upon.

The financial aid provided by the Berlin dispensaries during 1910 amounted to 26,746 marks (\$6,365.55). From a special fund 822 persons were provided with meals for a period of six weeks each. In addition thereto, 91,439 meals were provided for tuberculous children at public diet kitchens. Pure milk was provided for 339 persons exclusive of families taken care of by the poor-law authorities. The number of tuberculous persons sent to sanatoria and to homes for incurables through the intervention or assistance of the dispensaries was 932 adults and 1,029 children. Finally, 1,085 patients were directed to physicians and polyclinics and 367 were taken care of in hospitals.

The 6 dispensaries employed 17 visiting nurses, who during the year made 37,750 visits to the homes of tuberculous patients, or an average of from 7 to 8 visits a day.

The chief object of the tuberculosis dispensaries is to protect the healthy, but much is done for the afflicted, particularly with regard to the recovery of the patients' earning capacity. As far as practicable the children in tuberculous families are removed therefrom and taken care of in children's homes or in forest day camps. The present effort is largely directed toward the protection of the children against infection, as perhaps the most promising means of ultimately reducing the mortality from tuberculosis. It is pointed out in the report for 1910 that one of the results of preventive effort will be to increase the number and proportion of young men fit for military service, which at present, in the large cities, is not more than 50 per cent of the number examined.

## TUBERCULOSIS DISPENSARIES IN HAMBURG.

The city of Hamburg in 1910, with a population of 932,166, had five tuberculosis dispensaries, two of which had been established during the previous year. The dispensaries are subsidized to the extent of 10,000 marks (\$2,380) per annum by the State of Hamburg, and in addition 9,000 marks (\$2,142) is provided by the Hanseatic Invalidity Insurance Institution. The German Central Committee furnished 2,000 marks (\$476) for the establishment of two new dispensaries. The various communal sick funds furnished 4,529.65 marks (\$1,078.06), and a number of other sick and burial funds provided 3,564.50 marks (\$848.35). In addition to this income the sum of 2,487.53 marks (\$592.04) was derived from miscellaneous, chiefly charitable, sources, making a total income of 31,581.68 marks (\$7,516.45). The disbursements during the year were, in some detail, as follows: For medical fees, 10,490 marks (\$2,496.62); for nurses, 5,900 marks (\$1,404.20); for clerical assistance, 2,787.60 marks (\$663.45); financial aid to patients, 1,475 marks (\$351.05); for beds and bedding, 1,571.65 marks (\$374.05); for rent, 1,066.65 marks (\$253.86); for thermometers, 193.80 marks (\$46.12); for printing, 670.05 marks (\$176.14); and for furniture and miscellaneous expenses, 1,693.63 marks (\$403.08), making a total disbursement for the year of 25,848.28 marks (\$6,151.89).

The number of new patients or applicants considered during the year was 5,004, including 1,720 men, 1,867 women, and 1,417 children. Of the total number, 2,302 were members of sick funds and 2,391 were members of invalidity insurance institutions. Among the applicants were 59 disability annuitants, including 40 males and 19 females. Of the 5,004 persons considered, 1,870, or 37.4 per cent, were found to be tuberculous. The number of medical examinations made during the year was 12,520. Of the 5,004 persons considered, 2,340 applied at the dispensaries on their own account, 1,369 were sent to the dispensaries by physicians, and 169 applied at the suggestion of the invalidity insurance institution, and 61 at the suggestion of sick funds. The dispensaries received notifications of 2,638 tuberculous persons through the invalidity insurance institution, but of this number 1,140 had been previously considered by the tuberculosis dispensaries. The number of persons sleeping alone was 1,841, the number sleeping with other adults was 499, and the number sleeping with children was 381. Only 759 had their own bedroom, but in 2,907 cases the home was found to be clean and in a sanitary condition, in 533 cases the condition was fairly satisfactory, and in only 40 was the condition decidedly unsatisfactory.

The number of persons making application for sanatorium treatment was 678, including 238 men, 318 women, and 122 children.

Sanatorium treatment was provided at the expense of the invalidity insurance institution in the case of 118 males and 93 females, and at the expense of sick funds in the case of 45 males and 35 females, and by public authorities in the case of 46 men, 84 women, and 97 children. In addition thereto 8 men, 19 women, and 6 children were provided with sanatorium treatment at their own expense, and 5 persons were taken care of at the expense of others. The number of cases declined as unsuitable for sanatorium treatment was 162. There were 95 children of tuberculous parents provided with vacations or treatment in the country, the expenses being paid for in 11 cases by the invalidity insurance institution and in the remainder of the cases by various authorities, societies, etc.

Of the tuberculous applicants, 209 were provided with accommodation in hospitals, and there were 168 deaths, probably of persons in the advanced stages of the disease. In 1,103 cases the homes of tuberculous persons were disinfected more or less in cooperation with the public authorities. In 34 cases beds were provided and in 239 cases financial assistance was rendered to the total amount of 615.96 marks (\$146.60); in 69 cases milk was furnished; and in 39 cases additional rent was provided to the amount of 3,317.68 marks (\$789.61); 55 persons were provided with clothing, and in 67 cases financial assistance was secured through private sources. There were 95 cases in which coal was furnished, and in 107 cases the tuberculous patients were supplied with suitable sputum cups.

A considerable proportion of the male applicants were common laborers or small wage earners, but practically all occupations are represented, including a fair number of persons in employments of a higher grade, such as clerks, stenographers, etc. The total number of new applicants at the dispensaries increased from 3,480 in 1909 to 5,004 in 1910, and the number of persons medically examined increased from 7,338 in 1909 to 12,520 in 1910. The general results are considered entirely satisfactory and a determined effort is being made to increase the usefulness of the institutions in every direction. The growth of the institutions is conclusive evidence of public appreciation, and the practical results are made evident by the fact that the tuberculosis death rate has persistently declined from 14.9 per 10,000 in 1907 to 13.3 in 1908, to 13.1 in 1909, and to 12.6 during 1910. It may safely be assumed that the establishment and intelligent administration of the tuberculosis dispensaries and information bureaus throughout the city of Hamburg has materially contributed toward this gratifying reduction in the mortality from this disease.

#### TUBERCULOSIS DISPENSARY IN LEIPZIG.

In Leipzig, which in 1910 had a population of 587,635, a tuberculosis dispensary and information office has been established through the Association for the Care of Sick Workmen, which has

given special and extended consideration to the problem of tuberculosis prevention and relief. The number of new applicants during 1910 was 2,162, which compares with 1,999 during 1909, and 765 during 1908. Of the applicants considered during 1910, 809 were males insured with invalidity insurance institutions, and 854 were insured females. The number of children considered during 1910 was 499. The number of medical examinations was 4,113, and 4,515 visits were made to homes of persons who actually had or were suspected of having tuberculosis. These visits were made by one male nurse and two female nurses. The dispensary provided 15,340 liters (16,209.5 quarts) of milk and 758 marks (\$180.40) in cash for rent, etc. A considerable amount of food and medicines, as well as a large number of sputum cups, etc., were provided, but in a general way the methods and results conform to those of the tuberculous dispensaries of Hamburg and of Berlin. A special effort was made in the direction of public education in all matters relating to tuberculosis, and among the publications distributed were the following: A Brief Outline of the Effective Protection of the Person against Tuberculosis; An Advisory Circular for the Tuberculous; Information as to the First Indications of Tuberculosis; Chronic Lead-Poisoning as an Occupation Disease; The Dangers of Dusty Trades; and The Dangers of Living in Damp, Small, and Overcrowded Dwellings.

The foregoing is only a brief outline of the activity of the tuberculosis dispensary of Leipzig during the year 1910. Effective work of far-reaching importance is also done by a number of charitable and philanthropic associations, as well as through the Communal Sick Fund, with which a large majority of the wage earners of the city of Leipzig are insured. The tuberculosis death rate of Leipzig has decreased within recent years from 18.6 in 1907 to 17.4 in 1908 and to 16.3 in 1909. The data for 1910 are not available.

#### TUBERCULOSIS DISPENSARY IN MUNICH.

Munich, with a population in 1910 of 595,053, has only one dispensary, opened on March 1, 1908. In 1909 (the report for 1910 not being available) the dispensary was visited by 1,204 persons, who made 4,210 calls during 86 hours of available medical advisory service. The visiting nurse made 1,794 calls at the homes of the patients, who represented all of the principal occupations and included 216 married women and widows and 403 children. The work of the dispensary is as yet very limited, considering the large population contributory thereto. In 1909, out of 1,204 persons medically examined, 745 were found to be tuberculous and in an advanced stage of the disease, 362 were probably tuberculous, while only 97 were

entirely free from the disease or indications thereof. Most of the persons were of the age period 21 to 50 years. Of the 1,204 persons, 229 were recommended to the dispensary by physicians, 155 by polyclinics, and 790 otherwise. The number of persons found to have a tubercular family history was 446, and of this number 256 were certainly tuberculous, 156 were probably tuberculous, and 34 were free from the disease or indications thereof. Of the 745 persons who were certainly tuberculous, 14.7 per cent were of the age period 21 to 30 years and 17.2 per cent of the ages 31 to 40 years. The number of persons having their own beds was 994, or 82.6 per cent of the total. The number sharing their beds with one other person was 198, or 16.4 per cent, and the number sharing their beds with two persons was 12, or 1 per cent.

All cases of tuberculosis as determined at the dispensary are registered on cards and indicated on a map of the city, showing precisely the relation of congestion of population to the occurrence of disease.

The work of the dispensary is further emphasized in the extent to which necessary articles were lent for temporary use, chiefly thermometers, beds, mattresses, bedding material, sputum cups, spittoons, etc. The total amount of financial support on behalf of patients provided with accommodation in sanatoria, forest day camps, etc., in 112 cases was 6,712.90 marks (\$1,597.67). In 18 cases an addition to the rent was paid for the purpose of providing better living quarters, amounting to 234.25 marks (\$55.75). There were 15,198 liters (16,059.5 quarts) of milk furnished, at a cost of 2,735.68 marks (\$651.09), and other expenditures for relatively small amounts were incurred for financial assistance to patients in urgent need thereof.

The work of the dispensary is aided materially by the efforts of the Munich Association for the Prevention of Tuberculosis, which carries on an effective propaganda against the disease, and maintains two day camps, one each for men and women. The day camp for women is combined with an open-air school for children, which during 1909 was open from May 10 to September 26 and provided accommodation for 67 children. The day camp for women was open from May 1 to December 26 and 829 persons were cared for, chiefly at the expense of the communal and trade sick funds and the Invalidity Insurance Institution of Upper Bavaria. The physical results of the institution are made evident by the fact that for 663 patients there was an average gain in weight of 2.7 kilograms (5.95 pounds) as the result of an average stay of 28 days. The attendance has rapidly increased from an average of 30 persons per day in 1904 to 158 in 1909. Of 236 patients for which the information is given, 107, or 45.3 per cent, were tuberculous. Of the 236 patients under treatment and care, 80.9 per cent recovered their full earning capacity, and 7.2 recovered

partial earning capacity. The physical results in the case of children were particularly satisfactory, the average gain in weight having been 3.7 kilograms (8.16 pounds), and the average increase in height 4.4 centimeters (1.7 inches). Under the present limitations the usefulness of the tuberculosis dispensary is, however, far from what the local conditions require, for the death rate from tuberculosis in Munich is high, having been 22.9 per 10,000 in 1909 against 17.9 for Berlin, and 15.6 for Cologne. The tuberculosis death rate of Munich has been practically stationary for the three years 1907 to 1909, but there has been a decline in the occurrence of the disease when comparison is made with earlier years.

#### **TUBERCULOSIS DISPENSARIES IN SILESIA.**

The results of dispensary treatment have been fully as encouraging in small communities, and even in rural districts, in which, in some sections of Germany, the tuberculosis death rate is higher than in the cities. What has been done in this direction in the Province of Silesia is particularly interesting in view of the fact that 32 communities, in 1910, maintained information bureaus and tuberculosis dispensaries, and that in these 4,853 persons were medically examined, of whom 2,186, or 45 per cent, were found to be tuberculous. The visiting nurses made 16,419 calls in behalf of 1,847 tuberculous patients or families. In 490 cases infected homes were disinfected by scientific methods, aside from a large amount of disinfection by public authorities. The number of men provided with institutional treatment was 189; of women, 208; and of children, 214. The financial needs of the dispensaries were provided for in part by 25 communities furnishing 9,860 marks (\$2,346.68). In addition thereto the invalidity insurance institution of Silesia subsidized the dispensaries with the sum of 9,615 marks (\$2,288.37), and the German Central Committee furnished 1,000 marks (\$238). Finally, three communities were aided to the extent of 13,000 marks (\$3,094) for the establishment and support of forest day camps.

#### **TUBERCULOSIS DISPENSARY IN AUGSBURG.**

In the city of Augsburg, which in 1910 had a population of 102,570, a tuberculosis dispensary was established in 1909. From the outset the institution met with a decided response, and in 1910 97 medical consultations were held, during which, on an average, from 15 to 20 persons were examined as to evidences of tuberculosis. The number examined included all of the patients discharged from the sanatorium of the invalidity insurance institution, with provision for their subsequent observation and record. The chief aim of the institution is the education of the public in all that pertains to the prevention, treatment, and cure of tuberculosis, and included in this

propaganda are the members of the patients' families. The effort is to control, as far as possible, the housing conditions of those infected with the disease, and the visits of the nurse are largely directed toward remedial measures and a moderate amount of financial support.

During the two years the dispensary has been established 680 homes have been inspected and as far as necessary the immediate living conditions have been improved as a first requisite in providing an environment favorable for the cure of the disease. In many instances very unsatisfactory housing conditions were disclosed by the inspection and brought to the attention of the public authorities. A special effort is made to control the expectorations of the patients, for the purpose of preventing the infection of other members of the family or the reinfection of the patient. Disinfection is practiced to a considerable extent, and in all cases when a tuberculous person moves from one locality to another or in the event of death.

On January 1, 1910, there were 294 persons under observation, and during the year 359 new applicants received consideration. Of the 359 new applicants, 119 were men, 139 were women, and 101 were children. Of the 119 men, 100, or 84 per cent, were tuberculous or probably so; and of the 139 women, 110, or 79.1 per cent; and of the 101 children, 55, or 50.5 per cent. The number of families under observation on January 1, 1911, was 179. The number of medical examinations, including reexaminations, made during 1910, was 476. The visiting nurse during the year made 1,105 visits, and in 115 cases material improvements were brought about in the home and living conditions of the patients. The amount of financial assistance in the case of eight families was 334 marks (\$79.49). For the prevention of infection, 106 sputum cups and a considerable amount of disinfecting material were provided. Disinfection of premises took place in 150 cases, of which 135 were on account of death and 15 on account of change of residence. The dispensary provided for 734 patients 11,055 liters (11,682 quarts) of milk and for 52 patients 1,650 noonday meals.

The death rate from tuberculosis in Augsburg is gradually declining. In 1900 the rate was 37.0 per 10,000 population, in 1904 it was 30.7, in 1909 it was 22.9, and in 1910 it was 22.6. The actual number of deaths had decreased from 328 in 1900 to 232 in 1910, although the population had increased from 88,749 to 102,570.

#### TUBERCULOSIS DISPENSARIES IN WESTPHALIA.

In concluding this brief review of some of the more important and typical tuberculosis dispensaries and information bureaus, which within recent years have been established throughout the German Empire, reference may be made to what has been done in this direc-

tion in the Prussian Province of Westphalia, which in 1910 had a population of 4,125,904. The number of dispensaries, which in 1909 had been 14, was increased by 14 during 1910. The problem is seriously complicated by more or less unsatisfactory housing conditions, and the work of the dispensaries is therefore intelligently coordinated to a well-organized system of house inspection. In the aggregate 5,698 persons applied to the dispensaries during 1910, and of this number 2,774 were medically examined. An examination of the sputa was made in 1,299 cases and a positive diagnosis of tuberculosis was made in the case of 1,839 applicants. The total number of persons under supervision and care was 1,925, and of this number 585 were provided with nourishing food, 123 with beds, 736 with medicinal baths, 49 with financial assistance on account of rent, and 193 with sputum cups and disinfecting material, etc. In 531 cases the premises were disinfected, including 284 on account of deaths from tuberculosis.

#### **AGRICULTURAL COLONY FOR TUBERCULOUS WAGE EARNERS.**

One special effort should here be referred to for the purpose of completeness, and that is the establishment of an agricultural colony by the Invalidity Insurance Institution of Hanover chiefly for the benefit of patients discharged from sanatoria for the treatment of tuberculosis. The colony is located at Stübeckshorn, in the Lüneburg Heath, within a reasonable distance of the city of Hanover and about 5 miles from the city of Soltau. The estate comprises 750 hectares (1,853.3 acres) of land, of which 650 hectares (1,606.2 acres) consist of pine woods. A simple provision has been made for the housing of the patients, who are employed in the open air, chiefly in the making of roads in the woods, in the preparation of asparagus beds, and in light field work during the harvest season. The value of the property in 1910 was 175,587 marks (\$41,789.70). The work is done under medical supervision, but every inmate is required to perform certain duties punctually and to the best of his ability. The principle of compulsory labor is therefore fundamental. The minimum working time per day is four hours, the patients being divided into three grades, those in the first grade working up to four hours, those in the second grade to six hours, and those in the third grade to eight hours, according to their strength and capacity. The stay in the colony is usually limited to two months. The patients admitted must as a rule be tuberculous persons who, up to the time of their admission, had been treated in a sanatorium, but who were relatively free from definite symptoms of the disease on their discharge. Persons are also admitted who are not tuberculous, but who have had inflammation of the lungs and who to that extent would be predis-

posed to the disease. The two classes of patients are, however, kept entirely separate.

The maximum duration of work is eight hours a day, the work being paid for at the rate of 10 pfennigs (2.4 cents) an hour, which makes possible maximum earnings of 80 pfennigs a day (19 cents), which is credited to the patient and paid to him on his discharge, if not before. The patients are required to be insured members of the Invalidity Insurance Institution of Hanover.

This institution was opened on May 5, 1902. As far as the results have been reported to date, the experiment on the whole appears to have been satisfactory. Of the cases reported upon in 1905, 78 per cent were finally discharged as fully capable of work. Of those who had previously worked in factories 9 per cent on discharge changed their occupations to different and more suitable employments. The average gain in weight during the stay in the colony was 3.1 kilograms (6.8 pounds). The average earnings per patient amounted to 27.15 marks (\$6.46). The average hours of labor for days actually employed amounted to 6.9. The average cost per patient per day during the first year of the establishment was 98 pfennigs (23 cents).<sup>1</sup> The food served is the ordinary nutritious diet of agricultural laborers and not the specially prepared diet of tuberculosis sanatoria. Provision is made for a maximum of 65 patients.

A drawback to the success of this establishment has been the inclination of the better class and more industrious married workmen to return to their families too soon after their discharge from the sanatorium, even though such a return was likely to be followed by consequences injurious to health. Another drawback is that during winter months, when there is little agricultural work to be done throughout the section, persons who can not find any employment seek to be admitted to the colony. The hope is held out that the colony, in course of time, will become a most valuable connecting link in the chain of institutions established for the common welfare of German wage earners, primarily for the purpose of conserving the health and well-being of men and women employed in industry.

#### CONTROL OF TUBERCULOSIS THROUGH HOUSING REFORM.

The public control of tuberculosis through housing reform received extended consideration for the first time in 1901 in an address read before the German Central Committee.<sup>2</sup> Earlier observers had emphasized the intimate relation between density of population,

<sup>1</sup> During 1910 a total of 19,087 days' support was provided at the colony, of which only 16 days was on account of patients other than those who, on admission, were tuberculous or who had received treatment on account of tuberculosis of the lungs previous to their admission.

<sup>2</sup> Dr. Heydweiller, Ueber Bekämpfung der Tuberkulose durch Wohnungsfürsorge. Berlin, 1901.

unsatisfactory housing conditions, and tuberculosis frequency, indicating that the disease is most often caused by domestic infection, family infection, overcrowding, and bad air. It had been shown that "the death rate from phthisis steadily increases with the proportion of the total population living more than two in a room in tenements comprising less than five rooms."<sup>1</sup> The average annual phthisis rate of London was found to range from 11.1 per 10,000 of population in districts practically free from congestion to 25.9 in badly congested districts. Official inquiries into housing conditions established the fact that adequate treatment and care of tuberculous wage earners in their homes was often prevented by serious defects in structural arrangement or by bad sanitary conditions such as dampness, defects in lighting, ventilation, etc. Adequate and sanitary housing accommodations for wage earners and their dependents were, therefore, urged as a first step in the campaign against tuberculosis. Much had already been done in this direction by local welfare organizations and building societies, particularly in the Rhine Province and in the Grand Duchy of Hesse. Attention, however, was drawn at about the same time to the vital interest of invalidity insurance institutions in the reduction of the morbidity and mortality from tuberculosis, and to the service to be rendered by these institutions in providing the means for a nation-wide reform in housing conditions along lines of rational sanitary requirements.

An address on the relation of housing to tuberculosis before the German Central Committee at its fourteenth annual session in 1910,<sup>2</sup> emphasized the view that the administrative control of tuberculosis was largely a housing problem, not only in the congested sections of large cities, but also throughout the agricultural districts. The argument was sustained by statistical data, showing the existence of a vast amount of overcrowding and the intimate relation thereto of the excessive occurrence of tuberculosis. For Mannheim, for illustration, it was shown that in the overcrowded homes the death rate from tuberculosis was nearly double what it had been ascertained to be in homes with suitable accommodation. The conclusion was advanced that by providing normal housing conditions the mortality from tuberculosis would be materially reduced, but also that much could be done by rigid house inspection along the lines developed in the Grand Duchy of Hesse, which provides a trained building inspector for every territorial division. In summarizing the conclusions it was pointed out that (1) tuberculosis was a house disease with a variable degree of frequency, according to overcrowding and density of population; (2) the improvement in housing conditions and the education of wage earners in rational methods of living would largely

<sup>1</sup> The Prevention of Tuberculosis, by Arthur Newsholme, M. D., p. 147. New York, 1908.

<sup>2</sup> Zur Tuberkulose-Bekämpfung, 1910, pp. 22, by Dr. Paul Römer.

affect the future reduction of the death rate; (3) the importance of utilizing the services of trained building inspectors; (4) the notification of cases of tuberculosis and the disinfection of the premises in the event of change of residence or death; (5) the intelligent co-ordination of the investment of surplus funds of invalidity insurance institutions in approved building projects primarily adapted to the needs of wage earners, with a due regard to advanced sanitary and social requirements; and (6) the general sanitary improvement of cities, adequate drainage, and effective methods of dust prevention and the eradication of the smoke nuisance.

In discussing the foregoing conclusions, Dr. Sarason, of Berlin, emphasized the necessity of personal hygiene as a prerequisite for the attainment of required results in public hygiene. Dr. F. Köhler, of Holsterhausen, sustained the argument of Building Inspector Gretzschel by an analysis of returns for 1,000 wage earners in the Rhine Province, showing that of 636 tuberculous married men, only 24.7 per cent occupied their own beds, while 75.3 per cent shared their beds with other members of the family, in this way exposing the other members to additional risk of infection. Of 649 married tuberculous wage earners, including widowers having 1,866 children, it was found that the large majority of these children occupied beds with tuberculous members of the family. Under conditions like these, which are fairly typical at least for the industrial districts of the German Empire, it is evident that the gradual eradication of tuberculosis is largely conditioned by the problem of housing reform.

#### BUILDING LOANS BY INVALIDITY INSURANCE INSTITUTIONS.

The intimate relation which exists between the local occurrence of tuberculosis and the more or less unsatisfactory housing conditions early suggested to the invalidity insurance institutions the propriety and advantage of investing a considerable proportion of their surplus funds in the erection of model dwellings, primarily for the use of wage earners and their families.

In a statistical analysis published in 1905<sup>1</sup> of what had been done by invalidity insurance institutions it was shown that 109,533,296 marks (\$26,068,925) had been invested by December 31, 1903, in building projects, or 10.8 per cent of the total funds accumulated as reserve. The largest amount had been invested by the Invalidity Insurance Institution of the Rhine Province, or 21,793,584 marks (\$5,186,873), or 18.8 per cent of the total funds. The institution of Hanover, however, had invested 40.4 per cent of its funds in buildings and homes for wage earners, or a total of 16,374,215 marks (\$3,897,063). By 1903, therefore, substantial results had been

<sup>1</sup> Die Vorteile der Invalidenversicherung und ihr Einfluss auf die deutsche Volkswirtschaft. Bearbeitet von Gustav Vogt, Berlin-Grünwald, 1905.

achieved, and in response to a strong agitation larger investments in this direction were made by the invalidity insurance institutions, so that by December 31, 1910, the total amount invested in housing accommodation for German wage earners and their families was 320,065,539 marks (\$76,175,598), and of this sum 39,600,000 marks (\$9,424,800) was provided by the invalidity insurance institutions during 1910.

According to an analysis of the investments for the year 1910 in the publications of the Imperial Insurance Office for March 15, 1911, of the 320,065,539 marks (\$76,175,598), the sum of 301,280,659 marks (\$71,704,797) was invested in homes for family purposes, while 18,784,880 marks (\$4,470,801) was invested in lodging houses and other means of providing for the needs of unmarried wage earners. Of the 301,280,659 marks (\$71,704,797) provided for the building of family homes, 184,241,241 marks (\$43,849,415) was lent to building societies, stock building associations, and philanthropic building societies, at an average rate of interest of from 2.5 per cent to 4.25 per cent. The sum of 37,571,717 marks (\$8,942,069) was lent to provinces, communities, and savings banks and other public institutions at rates of interest of from 2.5 per cent to 3.75 per cent.

The sum of 63,426,736 marks (\$15,095,563) was lent to wage earners insured with invalidity insurance institutions at rates of interest of from 2 per cent to 4.5 per cent. The sum of 16,040,965 marks (\$3,817,750) was lent to employers of labor at rates of interest of from 3 per cent to 4.5 per cent.

Of the 18,784,880 marks (\$4,470,801) lent for building purposes to provide accommodation for unmarried wage earners, 15,905,180 marks (\$3,785,433) was lent to building societies, stock building associations, and philanthropic building associations at rates of interest of from 3 per cent to 4 per cent.

The sum of 2,259,950 marks (\$537,868) was lent to provinces, communities, and savings banks and other public institutions at rates of interest of from 3 per cent to 3.75 per cent. The sum of 619,750 marks (\$147,501) was lent to employers of labor at rates of interest of from 3.5 per cent to 4 per cent.

The Invalidity Insurance Institution of the Rhine Province provided the largest amount in loans for building purposes, or 55,982,937 marks (\$13,323,939). The next most important invalidity insurance institution was that of Hanover, with 34,822,174 marks (\$8,287,677); followed by that of Westphalia, with 33,682,841 marks (\$8,016,516); the Kingdom of Saxony, with 25,451,670 marks (\$6,057,497); the Grand Duchy of Baden, with 22,580,197 marks (\$5,374,087); the Kingdom of Wurttemberg, with 17,755,224 marks (\$4,225,743); the pension fund of the Prussian-Hessian railways, with 14,681,276 marks (\$3,494,144); and the Province of Hesse-Nassau, with

13,680,356 marks (\$3,255,925). None of the other invalidity insurance institutions provided a sum amounting to as much as 10,000,000 marks (\$2,380,000).

#### TOWN PLANNING AND SANITARY PROGRESS IN GERMANY.

A very comprehensive account of building reform in German cities,<sup>1</sup> largely for the purpose of improving the living conditions of wage earners, was published by the Imperial Statistical Office in 1910. The report brings out the remarkable progress which has been achieved within recent years, not only in the direction of providing better living quarters, but also in the more effective administrative control by means of trained building inspectors and carefully devised rules and regulations governing the erection of sanitary dwellings for wage earners and others. To the extent that these aims and plans are realized, the conditions favorable for the spread of tuberculosis will largely be done away with, and, as has been previously pointed out, a special effort in this direction has been made in the Rhine Province, largely sustained by the Rhenish-Prussian Association for the Housing of the Working Classes. The report of this association for 1909-10 contains an interesting account of what thus far has been achieved and what will be done in the near future, including a statement of the methods and means by which the required funds have been provided. The model building rules of this association, as adopted at the general meeting in 1910, are a sure foundation for the intelligent control of future building operations conditioning not only the erection of new housing quarters but also the gradual remodeling of existing houses for their better adaptation to the needs of wage earners, with a particular regard to the required raising of the level of physical and material well-being. Equally interesting in this direction has been the effort made by the Association of Industrial Employers of Saxony, as emphasized in an exhibit made at the International Exposition of Hygiene, at Dresden, in 1911. The efforts of this association are not limited merely to providing houses and gardens, but also estimates are supplied of the cost of rational furnishings, including all the articles required for sanitary housekeeping and at reasonable expense. Finally, mention may be made of what has been done by the Friederich Krupp Corporation, of Essen. All of these efforts, local or general, are in effect a furtherance of the aims and efforts to improve the social and economic condition of wage earners throughout the German Empire, and to the extent that this laudable purpose is achieved within a reasonable period of time the amount of tuberculosis due to social and economic causes must necessarily be materially diminished.

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<sup>1</sup> Wohnungsfürsorge in deutschen Städten. Berlin, Carl Heymanns Verlag. 1910.

**EXPERIENCE DATA OF REPRESENTATIVE INVALIDITY INSURANCE INSTITUTIONS IN THE TREATMENT AND CARE OF TUBERCULOUS WAGE EARNERS IN 1910.****BERLIN.**

The territory of the Invalidity Insurance Institution of Berlin is coextensive with the administrative area of the city of Berlin, which includes 63 square kilometers (24.3 square miles), and in 1910 had a population of 2,070,695, of which the increase during the last decade was 0.92 per cent per annum, against an average annual increase for the German Empire of 1.41 per cent. The density of population is 32,661 per square kilometer (0.386 square mile). The average death rate during the 10 years ending with 1909 was 16.3 per 1,000, but the rate decreased from 18.9 in 1900 to 14.7 in 1909. For the purpose of convenient comparison it may be stated that the general death rate of the city of New York during the year 1910 was 16 per 1,000. Comparing the five years ending with 1910, the death rate of Berlin decreased 42 per cent when compared with the death rate prevailing during the period 1881 to 1885. The corresponding decline during the same period in the general death rate for the city of New York was 38 per cent. The death rate of Berlin decreased from 29.7 per 1,000 in 1880 to 20.2 in 1895 and 15.1 in 1909. The death rate from tuberculosis decreased from 34.7 per 10,000 in 1880 to 23.4 in 1895 and to 17.9 in 1909. The average death rate from tuberculosis of the lungs, of males, ages 30 to 60 years, inclusive, during the year 1908 was 35 per 10,000 of population of corresponding ages, and for females 17.

In the experience of the Invalidity Insurance Institution of Berlin the proportion of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1896 to 1899, was 25.2 per cent for males against 15.0 for all institutions, and 14.9 per cent for females against a general average of 9.5 per cent. The rate of insured persons treated and cared for on account of sickness from all causes by the Invalidity Insurance Institution of Berlin during 1910 was 15.7 per 1,000 of the population subject to the insurance laws, or almost exactly twice the average rate of 7.8 per 1,000 for the German Empire as a whole. The number of patients under treatment and care on account of tuberculosis of the lungs during the year was 3,961, or 6.10 per 1,000 of the insured population. The corresponding average for all insurance institutions was 3.19 per 1,000. The amount expended on account of treatment and care during the year 1910 for tuberculosis was 1,957,358 marks (\$465,851), or an average expenditure of 494.16 marks (\$117.61) per patient per annum. The Invalidity Insurance Institution of Berlin maintains two sanatoria of its own and a tuberculin station, to which more extended reference is made further on.

According to the annual report for 1910 of the Invalidity Insurance Institution of Berlin, diseases of the lungs, including tuberculosis, accounted for the largest number of applicants for disability annuities. Out of every 100 disability annuities granted during the year at ages 20 to 24 years on account of diseases of the lungs, the proportion of males was 56 per cent and of females 62 per cent; at ages 25 to 29 years the corresponding percentages were 54 and 42, respectively. The details, by divisional periods of life, are given in the following table:

PER CENT OF DISABILITY ANNUITIES GRANTED TO MALES AND TO FEMALES IN SPECIFIED AGE GROUPS ON ACCOUNT OF TUBERCULOSIS AND OTHER DISEASES OF THE LUNGS<sup>1</sup> BY THE INVALIDITY INSURANCE INSTITUTION OF BERLIN, 1910.

Age groups.	Per cent granted to—		Age groups.	Per cent granted to—	
	Males.	Females.		Males.	Females.
20 to 24 years.....	56	62	55 to 59 years.....	20	11
25 to 29 years.....	54	42	60 to 64 years.....	19	10
30 to 34 years.....	45	39	65 to 69 years.....	18	8
35 to 39 years.....	33	26	70 years and over.....	13	7
40 to 44 years.....	30	15	Total.....	28	18
45 to 49 years.....	30	15			
50 to 54 years.....	24	13			

<sup>1</sup> Includes also chronic bronchial catarrh. (See p. 32 of the report for 1910.)

It is brought out by this comparison that the relative frequency of lung diseases including tuberculosis was much greater among males than among females, except at the age period 20 to 24 years. The relative frequency diminishes with increasing age, reaching at ages 70 years and over a minimum of 13 per cent for males and 7 per cent for females.

The proportion of disability annuities granted on account of tuberculosis of the lungs has gradually decreased for males from 27.6 per cent in 1900 to 19.7 per cent in 1910; for females the rate increased during the corresponding period from 11.7 per cent in 1900 to 13.1 per cent in 1910. Considered by groups of employment, the percentage of disability annuities granted on account of tuberculosis of the lungs was highest for persons employed in the manufacture of metals and machinery, or 24.6 per cent, followed by persons employed in commerce and trade, with 23.9 per cent. The lowest rate prevailed among porters and servants, or 9.3 per cent. For females the percentage of disability annuities granted on account of tuberculosis of the lungs was 20.7 per cent for those employed in the clothing industry, and only 7.4 per cent for domestic servants.

During the year 1910, 3,404 persons were under treatment on account of tuberculosis of the lungs at the sanatorium at Beelitz, and of this number 2,031 were males and 1,373 females.<sup>1</sup> In addi-

<sup>1</sup> See p. 63 of the report for 1910.

tion to the sanatorium the invalidity insurance institution aids in the maintenance of information bureaus and dispensaries, and on this account during the year 1910 a subvention of 25,000 marks (\$5,950) was paid out. The accommodations at Beelitz were enlarged during the year by the erection of a building for infectious diseases, a restaurant, and a school for the children of the employees of the institution. For the support of patients during the year 1910 the net sum of 1,740,946 marks (\$414,345) was paid out, equivalent to an expenditure of 4.19 marks (\$1) per patient per day, against an expenditure of 4.16 marks (99 cents) for the previous year. Including, however, interest payments on capital account, amounting to 657,519 marks (\$156,490) for the year 1910, the true expenditure per patient per day was 5.77 marks (\$1.37) for 1910, against 5.72 marks (\$1.36) for 1909. The increase in expenditure is accounted for by higher salaries and interest payments. The average duration of treatment for male patients was 70 days and for female patients 75 days. The available accommodation during the summer half year is 490 beds for male patients and 356 beds for female patients. The corresponding accommodation during the winter half year is 474 beds for males and 356 beds for females. The total number of days' treatment on account of tuberculosis of the lungs during the year was 363,134, consisting of 303,774 days' support for patients, and 59,360 days' support, or 16.3 per cent of the total, on account of employees. The average expenditure per patient per day for board was 1.37 marks (32.6 cents) for patients only, and 1.41 marks (33.6 cents) for patients and employees combined. The individual items of expenditure per day on account of board are given in tabular form below for the two years 1909 and 1910 to illustrate the comparative expenditures for the two years:

ITEMIZED DAILY EXPENDITURES ON ACCOUNT OF BOARD FOR PATIENTS AND EMPLOYEES AT THE BEELITZ SANATORIUM, BERLIN, 1909 AND 1910.

[From Annual Report for 1910, p. 68.]

Articles.	1910	1909	Articles.	1910	1909
Cheese, etc.....	\$0.0112	\$0.0119	Fowl.....	\$0.0014	\$0.0014
Pastry.....	.0193	.0205	Spices.....	.0038	.0040
Butter.....	.0438	.0443	Peas, beans, etc.....	.0007	.0007
Eggs.....	.0093	.0102	Milk.....	.0417	.0417
General groceries.....	.0112	.0117	Flour.....	.0019	.0021
Fish.....	.0031	.0024	Fruit (dried and preserved).....	.0014	.0017
Meat and sausage.....	.1495	.1442	Fruit (fresh).....	.0005	.0005
Vegetables (dried and canned).....	.0012	.0017	Fruit (wild).....	.0002	.0002
Vegetables (fresh).....	.0143	.0126			
Wine, beer, mineral waters, etc.....	.0214	.0236	Total.....	.3358	.3353

It is brought out by this table that for the three important items of milk, butter, and eggs, 0.398 marks (9.48 cents) per patient per day was paid during 1910, or 28.2 per cent of the total per capita expenditure on account of board. The total expenditures on account

of food and drink, comprehended under the term "board" as an equivalent of the term "support," as used in the German reports, amounted to 547,682 marks (\$130,348), but deducting 35,129 marks (\$8,361) received in payment for board and for meat, etc., sold, the net expenditure during the year was 512,553 marks (\$121,988).

According to the annual report of the medical director of the Invalidity Insurance Institution of Berlin for the treatment of tuberculosis of the lungs, the number of patients on January 1, 1910, was 824, of which 356, or 43.2 per cent, were women. The number of patients discharged during 1910, including 3 deaths, was 3,411, of which 2,031 were males and 1,380 were females. The number of patients remaining on December 31, 1910, was 817, of which 349, or 42.7 per cent, were women.

Of the patients discharged during the year, 213 left the institution for personal or other reasons before completing their respective course of treatment. There were also 37 patients who subsequent to a definite period of observation were discharged as apparently not tuberculous. There remained, therefore, 3,374 patients under treatment for tuberculosis of the lungs, and these were distributed according to the Turban stage of the disease, as follows: Of 2,018 male patients, 1,513, or 75 per cent, were in the first stage of the disease; 231, or 16.4 per cent, were in the second stage; and 174, or 8.6 per cent, were in the third stage. Of the 2,018 male patients, the sputum of 519, or 25.7 per cent, contained the bacilli of tuberculosis. Of the patients in the first stage of the disease 7.34 per cent were carriers of bacilli; in the second stage, 75.8 per cent; and in the third stage, 90.23 per cent. During the course of treatment 26.8 per cent of the patients having bacilli in the sputum on admission were free therefrom on discharge.

Of the 1,356 female patients, 1,067, or 78.7 per cent, were in the first Turban stage of the disease; 198, or 14.6 per cent, in the second stage; and 91, or 6.7 per cent, in the third stage. Of the 1,356 female patients, 309, or 22.86 per cent, were found to have the bacilli of tuberculosis in their sputum. Of these numbers the respective proportions having bacilli in their sputum were 8.8 per cent for the first stage, 66.7 per cent for the second, and 91.2 per cent for the third stage of the disease. Of the total patients with bacilli in their expectoration, 52.4 per cent were free therefrom at the time of their discharge.

The total number of patients subjected to the tuberculin treatment was 763, against 590 during the previous year. There was, therefore, a material increase in the number of patients treated by specific therapeutic methods, and the results were in every respect satisfactory. Objections on the part of patients are stated to have practically disappeared, and the most of them underwent the treatment voluntarily and carried the same conscientiously through from beginning to end.

The essentials of successful treatment are stated to be a sufficient duration, an extremely careful selection of patients, and most painstaking observations during the course of treatment. It is held that even in the second and third stages of the disease a material improvement can be brought about by tuberculin treatment under the conditions stated.

A special tuberculin station is maintained at Lichtenberg, where 582 new patients received treatment during 1910. In addition to this establishment preliminary medical examinations were made of patients intended for the institution at Beelitz, numbering in the aggregate 8,895 for the year. In the case of 3,875 persons the treatment was declined, partly on account of the fact that a considerable proportion of the patients were in too advanced a stage of the disease to warrant the anticipation of favorable economic results.

A number of tuberculosis dispensaries are maintained or substantially aided by the Invalidity Insurance Institution of Berlin. The results during 1910 were quite favorable in that many cases received consideration in the very early stages of the disease, including an opportunity for family protection much in the nature of the work of visiting-nurse associations. In the case of 127 families additions were granted to the amount paid for rent so as to provide more wholesome living accommodation. In 479 cases the living quarters were disinfected on account of having been inhabited by tuberculous patients or because of a death from tuberculosis. In the case of 234 families infected members were removed therefrom for treatment or were otherwise adequately provided for to prevent the spread of the disease. In most of these cases persons were affected who had made no application for institutional treatment and who themselves were not aware of the fact that they were afflicted with the disease. This form of thorough family examination in suspected cases has in practice been decidedly effective. In other words, if reasons exist for supposing one or more members of a family to be infected with the disease, the entire family is subjected to a thorough medical examination and, if necessary, is placed under medical observation for a required period of time.

Visiting nurses connected with the dispensaries are, as a rule, required to make each month at least one visit to the homes of patients who have been removed to institutions for systematic treatment. Such visits are utilized for purposes of instruction and the amelioration of more or less adverse economic conditions at small expense. In cases where the patients are treated at home additional beds are provided so as to prevent the sleeping together of tuberculous and nontuberculous members of the same family. Such beds are lent, and when no longer required they are thoroughly disinfected. Through private philanthropy further provision is made for providing six weeks' medical treatment free of cost, and the care of the

family is extended to the protection of children, who, as far as practicable, are removed to wholesome surroundings. During 1910, 88 children apparently affected with tuberculosis were taken care of in special institutions, and in 221 cases adults were provided for in city homes for the incurable. A record is kept of all infected houses.

Summarizing the results of the three dispensaries, established almost exclusively for the benefit of the wage-earning population of Berlin and vicinity, the number of persons examined during 1910 was 6,991, and of this number 1,423, or 20.4 per cent, were children. The number of persons ascertained to be tuberculous was 3,003, and the number seriously predisposed to infection was 901. In addition to the foregoing 1,299 tuberculous persons receiving disability annuities, or patients discharged from the Beelitz institution as more or less improved, were taken care of during the year. Of this number 564 were ascertained to be in a condition involving the risk of infection of others. The number of deaths followed by disinfection of the premises was 212, and the number of visits made by nurses of the institution was 9,046. The total number of patients to whom financial aid was extended was 127, and the total amount disbursed was 6,068 marks (\$1,444).

The number of patients discharged from the Beelitz institution for the treatment of tuberculosis of the lungs during 1910 was 2,037 males and 1,367 females. Of the males 158 received less than 30 days' treatment, and 184 more than 180 days' treatment. Among the females 108 received less than 30 days', and 140 more than 180 days' treatment. The average duration of treatment during 1910 was 87.1 days for males and 92.9 days for females. The average duration of treatment has increased considerably during recent years, having been 68.4 days for males and 74.5 days for females in 1908.

The number of male patients receiving over three months' treatment was 483, and of this number 6 recovered their full earning capacity, 299 recovered 75 per cent, 117 recovered 60 per cent, and 26 recovered 50 per cent of their previous earning capacity. Thirty-five were discharged without having their earning capacity restored. Of the female patients 346 were more than three months under treatment, and of this number 1 was discharged with full restoration of earning capacity, 276 with 75 per cent restored, 33 with 60 per cent, and 18 with 50 per cent of previous earning capacity restored. The number of females discharged without restored earning capacity was 18.

Of the 2,037 male patients discharged during 1910, 484, or 23.8 per cent, were discharged as cured; 1,302, or 63.9 per cent, as improved; and 251, or 12.3 per cent, as unimproved. Of the 1,367 female patients, 71, or 5.2 per cent, were discharged as cured; 1,148, or 84 per cent, as improved; and 148, or 10.8 per cent, as unimproved. In nearly all cases, however, a physical improvement was

obtained, as was made evident by an average increase in weight of from 11 to 13 pounds.

The age distribution of patients discharged from the Beelitz institution during 1910 is given in the following table:

AGE DISTRIBUTION OF PATIENTS DISCHARGED FROM THE BEELITZ INSTITUTION FOR THE TREATMENT OF TUBERCULOSIS OF THE LUNGS, 1910.

Age periods.	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
Under 20 years.....	171	8.4	188	13.8
20 to 29 years.....	961	47.2	862	63.1
30 to 39 years.....	662	32.5	258	18.9
40 to 49 years.....	214	10.5	56	4.1
50 to 59 years.....	29	1.4	2	.1
60 to 69 years.....			1	.1
Total.....	2,037	100.0	1,367	100.0

It is shown by this table that the actual numbers and relative proportions of admissions are largest at comparatively young ages, and that the older ages are affected to but a very limited extent. With regard to occupations, it may be stated in this connection that the first position, as measured by the number of admissions, is held by workers in metal, including, no doubt, a relatively large number of polishers, grinders, machinists, etc.

The pecuniary assistance extended to families of patients treated on account of tuberculosis of the lungs at the Beelitz institution during 1910 was as follows: To 1,257 families of males the sick funds paid, in accordance with the provisions of the sickness insurance law, 176,068 marks (\$41,904). In addition thereto the invalidity insurance institution paid 55,655 marks (\$13,246) in the form of supplementary family aid, in accordance with the discretionary powers permitted under the invalidity insurance laws. In the case of 1,784 families the sick funds reimbursed the invalidity insurance institution to the amount of 276,997 marks (\$65,925). In 473 cases small amounts were granted to patients for personal purposes. In the case of 232 female patients pecuniary aid was extended to the families amounting to 19,097 marks (\$4,545) and paid by the sick fund in conformity to the sickness insurance laws. In addition thereto the invalidity insurance institution granted 3,206 marks (\$763) of supplementary aid. The sick funds reimbursed the invalidity insurance institution on account of 1,095 patients to the amount of 111,099 marks (\$26,442). In the case of 677 female patients small amounts were granted for personal use.

The number of patients discharged with restored earning capacity from the Beelitz institution during the period 1901 to 1910 was 13,813 males and 8,143 females. Of this number 949 males, or 6.9 per cent, and 327 females, or 4 per cent of the respective numbers discharged, became subsequently entitled to disability annuities on account of the

loss of their earning capacity. In the case of six males and five females of the number discharged during the decade, disability occurred but no annuities were granted. The number of male patients readmitted for treatment was 1,348, or 9.8 per cent of the number discharged, and of female patients 500, or 6.1 per cent. The number of deaths during the period was 248 males, or 1.8 per cent, and 25 females, or 0.3 per cent. In a general way these results may safely be considered as proving conclusively the economic value of the treatment as measured by general welfare considerations. It is not possible by means of the available statistical data to measure accurately the financial value of the results; but as far as it is possible to judge, the objects of the treatment—that is, the prevention of needless loss of earning power and the restoration of the same—were secured in a large number of cases. In a considerable proportion, however, the restored wage-earning capacity was not, of course, a full 100 per cent, but it would obviously be extremely difficult to ascertain precisely the results for any considerable period of time subsequent to discharge.

The essential facts concerning the ultimate results of treatment and care on account of tuberculosis are given in the following table for the period 1901 to 1910, showing the proportion of patients originally treated, but who subsequently became incapacitated for work, for each of the years of the period for which the information is available:

ECONOMIC RESULTS OF TREATMENT ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS.

MALES.

Year of discharge.	Total number of patients discharged.	Number of patients discharged with restored earning capacity.	Per cent of patients successfully treated, but subsequently becoming incapacitated for work in—									
			1901	1902	1903	1904	1905	1906	1907	1908	1909	1910
1901.....	867	745	9.0	14.2	19.2	23.9	25.5	27.2	29.1	33.4	35.7	36.9
1902.....	867	725	.....	7.4	12.8	21.8	24.4	26.9	28.7	32.6	35.6	37.0
1903.....	1,442	1,278	.....	.....	5.0	11.7	13.9	17.4	20.1	26.9	30.8	33.1
1904.....	1,420	1,249	.....	.....	.....	3.2	6.2	11.5	14.4	21.6	27.1	29.0
1905.....	1,461	1,282	.....	.....	.....	.....	1.7	5.5	7.8	14.2	19.9	23.6
1906.....	1,491	1,329	.....	.....	.....	.....	.....	1.3	3.6	12.3	19.8	24.0
1907.....	1,547	1,331	.....	.....	.....	.....	.....	.....	1.8	8.3	15.5	21.5
1908.....	2,450	2,054	.....	.....	.....	.....	.....	.....	.....	3.0	6.4	9.9
1909.....	2,434	2,086	.....	.....	.....	.....	.....	.....	.....	.....	4	3.6
1910.....	2,031	1,734	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0

FEMALES.

1901.....	499	464	3.0	5.8	8.2	9.9	11.9	12.3	13.4	15.3	16.2	17.4
1902.....	464	430	.....	3.5	6.3	9.3	11.4	12.6	13.0	14.7	17.4	17.9
1903.....	597	555	.....	.....	2.5	7.0	9.5	11.9	13.9	17.1	19.3	22.0
1904.....	673	631	.....	.....	.....	2.2	3.8	7.8	10.6	14.7	17.1	20.3
1905.....	743	686	.....	.....	.....	.....	2.0	3.5	5.8	10.6	14.0	17.3
1906.....	774	731	.....	.....	.....	.....	.....	1.4	1.6	7.7	12.4	15.7
1907.....	809	721	.....	.....	.....	.....	.....	.....	1.1	5.1	10.4	14.4
1908.....	1,631	1,464	.....	.....	.....	.....	.....	.....	.....	1.4	2.9	5.5
1909.....	1,456	1,253	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.8
1910.....	1,362	1,208	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.6

According to this tabulation, which is of unusual importance in that the period of observation for the patients treated in 1901 extends over the 10 successive years, the ratio of male patients becoming incapacitated within 10 years was only 36.9 per cent of the total originally discharged as successfully treated from an economic point of view. The results throughout were much better for female patients, and only 17.4 per cent of the patients treated in 1901 became incapacitated for work by the end of 1910. As far, therefore, as it is possible to judge, the economic results were in full conformity to the expectations, but whether the results justified the expense incurred it is not possible to determine from the data at hand. It would seem to be a safe assumption, however, that, without attempting to determine the value of the results upon the basis of precise financial and actuarial calculations, the object of restoring a considerable proportion of wage earners for a reasonable time to their former full or partial earning capacity was successfully attained.

#### WESTPHALIA.

The territory of the Invalidity Insurance Institution of Westphalia is coextensive with the Prussian Province of Westphalia, which has an area of 20,214 square kilometers, and in 1910 had a population of 4,125,904. The increase in population during the last decade was 2.57 per cent per annum, against an average annual increase for the German Empire of 1.41. The density of population is 204 per square kilometer, which is considerably above the average of 120 for the German Empire as a whole. The principal cities are Dortmund, with a population of 214,333; Gelsenkirchen, with a population of 169,530; Bochum, with a population of 136,916; and Münster, with a population of 90,283. The average death rate for the Province during the 10 years ending with 1909 was 17.8 per 1,000, the rate having decreased from 20.1 in 1900 to 15.7 in 1909. The average death rate from tuberculosis of the lungs, of males, ages 30-60, inclusive, during 1908, was 25 per 10,000 of population; and for females, 21. The general death rate of Dortmund decreased from 31 per 1,000 in 1880 to 19.2 in 1895, and 16.7 in 1909. The death rate from tuberculosis decreased from 49.5 per 10,000 in 1880 to 16.3 in 1895, and 12 in 1909. The general death rate of Bochum decreased from 31.4 in 1880 to 22.4 in 1895, and 19 in 1909. The death rate from tuberculosis decreased from 35 per 10,000 in 1882 (information for earlier years not being available) to 30.7 in 1895, and to 13.4 in 1909.

In the experience of the Invalidity Insurance Institution of Westphalia the proportion of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1886-1899, was 18.2 per cent

for males against 15 per cent for all insurance institutions; and 10.6 per cent for females against a general average of 9.5 per cent. The rate of insured persons treated and cared for on account of sickness from all causes by the Invalidity Insurance Institution of Westphalia during 1910 was 9.1 per 1,000 of the population subject to the insurance laws, or slightly above the average of 7.8 per 1,000 for all insurance institutions. The number of patients under treatment on account of tuberculosis of the lungs during the year was 3,193, or 4.87 per 1,000 of the insured population. This rate is considerably in excess of the general average of 3.19 per 1,000 for all insurance institutions, but the excess is largely due to the fact that the population of the Province is almost exclusively engaged in mining and other industrial pursuits. The amount expended on account of treatment and care during 1910 for tuberculosis was 838,409 marks (\$199,541) or an average expenditure of 262.58 marks (\$62.49) per case per annum.

According to the annual report of the Invalidity Insurance Institution of Westphalia, the number of male patients treated and cared for on account of tuberculosis of the lungs was 2,144, and the number of female patients was 921.<sup>1</sup> Of the 2,144 male patients, 2,034, or 94.9 per cent, were discharged as successfully treated from an economic point of view. Out of 921 female patients, 867, or 94.1 per cent, were treated successfully during the year.

Special efforts have been made during recent years to reduce the average duration of treatment, and of the patients treated at the sanatorium at Hellersen the average duration of treatment was 72 days in 1905, 60 days in 1909, and 59 days in 1910; and at Ambrock the average duration was reduced from 83 days in 1905 to 55 days in 1910. This reduction was apparently brought about by a more careful selection of patients, and it may be stated in this connection that out of 2,144 male patients treated and cared for during 1910, 1,135, or 52.9 per cent, were in the first Turban stage of the disease; 771, or 36 per cent, were in the second stage; and 238, or 11.1 per cent, were in the third stage. Of 921 female patients treated and cared for during the same period, 582, or 63.2 per cent, were in the first Turban stage of the disease; 271, or 29.4 per cent, were in the second stage; and 68, or 7.4 per cent, were in the third stage on admission to institutional treatment and care.

Special efforts have also been made to increase the number and enlarge the scope and function of tuberculosis dispensaries throughout the Province of Westphalia, and as elsewhere discussed in more detail, the number of these useful institutions was doubled during the year 1910, increasing from 14 to 28.<sup>2</sup> This effort probably

<sup>1</sup> Annual Report for 1910, p. 25.

<sup>2</sup> Idem, p. 29.

accounts also in part for the reduction in the average duration of institutional treatment.

The Invalidity Insurance Institution of Westphalia has been particularly active in the lending of funds for building purposes, and during the year 1910, 473 loans were made, for an aggregate amount of 6,968,825 marks (\$1,658,580). The total amount loaned out to the end of 1910 for building purposes was 41,567,407 marks (\$9,893,043). It should be understood that loans of this character are governed by very specific rules and regulations, aiming to provide healthful homes for wage earners in place of the more or less inadequate and ill-health-producing housing conditions and accommodations of an antiquated form and primitive methods of construction.

The importance of tuberculosis of the lungs as a cause of invalidity is emphasized by the statement that during 1910 20.1 per cent of the disability annuities granted were on account of this disease.<sup>1</sup> Of the total number of patients treated and cared for on account of all diseases and causes, 56.1 per cent were treated on account of tuberculosis of the lungs.

At the public sanatorium at Hellersen the number of patients treated during the period 1898-1910 was 5,862. Of this number 12.1 per cent were discharged with their earning capacity fully restored; 75.6 per cent had their earning capacity partly restored; and 12.3 per cent were unsuccessfully treated. Of all the patients at least five years under observation subsequent to their discharge from the institution, 33.2 per cent had retained their full earning power, 23 per cent had retained partial earning capacity, and 43.8 per cent had either died or become incapacitated for work and entitled to disability annuities. The economic results show a distinct tendency toward an improvement, and while, for illustration, of the patients discharged in 1898, only 28.4 per cent had retained their full earning capacity after five years, of the patients discharged in 1905 the corresponding proportion was 38.6 per cent.<sup>2</sup>

At the Sanatorium Auguste Victoria Stift, at Lippspringe, opened in 1902, the number of patients treated to the end of 1910 was 3,018. Of this number, 25.18 per cent were discharged with their earning capacity fully restored, 63.75 per cent had their earning capacity partly restored, and 11.07 per cent were treated unsuccessfully. Of the patients treated at least five years, the economic results at the end of the period as determined by special inquiry showed that 33 per cent of the patients still retained their full earning capacity, 26.5 per cent retained a partial earning capacity, and 40.6 per cent had either died or become incapacitated for work and entitled to disability annuities.

<sup>1</sup> Annual Report for 1910, p. 107 (843 cases of tuberculosis out of a total of 4,185).

<sup>2</sup> *Idem*, p. 33.

At the Sanatorium Ambrock, opened in 1903, the total number of patients treated to the end of 1910 was 4,178. Of this number, 27.33 per cent were discharged as successfully treated from an economic point of view, 63.43 per cent were discharged with their earning capacity partly restored, and only 9.2 per cent of the cases were unsuccessful. Of the patients at least five years under observation, 37.8 per cent had retained their full earning capacity, 30.6 per cent had retained partial earning capacity, and 31.6 per cent had either died or become incapacitated for work and entitled to disability annuities.

The number of tuberculosis patients treated at the baths at Lipp-springe and in private homes, or elsewhere than in a sanatorium, was 7,474 during the period 1896-1910. Of this number only 11.16 per cent had their full earning capacity restored, but 82.70 per cent had their earning capacity partly restored, and only 6.14 per cent were unsuccessfully treated. Of the patients under observation at least five years the proportion retaining their full earning capacity to the end of the period was 28.99 per cent, those retaining partial earning capacity represented 29.29 per cent, and the proportion that had died or become incapacitated for work and entitled to disability annuities was 41.72 per cent. The results at the baths of Lipp-springe, however, show a tendency toward an improvement, and of the patients discharged in 1905 the proportion retaining their full earning capacity to the end of 1910 was 33.33 per cent, the proportion retaining a partial earning capacity was 37.88 per cent, and the proportion that died or became incapacitated for work was 28.79 per cent.

Combining all of the patients treated on account of tuberculosis of the lungs during the period 1905-1910, numbering 14,307, the proportion discharged with their earning capacity fully restored was 18.3 per cent, the proportion discharged with their earning capacity partly restored was 73.7 per cent, and the proportion unsuccessfully treated was 8 per cent. After one year, of the number discharged and observed by means of subsequent inquiry, 33 per cent still retained their full earning capacity, 46.5 per cent retained a partial capacity for work, and 20.5 per cent had either died or become incapacitated. At the end of the third year 35.8 per cent still retained their full capacity for work, 37 per cent retained a partial capacity, and 27.2 per cent had either died or become incapacitated for work. At the end of the fifth year 36.8 per cent retained their full earning capacity, 32.2 per cent retained a partial earning capacity, and 31.1 per cent had either died or become incapacitated for work.

These results may safely be considered evidence of successful treatment from an economic point of view. They require to be considered, however, with great caution to avoid erroneous inferences on account of the methods of statistical analysis employed. It will have been

noted that the proportion discharged as successfully treated, with their full earning capacity restored, was only 18.3 per cent at the end of the treatment, but this proportion was increased to 33 per cent at the end of the first year, 35.8 per cent at the end of the third year, and 36.8 per cent at the end of the fifth year. There was a corresponding reduction in the proportion retaining a partial earning capacity from 73.7 per cent at the end of the treatment to 46.5 per cent at the end of the first year, to 37 per cent at the end of the third year, and to 32.2 per cent at the end of the fifth year. There was an increase in the proportion incapacitated for work from 8 per cent at the end of the treatment to 20.5 per cent at the end of the first year, to 27.2 per cent at the end of the third year, and to 31.1 per cent at the end of the fifth year. These apparent inconsistencies are made clear by the table below, which gives the actual numbers as well as the resulting percentages. In other words, the foregoing percentages are derived from each group<sup>1</sup> and not from the original number under treatment and care.

**ECONOMIC RESULTS OF SANATORIUM TREATMENT AND CARE OF TUBERCULOUS WAGE EARNERS INSURED WITH THE INVALIDITY INSURANCE INSTITUTION OF WESTPHALIA, 1905 TO 1910.**

	Number.	Per cent.
Total patients treated and cared for.....	14,307	.....
Discharged with full earning capacity restored.....	2,617	18.29
Discharged with partial earning capacity restored.....	10,541	73.68
Unsuccessfully treated.....	1,149	8.03
Number retaining full earning capacity after one year.....	3,667	32.96
Number retaining partial earning capacity after one year.....	5,178	46.54
Number incapacitated for work after one year.....	2,282	20.50
Number retaining full earning capacity after three years.....	2,090	35.77
Number retaining partial earning capacity after three years.....	2,162	37.00
Number incapacitated for work after three years.....	1,591	27.23
Number retaining full earning capacity after five years.....	656	36.77
Number retaining partial earning capacity after five years.....	574	32.17
Number incapacitated for work after five years.....	554	31.06

According to this table the percentages as here given and as derived from the annual report of the Invalidity Insurance Institution of Westphalia for 1910 apply to each group and have no reference to the original number of 14,307 patients treated and cared for, with or without economic results. The results are more precisely indicated, however, by the statement that of the 14,307 patients treated and cared for during the period 1905-1910, the number, as far as known, retaining their full earning capacity to the end of the fifth year was 656, or 4.6 per cent. The number retaining a partial earning capacity to the end of the fifth year was 574, or 4 per cent, and the number becoming incapacitated for work or dying during the fifth year was 554, or 3.9 per cent. The number of cases not traced or controlled is not shown in the report. It also requires to be considered

<sup>1</sup> Annual Report for 1910, pp. 32-39.

that quite a considerable proportion of the patients treated and cared for during the period 1905-1910 had not been five full years under subsequent observation. The method of analysis is crude and not conclusive, but it may be questioned whether the application of actuarial methods in conformity to the theories of Pearson and Elderton would serve the purpose of bringing the essential facts of successful sanatorium treatment home to the public at large. Even the crude statistical data are fairly conclusive in showing that out of a total number of 14,307 tuberculous patients treated, 1,784 survived to a period of five years, with a reasonable assurance of a continued lifetime for a number of years more. Of the 1,784, as has been previously stated, 36.8 per cent retained their full earning capacity, 32.2 per cent retained partial earning capacity, and 31.1 per cent had either died or become entitled to disability annuities on account of incapacity for work. It can not be too often emphasized that tuberculosis of the lungs is a most important cause of invalidity in the experience of invalidity insurance institutions, and it may be stated again in this connection that out of 3,027 disability annuities granted to males by the Invalidity Insurance Institution of Westphalia during 1910, 620, or 18.5 per cent, were on account of tuberculosis of the lungs. Out of 1,158 females to whom invalidity disability annuities were granted, 223, or 19.3 per cent, were on account of tuberculosis of the lungs. The relation of tuberculosis to industry is further emphasized by the statement that of 2,749 disability annuities granted during 1910 to persons employed in industry and mining, 629, or 22.9 per cent, were granted on account of tuberculosis of the lungs. The importance of the disease as a cause of disability in early life is emphasized by the statement that out of 274 disability annuities granted to males at ages 20-30, 145, or 52.9 per cent, were granted on account of tuberculosis of the lungs. The corresponding number and proportion for females was 202 disability annuities granted for all causes, of which 115, or 56.9 per cent, were granted on account of tuberculosis of the lungs.

#### RHENISH PRUSSIA.

The territory of the Invalidity Insurance Institution of Rhenish Prussia is coextensive with the Prussian Province of Rhenish Prussia,<sup>1</sup> which has an area of 26,996 square kilometers (10,423.2 square miles), and in 1910 had a population of 7,120,519. The increase in population during the last decade was 2.11 per cent per annum, against an average annual increase for the German Empire of 1.41. The density of population is 264 per square kilometer (0.386

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<sup>1</sup> The territory also includes the principalities of Hohenzollern and Birkenfeld. Hohenzollern has an area of 1,142 square kilometers (440.9 square miles), and in 1910 had a population of 71,009. The corresponding information for Birkenfeld is not available.

square mile), which is more than double the average of 120 for the German Empire as a whole. The principal cities are: Cologne, with a population of 516,167; Dusseldorf, with 357,702; Essen, with 294,629; Duisburg, with 229,478; Elberfeld, with 170,118; and Barmen, with 169,201. The average death rate for the Province during the 10 years ending with 1909 was 18 per 1,000, but the rate decreased from 20.9 in 1900 to 15.6 in 1909. The average death rate from tuberculosis of the lungs of males, ages 30 to 60 years, during the year 1908 was 26 per 10,000 of population, and for females 19, which compare with the corresponding averages of 27 and 20, respectively, for the male and female populations of the German Empire as a whole. The general death rate of Cologne decreased from 29.2 in 1880 to 22.8 in 1895 and 16.8 in 1909. The death rate from tuberculosis decreased from 41.4 per 10,000 of population in 1880 to 27.1 in 1895 and 15.6 in 1909. The general death rate of Essen decreased from 27.3 in 1880 to 21 in 1895 and 13 in 1909. The death rate from tuberculosis decreased from 40.9 in 1880 to 29.4 in 1895 and 10 in 1909. The general death rate of Dusseldorf decreased from 30 per 1,000 in 1880 to 22.6 in 1895 and 14 in 1909. The death rate from tuberculosis decreased from 38.8 per 10,000 in 1880 to 25.4 in 1895 and to 11.9 in 1909.

In the experience of the Invalidity Insurance Institution of Rhenish Prussia the ratio of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1891 to 1899, was 20.8 per cent for males, against 15 for all insurance institutions, and 11.7 for females, against a general average of 9.5. The rate of insured persons treated and cared for on account of sickness from all causes by the Invalidity Insurance Institution of Rhenish Prussia during 1910 was 7.5 per 1,000 of the population subject to the insurance laws, or slightly below the general average of 7.8 per 1,000 for all insurance institutions. The number of patients under treatment on account of tuberculosis of the lungs during the year was 5,393, or 3.97 per 1,000 of the insured population. The amount expended on account of treatment and care during 1910 for tuberculosis was 1,945,974 marks (\$463,142), or an average expenditure of 360.83 marks (\$85.88) per case per annum. The Invalidity Insurance Institution of Rhenish Prussia has the largest population subject to the insurance laws, or, according to the occupation census of 1907, 1,357,952.

The Invalidity Insurance Institution of Rhenish Prussia maintains only one public sanatorium for tuberculosis of the lungs for male patients, at Ronsdorf, to which, during 1910, 704 new patients were admitted, while 662 were discharged. Not all of these patients, however, were provided for at the expense of the insurance institution, although probably this was the case with most of them. The sana-

torium at Ronsdorf was established in 1909, and has a bed accommodation of 138. The number of days of treatment in 1910 was 49,474, and the average expenditure per patient per day was 4.26 marks (\$1.01).

According to the annual report of the Invalidity Insurance Institution of Rhenish Prussia, out of 9,093 invalidity annuities granted during 1910, 1,865, or 20.5 per cent, were granted on account of tuberculosis of the lungs. The information, in detail, for the period 1900 to 1910, is given in tabular form below :

DISABILITY ANNUITIES GRANTED BY THE INVALIDITY INSURANCE INSTITUTION OF RHENISH PRUSSIA, 1900 TO 1910.

Years.	Annuities granted each year.		
	For all causes.	On account of tuberculosis of the lungs.	
		Number.	Per cent.
1900.....	10,746	1,808	16.8
1901.....	12,174	2,085	17.1
1902.....	13,503	2,260	16.7
1903.....	13,713	2,209	16.1
1904.....	13,693	2,081	15.2
1905.....	10,608	1,957	18.4
1906.....	8,850	1,856	21.0
1907.....	8,221	1,650	20.1
1908.....	9,166	1,773	19.3
1909.....	8,747	1,740	19.9
1910.....	9,093	1,865	20.5
Total.....	118,514	21,284	18.1
1900 to 1904.....	63,829	10,443	16.4
1905 to 1910.....	54,685	10,841	19.8

It would be unsafe, perhaps, to draw definite conclusions from the foregoing comparison, since various important factors, aside from the general practice of the institution, would determine the ratio of disability annuities granted for all causes in general and for tuberculosis of the lungs in particular. As far as it is possible to judge, however, the ratio of disability annuities granted on account of tuberculosis of the lungs to the insured population has increased during recent years, which may be due chiefly to more careful methods of selection and to a more extended use of sanatorium methods of treatment.<sup>1</sup>

The number of male patients treated and cared for on account of tuberculosis of the lungs by the Invalidity Insurance Institution of Rhenish Prussia during 1910 was 4,160 and of female patients 1,356. The total number discharged during the year was 4,260. The duration of treatment is given in detail in the table below :<sup>2</sup>

<sup>1</sup> Annual Report for 1910, p. 29.

<sup>2</sup> Idem, p. 45.

NUMBER AND PER CENT OF PATIENTS DISCHARGED, BY DURATION OF TREATMENT ON ACCOUNT OF TUBERCULOSIS OF THE LUNGS, PUBLIC SANATORIA, RHENISH PRUSSIA, 1910.

Duration of treatment.	Number.	Per cent.	Duration of treatment.	Number.	Per cent.
Under 2 weeks.....	131	3.1	14 to 16 weeks.....	183	4.3
2 to 4 weeks.....	201	4.7	16 to 18 weeks.....	123	2.9
4 to 6 weeks.....	316	7.4	18 to 20 weeks.....	36	.8
6 to 8 weeks.....	389	9.1	20 weeks and over.....	12	.3
8 to 10 weeks.....	598	14.0	Total.....	4,260	100.0
10 to 12 weeks.....	754	17.7			
12 to 14 weeks.....	1,517	35.7			

The bed accommodation in the public sanatoria in Rhenish Prussia in 1910 was 916. On an average a waiting period of six weeks was necessary previous to admission. In some of the institutions the average waiting period was as low as 2.5 weeks, and in one as high as 10 weeks. Institutions are provided for the observation of more or less doubtful cases, and a considerable number of tuberculosis dispensaries have been established in the principal cities, and the value of these is enhanced by traveling tuberculosis exhibits, which, during 1910, were open to the public on 282 days and visited by 147,612 persons. The number of public addresses on tuberculosis during the year in connection with the traveling tuberculosis exhibits was 75.<sup>1</sup>

The number of male patients receiving full treatment and care on account of tuberculosis of the lungs during 1910 was 4,129, and the number of days of treatment was 262,049, or an average duration of treatment of 63 days. The expenditures on account of male patients amounted to 1,559,595.33 marks (\$371,183.69), or an average expenditure of 377.72 marks (\$89.90). Of the disbursements on account of male patients, 27 per cent were reimbursed to the invalidity insurance institution by the communal, industrial, and other sick funds. The amount provided for the family support of male patients treated on account of tuberculosis of the lungs was 431,614 marks (\$102,724.13), or an average support per patient per case of 104.53 marks (\$24.88). Of the 4,129 male patients treated, 3,513, or 85.08 per cent, were treated successfully from an economic point of view; that is, with regard to the required degree of restored wage-earning capacity.

The number of female patients receiving full treatment on account of tuberculosis of the lungs during the year 1910 was 1,263, and the number of days of treatment was 90,519, or an average duration of treatment of 72 days. The total disbursement on account of female patients was 386,338 marks (\$91,948.44), or an average expenditure of 305.89 marks (\$72.80). Of the expenditures incurred on account of female patients, 16 per cent was reimbursed to the invalidity

<sup>1</sup> Annual Report for 1910, p. 4.

insurance institution by communal, industrial, and other sick funds. The amount of family support granted to female patients was 13,746 marks (\$3,271.55), or an average support of 10.88 marks (\$2.59) per case. Of the 1,263 female patients treated, 1,079, or 85.43 per cent, were treated successfully from an economic point of view or with regard to restored wage-earning capacity.

Of the 2,777 male patients treated in 1905, 928, or 39 per cent, had retained their earning capacity to the beginning of the year 1911. Of 803 female patients treated during 1905, 286, or 41 per cent, had retained their earning capacity to the commencement of 1911.<sup>1</sup> The results with patients treated during subsequent years are equally favorable and fully justify the conclusion that, from an economic point of view, the treatment and care of tuberculous wage earners is warranted by the facts of extended experience. It may be stated, however, that out of 11,682 male wage earners successfully treated and cared for on account of tuberculosis of the lungs during the period 1905-1910, only 595, or 5.1 per cent, became subsequently entitled to disability annuities. In the case of 3,506 female patients treated and cared for successfully during the same period, 113, or 3.2 per cent, became subsequently entitled to disability annuities. Of the male patients, 495, or 4.2 per cent, became subsequently incapacitated for work, without, however, becoming entitled to disability annuities, and 200 female patients, or 5.7 per cent, became disabled or incapacitated for work without becoming entitled to disability annuities. The number of deaths of male patients during the period under observation was 370, or 3.2 per cent of the number treated successfully; and the number of deaths of female patients was 69, or 2 per cent. The number of male patients who required readmission for institutional treatment was 1,144, or 9.8 per cent; and of female patients, 288, or 8.2 per cent. The number of male cases which could not be ascertained or made subject to control was 875; and of female cases, 362.<sup>1</sup>

The experience data of the public sanatorium at Ronsdorf conform to those of similar institutions and do not require extended consideration. Out of 662 patients discharged during 1910, 140 were from 12 to 13 weeks in the institution, and only a relatively small number received treatment for more extended periods of time. Of the patients discharged during the first six weeks of treatment, 25 were dismissed on account of the fact that the disease was too far advanced, 46 on account of nostalgia, personal reasons, etc., and 13 because they were not tuberculous.

In probably no other part of the German Empire has the tuberculosis campaign been more effectively organized than in Rhenish Prussia. Throughout the entire territory tuberculosis dispensaries

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<sup>1</sup> Annual Report for 1910, pp. 56, 57.

have been established, including rural communities, and efforts are being made to extend the campaign to all of the rural communities. For illustration, at Essen and vicinity,<sup>1</sup> tuberculosis dispensaries were established, in 1910, in five communities, with a total population of 245,000. The total number of persons making application for treatment and advice was 1,577, of which one-third were ascertained to be tuberculous. That the importance of early treatment is clearly recognized is made evident by the fact that of 545 persons provided for with treatment and care, 357, or 65.5 per cent, were in the first stage of the disease. The number of nurses employed is only five, and these during 1910 made 2,340 visits to the patients' homes. The expenditures during 1909 amounted to 11,500 marks<sup>2</sup> (\$2,737), and the number of cases considered during that year was 866, including 220 bacteriological examinations of the sputum. The expenditures during 1910 and 1911 were larger, but full information is not available. The medical results have been much the same as in other sections of Rhenish Prussia, and a consideration of details would involve needless repetition.

Unusual attention has been given to the treatment and care of tuberculous invalids; that is, persons in receipt of disability annuities on account of tuberculosis, but in too advanced a stage of the disease to warrant treatment and care on economic grounds.<sup>3</sup> The number of far-advanced cases cared for in return for the surrender of the annuity has rapidly increased from 167 in 1907 to 222 in 1908, 293 in 1909, and 411 in 1910. The treatment is in hospitals or homes for incurables, and the social importance of such treatment is made evident by the fact that during 1910 there were 67 patients who had been treated for more than two years, 75 for more than one year, and 111 for more than six months. In 10 cases the patients were discharged as successfully treated, with restored earning capacity for a reasonable period of time. Most of the patients undertake voluntarily the performance of suitable duties, chiefly domestic or farm labor. Many of the patients have agreed to remain permanently in the institutions providing for their care, which, of course, secures the best possible results from a sanatorium point of view. The 411 persons treated during 1910 received 73,652 days of treatment, or an average duration of treatment per person of 179.2 days. The total expenditure amounted to 132,805 marks (\$31,607.59), and of this amount 34,367 marks (\$8,179.35) was reimbursed by the surrender of disability annuities. The number of patients under treatment at the end of the year increased from 44 in 1906 to 128 in 1909 and 221 in 1911. The provision is chiefly in small hospitals

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<sup>1</sup> Annual Report for 1910, p. 94.

<sup>2</sup> *Idem*, p. 48.

<sup>3</sup> *Idem*, p. 106.

widely distributed throughout the territory of the Invalidity Insurance Institution of Rhenish Prussia, but also in special hospitals for tuberculosis and homes for incurables. It is held that the average expenditure per patient per day should not exceed 2 marks (48 cents), and that provision for treatment and care should be in comparatively small rooms, containing not more than from four to six beds.<sup>1</sup>

The Invalidity Insurance Institution of Rhenish Prussia has been especially active in fostering the movement for housing reform throughout the congested industrial districts of its territory, and up to the end of 1910 the sum of 54,234,795 marks (\$12,907,881) had been provided for this purpose, and of this amount, 42,482,509 marks (\$10,110,837.14) was still outstanding in the form of loans for wage-earners' dwellings at the end of 1910. Of the sum stated, 39,001,500 marks (\$9,282,357) was lent out at 3 per cent, 39,588 marks (\$9,422) at 3.25 per cent, and 3,421,420 marks (\$814,298) at 3.5 per cent. Of loans made for the erection of 8,113 dwellings, 2,728 provided for single families, 4,233 for two families, 696 for three families, 62 for four families, and 394 for five or more families—a total housing provision for 16,423 families.<sup>2</sup> It is pointed out as especially significant that 86 per cent of the houses erected through loans provided by the Invalidity Insurance Institution of Rhenish Prussia were for one or two families. Of the loans made to the end of 1910, 15.7 per cent provided housing accommodation in villages and towns having up to 5,000 inhabitants, 28 per cent provided for cities of from 5,000 to 20,000, 28 per cent for cities of from 20,000 to 100,000, and 28.3 per cent for cities with over 100,000 population. Of the loans made to the end of 1910, amounting to 54,234,795 marks (\$12,907,881), 70.8 per cent was lent to general building associations, 18.8 per cent to cities, communities, and public savings institutions, and 10.4 per cent to persons insured with the Invalidity Insurance Institution of Rhenish Prussia. A special effort has been made to utilize life-insurance principles for the amortization of mortgages, and at the end of 1910 there were 149 policies in force, insuring 732,180 marks (\$174,259), against 103 policies in force in 1909, insuring 529,292 marks (\$125,972). Thus far this effort can not be said to have been a success from a commercial point of view.<sup>3</sup>

#### WURTEMBERG.

The territory of the Invalidity Insurance Institution of Wurttemberg is coextensive with the Kingdom of Wurttemberg, which has an area of 19,511 square kilometers (7,533.2 square miles), and in 1910

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<sup>1</sup> A list of these institutions is given on p. 109 of the report for 1910.

<sup>2</sup> For a full discussion, see Annual Report for 1910, p. 120 et seq.

<sup>3</sup> Annual Report for 1910, p. 127.

had a population of 2,435,611, of which the increase during the last decade was 1.16 per cent per annum, against an average annual increase for the German Empire of 1.41 per cent. The density of population is 125 per square kilometer (324 per square mile), which is but slightly above the average of 120 for the German Empire as a whole. The principal cities are: Stuttgart, with a population of 285,589, and Ulm, with a population of 55,817. The average death rate for the Kingdom during the 10 years ending with 1909 was 20.2 per 1,000, the rate having decreased from 23.4 in 1900 to 19.1 in 1909. The average death rate from tuberculosis of the lungs, of males, ages 30 to 60 years, inclusive, during 1908, was 25 per 10,000 of population, and for females, 20. The general death rate of Stuttgart decreased from 23.5 per 1,000 of population in 1880 to 19.2 in 1895 and to 14.7 in 1909. The death rate from tuberculosis decreased from 23.0 per 10,000 in 1880 to 20.0 in 1895 and 16.8 in 1909. The corresponding information for Ulm is not available.

In the experience of the Invalidity Insurance Institution of Wurttemberg the ratio of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1896 to 1899, was 15.1 per cent for males, or practically the same as the general average of 15 per cent for all insurance institutions, and 10.1 per cent for females, against a general average of 9.5 per cent. The rate of insured patients under treatment and care on account of sickness from all causes by the Invalidity Insurance Institution of Wurttemberg during 1910 was 12.2 per 1,000 of the population subject to the insurance laws, which compares with the general average of 7.8 per 1,000 for all insurance institutions. The number of patients under treatment on account of tuberculosis of the lungs during the year was 1,759, or 3.75 per 1,000 of the insured population. The general average admission rate for all institutions was 3.19 per 1,000. The amount expended on account of treatment and care of tuberculous patients during 1910 was 676,341 marks (\$160,969.16), or an average expenditure of 384.50 marks (\$91.51) per case per annum. The Invalidity Insurance Institution of Wurttemberg maintains two sanatoria, one at Wilhelmsheim, for male patients, with a bed accommodation of 177, established in 1904, and one at Uberruh, for female patients, with a bed accommodation of 195, established in 1908.

The importance of tuberculosis of the lungs as a cause of death in the Kingdom of Wurttemberg is precisely shown in the following table exhibiting the proportionate mortality, by divisional periods of life, for the year 1908.

PROPORTIONATE MORTALITY FROM TUBERCULOSIS OF THE LUNGS IN THE KINGDOM OF WURTTENBERG, 1908 (EXCLUSIVE OF DEATHS NOT MEDICALLY CERTIFIED TO AS TO THEIR CAUSES).

Ages.	Males.			Females.		
	All causes.	Tuberculosis of lungs.		All causes.	Tuberculosis of lungs.	
		Number.	Per cent.		Number.	Per cent.
15 to 24 years.....	689	274	39.8	800	446	55.8
25 to 34 years.....	805	335	41.6	1,087	519	47.7
35 to 49 years.....	1,559	459	29.4	1,520	345	22.7
50 to 59 years.....	1,600	235	14.7	1,491	123	8.2
60 years and over.....	5,356	194	3.6	5,336	162	2.8
Total.....	15,142	1,630	10.8	15,282	1,798	11.8

According to the occupation census of 1907, the number of persons subject to the insurance laws in the Kingdom of Wurttemberg was 469,594, and of this number the proportion of males was 66.5 per cent, and of females 33.5 per cent. The insured population represented 20.4 per cent of the total population of the Kingdom of Wurttemberg, estimated at 2,302,179. The distribution of insured persons, by divisional periods of life, is given in the following table, which is self-explanatory, and requires no extended comment.

AGE DISTRIBUTION OF THE INSURED POPULATION OF THE KINGDOM OF WURTTENBERG, 1907.

Ages.	Males.		Females.	
	Number.	Per cent.	Number.	Per cent.
16 to 17 years.....	24,889	8.0	21,370	13.6
18 to 19 years.....	26,419	8.4	20,894	13.2
20 to 24 years.....	50,334	16.1	41,068	26.2
25 to 29 years.....	82,975	16.9	22,348	14.2
30 to 39 years.....	74,377	23.8	22,758	14.5
40 to 49 years.....	42,238	13.5	13,425	8.6
50 to 59 years.....	25,289	8.1	9,042	5.8
60 to 69 years.....	14,275	4.6	5,352	3.4
70 years and over.....	1,871	.6	670	.4
Total.....	312,667	100.0	156,927	100.0

Out of 312,667 males subject to the compulsory insurance laws, 216,497, or 69.2 per cent, were employed in industries, mines, and building. Of the insured female population of 156,927, the number employed in these pursuits was 63,580, or 40.5 per cent.

According to the annual report of the Invalidity Insurance Institution of Wurttemberg, the amounts expended for treatment and care on account of sickness from all causes have rapidly increased from 133,226 marks (\$31,707.79) in 1898 to 655,162 marks (\$155,928.56) in 1904 and 1,197,829 marks (\$285,083.30) in 1910. The amount of labor involved in the proper handling of the applicants for treatment and care is made evident by the fact that 15 persons

were employed for this purpose during the year. Of the total income of the Invalidity Insurance Institution of Wurttemberg during 1910, 13.6 per cent was expended in the treatment and care of patients on account of sickness from all causes, including tuberculosis of the lungs, which is the most important cause of disability in the experience of the institution.<sup>1</sup> The tendency during the earlier years was for tuberculosis of the lungs to increase proportionately to the total number of cases under treatment, but during the last few years the ratio declined. The facts are emphasized in the following table for the period 1897 to 1910:

TUBERCULOSIS OF THE LUNGS AS A CAUSE OF DISABILITY IN THE EXPERIENCE OF THE INVALIDITY INSURANCE INSTITUTION OF WURTEMBERG, 1910.

Years.	Cases of tuberculosis of lungs treated.		Years.	Cases of tuberculosis of lungs treated.	
	Number.	Per cent of total cases treated.		Number.	Per cent of total cases treated.
1897-1901.....	1,864	31.60	1906.....	1,318	48.39
1902.....	826	38.42	1907.....	1,577	48.73
1903.....	1,122	40.98	1908.....	1,646	47.54
1904.....	1,163	44.83	1909.....	1,621	44.04
1905.....	1,114	44.99	1910.....	1,759	42.59

This table shows that, commencing with the period 1897 to 1901, the number of cases of tuberculosis was 31.60 per cent of the total number of cases of sickness from all causes treated and cared for at the expense of the insurance institution for the purpose of restoring the wage-earning capacity for a reasonable period of time. This proportion increased to the maximum of 48.73 per cent in 1907, but subsequently to this year the proportion declined to a minimum of 42.59 per cent in 1910. It may be stated in this connection that the next most important causes of sickness among wage earners, in the experience of the Invalidity Insurance Institution of Wurttemberg, were rheumatism (9.3 per cent), anemia (8 per cent), neurasthenia (7.8 per cent), and general debility (7.7 per cent).

A significant fact disclosed by the experience of the Invalidity Insurance Institution of Wurttemberg is the large proportion of tuberculous women patients, and it is emphasized in the report for 1910 that tuberculosis of the lungs is of exceptional frequency among domestic servants, saleswomen, and female clerks.<sup>2</sup>

By an arrangement with the military authorities, the invalidity insurance institution is notified of the rejection of recruits for tuberculosis of the lungs or other diseases liable to bring about permanent wage-earning incapacity. While much had been anticipated from

<sup>1</sup> Annual Report for 1910, p. 41.

<sup>2</sup> Idem, p. 43.

this arrangement, in actual practice the number of notifications has been small and the tendency has been toward a decrease in the number reported. In 1907 the institution was notified of 152 cases, but this number decreased to 53 cases during each of the years 1908 and 1909, and finally to only 36 cases during 1910.

The number of applications for treatment on account of tuberculosis of the lungs, which, during 1910, received favorable consideration, was 1,759, and of this number 876 were males and 883 were females. The number of applications for treatment and care on account of tuberculosis of the lungs which were declined was 596, and of this number 354 were males and 242 were females.<sup>1</sup> Of the 1,759 cases of tuberculosis treated and cared for during 1910, 1,142, or 64.9 per cent, were discharged as materially improved, with a reasonable expectation of restored earning capacity, and 617 were discharged as unsuccessfully treated, but of this number 407 improved during the course of treatment, though not sufficiently so to warrant the anticipation of restored wage-earning capacity for a reasonable period of time.

The number of male patients treated on account of tuberculosis of the lungs during 1910 was 876, and the number of days of treatment was 62,953, or an average duration of treatment of 72 days. The expenditure incurred was 330,975 marks (\$78,772), or an average expenditure of 377.83 marks (\$89.93) per patient per case, or of 5.26 marks (\$1.25) per patient per day. On account of dependent members of male patients' families, 41,095 marks (\$9,781) was disbursed, and in addition thereto 6,810 marks (\$1,621) was paid in cash as pecuniary assistance to single persons in financial need. There were 883 female patients treated on account of tuberculosis of the lungs during the year 1910, receiving 77,031 days of treatment, or an average duration of treatment of 87 days. The expenditures amounted to 345,365 marks (\$82,197), or 391.13 marks (\$93.09) per person per case, or 4.48 marks (\$1.07) per patient per day. The pecuniary assistance to members of male patients' families amounted to 3,061 marks (\$729), and the pecuniary assistance to single persons amounted to 5,824 marks (\$1,386). In the case of male patients the insurance institution was reimbursed to the extent of 97,358 marks (\$23,171), and on account of female patients to the extent of 47,752 marks (\$11,365), by communal, industrial, and other sick funds liable to the insurance institution in conformity to the compulsory-insurance laws. The total number of persons treated during the year on account of tuberculosis was, therefore, 1,759, receiving 139,984 days of treatment, or an average duration of treatment of 80 days.

Of 839 male patients treated during the year, for which the information was available, 338, or 40.3 per cent, were in the first Turban

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<sup>1</sup> Annual Report for 1910, p. 55.

stage of the disease; 231, or 27.5 per cent, were in the second; and 270, or 32.2 per cent, were in the third. Of 877 female patients treated during the same period, 431, or 49.1 per cent, were in the first Turban stage of the disease; 366, or 41.7 per cent, were in the second; and 80, or 9.1 per cent, were in the third stage. It is therefore shown that the proportion of male patients received in the third Turban stage of the disease, when the prognosis is decidedly less favorable than during the earlier stages, was much larger than in the case of females.

Of 876 male patients treated and cared for on account of tuberculosis of the lungs during the year 1910, 410, or 46.8 per cent, were of the age period 21 to 30. Of 883 female patients, 481, or 54.5 per cent, were of this period of life when the prevention of wage-earning incapacity and the conservation of life are of the highest economic importance. The economic results of sanatorium treatment are shown by the experience of 1905 observed to the end of 1910.<sup>1</sup> Of 691 patients, including both sexes, only 60 became subsequently entitled to disability annuities during this period of time, but 51 became incapacitated for work though not entitled to annuities in conformity to the insurance laws. Only 36, or 5.2 per cent, died during the period of observation, and 55, or 8 per cent, required readmission for institutional treatment. In 23 cases, or 3.3 per cent, the information was not available. Out of the original 691 patients, therefore, 466, or 67.4 per cent, remained at the end of the period of 6 years in a more or less satisfactory condition of health, and with a sufficient degree of restored earning capacity so as not to require the payment of disability annuities in conformity to the compulsory insurance laws. The data, therefore, seem to prove that, from an economic point of view, the expenditures incurred in the systematic treatment and care of tuberculous wage earners otherwise likely to become a serious charge upon the funds of the invalidity insurance institution, were apparently justified by the results. Of course, these figures have no reference to the number of persons unsuccessfully treated, with regard to which it only needs to be said that there were 423 such cases in 1905, of which 122, or 28.8 per cent, were still alive and not a charge upon the funds of the invalidity insurance institution at the end of 1910.

The sanatorium at Wilhelmsheim was originally established by the Wurttemberg Association for Public Sanatoria, in the summer of 1900, with a bed accommodation of 100. On October 1, 1904, the same was purchased by the Invalidity Insurance Institution of Wurttemberg for 496,000 marks (\$118,048). By additions made during 1904 to 1906 the bed accommodation was increased to 177 in 59 rooms. There are now 10 rooms with 1 bed each, 20 with 2 beds each,

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<sup>1</sup> Annual Report for 1910, p. 66.

18 with 4 beds, and 11 with 5 beds. The total cost of the institution to December 31, 1910, was 1,244,109 marks (\$296,098). The cost of installation per bed amounted to 7,000 marks (\$1,666). The staff of the sanatorium consists of 1 medical director in chief, 2 to 3 medical assistants, 1 bookkeeper, 1 sister superior, 4 nurses, and 35 other employees. The number of patients has increased from 128 in 1904 to a maximum of 1,075 in 1908. During 1909 the number of patients was 1,064, and during 1910 it was 1,010. This is partly explained by the unwillingness of the patients to undergo treatment during the winter months. An important experiment has been tried at this institution to diminish the use of alcoholic drinks. The rule is that for dinner each patient is entitled to one-fourth of a liter of wine, and at supper to one-half of a liter of beer. While there is quite a number of patients who, upon their own volition, abstain from the use of alcoholic drinks and prefer mineral waters, which are provided in place thereof, it is suggestive that only 11.3 per cent of the total number of patients were abstainers from wine during 1910, and 13.5 per cent were abstainers from beer.<sup>1</sup>

The sanatorium at Uberruh was established during the period 1905 to 1908 at an expenditure of over 2,000,000 marks (\$476,000). The institution is for female patients only, and the number of beds is 195, in 61 rooms. There is only 1 room with one bed, 28 with two beds, 2 with three beds, 26 with four beds, 2 with six beds, and 2 with eight beds. The average expenditure per bed amounted to 11,000 marks (\$2,618). The administration consists of a medical director in chief, 3 assistant physicians, 2 clerks, 1 sister superior, 8 nurses, and 32 domestic servants and other persons. The number of patients has increased from 336 in 1908 to 869 in 1909 and 904 in 1910. Alcoholic drinks are not provided in this institution, except upon medical request.<sup>2</sup>

Much has been done by the Invalidity Insurance Institution of Wurttemberg to render material assistance to the cause of housing reform, but what has been done in this respect does not materially differ from corresponding efforts by other invalidity insurance institutions. It may be stated, however, that a special effort has been made to utilize life insurance principles for the purpose of amortization of building loans, but while the economic value of this effort is realized, the results as yet have not been very encouraging.<sup>2</sup> It is pointed out in the report for 1910 that in view of the fact that all loans are supposed to be repaid within a period of 35 years, the best security for complete amortization is provided by life insurance, and the advantage of this method is made clear by numerous illustrations within the understanding of anyone with average intelligence. As

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<sup>1</sup> Annual Report for 1910, p. 68.

<sup>2</sup> *Idem*, p. 81.

previously pointed out, however, the effort to combine life insurance with building loans has not as yet in actual experience been very successful, although every borrower is furnished with printed instructions pointing out the advantages of the plan.

In conclusion, it may be said that of 4,573 disability annuities granted during 1910, the number granted on account of tuberculosis of the lungs was 659, or 14.4 per cent. The number granted to males was 2,774 for all causes, and 398, or 14.3 per cent, for tuberculosis of the lungs, and to females 1,799 for all causes, of which 261, or 14.5 per cent, were on account of tuberculosis of the lungs. The importance of tuberculosis as a cause of disability, therefore, is clearly established by the experience of the institution, extending over many years.

#### BADEN.

The territory of the Invalidity Insurance Institution of Baden is coextensive with the Grand Duchy of Baden, which has an area of 15,067 square kilometers (5,817.4 square miles), and which in 1910 had a population of 2,141,832. The rate of increase during the last decade was 1.37 per cent per annum, against an average annual increase for the German Empire of 1.41 per cent. The density of population is 142 per square kilometer (368 per square mile), which is greater than the average of 120 for the German Empire as a whole. The principal cities are Mannheim, with a population of 193,379, and Karlsruhe, with a population of 134,161. The average death rate of the Grand Duchy of Baden for the 10 years ending with 1909 was 19.7 per 1,000, the rate having decreased from 22.4 in 1900 to 17.7 in 1909. The average death rate from tuberculosis of the lungs of males aged 30 to 60, inclusive, during 1908, was 30 per 10,000 of population, and for females, 24. The general death rate of Mannheim decreased from 23.8 per 1,000 in 1880 to 20.9 in 1895 and 15.1 in 1909. The death rate from tuberculosis decreased from 37.7 per 10,000 in 1880 to 28.6 in 1895 and to 16.9 in 1909. The general death rate of Karlsruhe decreased from 21.1 per 1,000 in 1885 (earlier data not being available) to 17.6 in 1895 and 15.3 in 1900. The death rate from tuberculosis decreased from 44.7 per 10,000 in 1885 to 26.6 in 1895, and to 15.8 in 1909.

In the experience of the Invalidity Insurance Institution of Baden the ratio of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1896-1899, was 23.1 per cent for males, against the general average of 15 per cent for all insurance institutions; and 21.4 per cent for females, against a general average of 9.5 per cent. The rate of insured persons treated and cared for by the Invalidity Insurance Institution of Baden on account of sickness from all causes during 1910 was 16.8 per 1,000 of the population

subject to the insurance laws, or very considerably above the average of 7.8 per 1,000 for all insurance institutions. The number of patients under treatment on account of tuberculosis of the lungs during the year was 2,948, or 6.71 per 1,000 of the insured population. This rate is considerably in excess of the general average of 3.19 for all insurance institutions, and the rate conforms to the excessive death rates from tuberculosis in the general population and to the high ratio of tuberculosis as a cause of disability in the experience of the Invalidity Insurance Institution of Baden during the period 1896 to 1899. The amount expended by the Invalidity Insurance Institution of Baden on account of treatment and care of tuberculous patients during 1910 was 1,131,011 marks (\$269,181), or an average of 383.65 marks (\$91.31) per case per annum. The only invalidity insurance institutions expending larger amounts on account of systematic treatment and care of tuberculous wage earners during 1910 were those of Berlin, Rhenish Prussia, and the Kingdom of Saxony, with, however, much larger populations subject to the administration of the compulsory insurance laws.

The actual importance of tuberculosis in the Grand Duchy of Baden as a cause of death in the general population is emphasized in the statement that during the year 1909 there were 3,598 deaths from tuberculosis of the lungs, 942 deaths from tuberculosis of other organs, and 104 deaths from miliary tuberculosis, a total tuberculosis mortality of 4,644 during the year. On the basis of the enumerated population of 2,141,832 in 1910, this would be equivalent to a tuberculosis death rate of 2.2 per 1,000 of population; and considering tuberculosis of the lungs only, of 1.7. It is gratifying to find that during the last five years there has been a persistent reduction of the actual mortality from tuberculosis in the Grand Duchy of Baden of, respectively, from 4,066 deaths in 1905 to 3,725 in 1907 and to 3,598 in 1909. Of 3,740 deaths from tuberculosis of the lungs in 1909, there occurred at ages under 1, 57, or 1.5 per cent; at ages 1 to 14, inclusive, 275, of 7.4 per cent; at ages 15 to 29, inclusive, 1,255, or 33.6 per cent; at ages 30 to 59, inclusive, 1,818, or 48.6 per cent; and at ages 60 and over, 335, or 9 per cent of the mortality from tuberculosis at all ages. It is evident, therefore, that the mortality from this disease, although on the decrease in the Grand Duchy of Baden, is a question of unusual social and economic importance. The Invalidity Insurance Institution of Baden maintains three sanatoria—one at Friedrichsheim, established in 1899, for male patients, with a bed accommodation of 234; one at Luisenheim, established in 1905, for female patients, with 199 beds; and one at Nordrach-Kolonie, established in 1908, for male patients, with 110 beds.

According to the annual report of the Grand Duchy of Baden, the expenditures on account of treatment and care for all causes, includ-

ing family support, have increased from 155,411 marks (\$36,988) in 1897 to 605,463 marks (\$144,100) in 1903, and 1,117,157 marks (\$265,883) in 1910. It is stated in the report that, according to the occupation census of 1907, there were then enumerated 458,146 persons making contributions to invalidity insurance institutions, and of this number 66.8 per cent were males and 33.2 per cent were females. The foregoing numbers are exclusive of the persons insured with the railway pension funds and salt works, numbering 18,087 and including 170 females. Of the insured male population, 69 per cent were employed in industries and trades, and of the females, 43.5 per cent. Of the total population of the Grand Duchy of Baden for the year 1910, it is estimated that 22.3 per cent were insured with the invalidity insurance institution; or, respectively, 30 per cent of the male population and 14.7 per cent of the female population.

In the year 1910, 4,736 new disability annuities were granted, and of these 18 per cent were on account of tuberculosis of the lungs and 3 per cent on account of tuberculosis of other organs.<sup>1</sup> In addition thereto the proportion of disability annuities granted on account of nontubercular diseases of the respiratory organs was 10.5 per cent. Next to tuberculosis the most important causes of disability were anemia and general debility, accounting for 13.6 per cent; rheumatism, 7.5 per cent; and diseases of the heart and circulatory organs, 8.9 per cent. Reviewing the experience for the 19-year period ending with 1910, and including 63,483 disability annuitants, the number of annuities granted on account of tuberculosis of the lungs was 12,647, or 19.9 per cent of the disability annuities granted for all causes. The results for 1910, therefore, were below the average for the experience as a whole, indicating a tendency toward a decrease in the occurrence of tuberculosis of the lungs as a cause of disability among the insured population of the Grand Duchy of Baden.

Of the 854 disability annuities granted in 1910 on account of tuberculosis of the lungs, 520, or 60.9 per cent, were to males, and 334, or 39.1 per cent, were to females. Of the number referred to, 74.6 per cent were persons employed in industries and trades and 8.4 per cent were employed in agriculture and forestry. Of the 854 disability annuities granted on account of tuberculosis of the lungs, 289, or 33.9 per cent of the total, were granted at ages 30 to 39. Considering only the earlier periods of life, it is stated that 18.7 per cent of the total number were granted at ages 25 to 29, and 11.2 per cent at ages 20 to 24. It is shown, therefore, that of the total number of disability annuities granted during 1910 on account of tuberculosis of the lungs, 63.8 per cent were granted to persons under 40 years of age.

<sup>1</sup> Annual Report for 1910, p. 24.

The treatment and care of tuberculous wage earners insured with the Invalidity Insurance Institution of Baden proceeds upon very liberal conditions, but it is required that at least 50 weekly contributions must have been paid, and in the case of persons having their permanent domicile outside of the German Empire a minimum requirement of 200 contributions is insisted upon. Exceptions are occasionally made in the case of very young persons who, on account of their age or by reason of their employment, have not paid the minimum of 50 contributions.<sup>1</sup>

It is pointed out in the annual report for 1910 that the number of persons treated and cared for on account of sickness from all causes, and tuberculosis of the lungs in particular, shows a constant tendency to increase. The number of tuberculosis cases treated in 1901 was 1,710, against 3,171 in 1910. This is exclusive of tuberculous patients under observation only, the number of which increased from 43 in 1905 to 416 in 1910. Most of the patients treated are from the large cities, particularly Mannheim, Karlsruhe, Pforzheim, and Freiburg.

During 1910 the number of days of treatment provided for tuberculosis patients was 219,641, or an average duration of treatment of 65.8 days, against 68 days during 1909. The comparatively short duration of treatment is accounted for by the method adopted to place suspected cases under preliminary observation, and to provide dispensary treatment through the 536 tuberculosis associations of the Grand Duchy of Baden, thoroughly organized and intelligently coordinated to one another as perhaps the most effective aid in the state-wide campaign against tuberculosis.

Information is available with regard to the duration of treatment in detail of 2,720 patients during 1910, it being shown that 9.5 per cent were treated from 1 to 14 days, 4.8 per cent from 15 to 35 days, 39.4 per cent from 36 to 91 days, and 46.3 per cent were treated for 92 days or longer, including a very small number who remained in the institution for 176 days or more.

The economic results of treatment have not been as satisfactory as the average for the German Empire as a whole, but the tendency is toward an improvement in the persistency of post-discharge results. It is claimed that the less favorable results for Baden are due in part to differences in methods of diagnosis, and partly because the average duration of treatment is higher for all the invalidity insurance institutions combined than for the Invalidity Insurance Institution of Baden considered alone. Considering, for illustration, the cases treated during 1904 and observed to the end of 1908, the percentage of patients retaining their earning capacity was only 37 per cent for Baden against 46 per cent for the Empire as a whole; and for the

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<sup>1</sup> Annual Report for 1910, p. 32.

four-year period ending with 1909 the percentage of successful cases for Baden was 31, against 46 for the German Empire. It is self-evident that unless these percentages are corrected for possible important variations in the age, sex, and occupation distributions of the patients, and with a due regard to the average duration of treatment and condition on admission, the comparison can not be entirely conclusive.

The number of patients treated and cared for on account of tuberculosis of the lungs has increased from 1,710 in 1901 to 2,265 in 1907, and 3,171 in 1910. The proportion of cases admitted in the first stage of the disease varies widely for the different sanatoria, having been highest for Nordrach village, for female patients, or 61 per cent, and lowest for Nordrach colony, for male patients, or 27 per cent. At Friedrichsheim, for male patients, the proportion admitted in the first stage of the disease was 36 per cent, against 41 per cent for female patients at Luisenheim. It is admitted that no satisfactory explanation can be given for these variations in conditions, which, in part, of course, are due to differential diagnosis.<sup>1</sup>

During the year 1910 the treatment and care, on account of tuberculosis of the lungs, was completed in the case of 2,968 patients, and of these 58.06 per cent were treated with entire success, 29.54 per cent with partial success, 0.99 per cent unsuccessfully, 11.26 per cent left the institution previous to completing the regular course of treatment, and 0.15 per cent died.

Of the patients treated in the first Turban stage of the disease, 90.05 per cent were successfully treated from an economic point of view; of those treated in the second stage, 91.93 per cent; and of those in the third stage, 72.60 per cent. The general results for the women patients were more satisfactory than for the men.

The accommodation in public sanatoria is inadequate, and as a rule a waiting period of from three to four weeks is required. The waiting period during the winter months, however, is much shorter than during the summer months; for illustration, the average waiting period for male patients during January was 20 days and during July 28 days. For female patients the minimum waiting period was 30 days in April and 83 days, respectively, in September and October. These waiting periods have been somewhat reduced during the first half of 1911.<sup>2</sup>

The details of administration and the medical as well as economic results of the several sanatoria conform in their essentials to those obtained in other institutions, making it unnecessary to enlarge upon the facts given in full detail in the report for 1910. It may be pointed out, however, that the medical reports are exceptionally

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<sup>1</sup> Annual Report for 1910, p. 38.

<sup>2</sup> *Idem*, p. 41.

complete, with ample statistical data and other information, proving the value of the treatment and the economic justification of the expense incurred.

The total number of disability annuities granted during 1910 was 4,376, and of this number 802, or 18.3 per cent, were granted on account of tuberculosis of the lungs; and 116, or 2.7 per cent, on account of tuberculosis of other organs. The number of disability annuities granted to males was 2,707, and of this number 489, or 18.1 per cent, were on account of tuberculosis of the lungs, and 66, or 1.5 per cent, on account of tuberculosis of other organs. The number of disability annuities granted to females was 1,669, and of this number 313, or 18.8 per cent, were on account of tuberculosis of the lungs, and 50, or 3 per cent, on account of tuberculosis of other organs. At the age period 20 to 24 the number of disability annuities granted for all causes was 144, and of this number 93, or 64.6 per cent, were on account of tuberculosis of the lungs; at ages 25 to 29 the total number of disability annuities granted for all causes was 246, and of this number 151, or 61.4 per cent, were granted on account of tuberculosis of the lungs; at ages 30 to 39 the total number of disability annuities granted was 543, and of this number 267, or 49.2 per cent, were on account of tuberculosis of the lungs; at ages 40 to 49 the total number of disability annuities granted was 561, and of this number 145, or 25.8 per cent, were on account of tuberculosis of the lungs. Subsequent to this period of life the number of disability annuities granted on account of tuberculosis of the lungs is of less economic importance and therefore does not require extended consideration.

The number of disability annuities granted to persons employed in agriculture and forestry was 961, and of this number 67, or 7 per cent, were granted on account of tuberculosis of the lungs. The number of disability annuities granted to persons employed in industry, mining, and building was 2,510, and of this number 603, or 24 per cent, were granted on account of tuberculosis of the lungs. The number of disability annuities granted to persons employed in commerce, trade, and transportation was 248, and of this number 55, or 22.2 per cent, were granted on account of tuberculosis of the lungs. The number of disability annuities granted on account of domestic service and casual labor was 183, and of this number 20, or 10.9 per cent, were granted on account of tuberculosis of the lungs. Other occupations are of less economic importance, and the actual numbers are too small for definite conclusions.<sup>1</sup>

Of 3,587 persons treated and cared for on account of tuberculosis of the lungs during the year 1910, excluding persons under observa-

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<sup>1</sup> Annual Report for 1910, p. 88.

tion, 1,470, or 49.5 per cent, were treated with full success from an economic point of view; 748, of 25.2 per cent, with partial success; and 25, or 0.8 per cent, were unsuccessful; while 4 died.<sup>1</sup> The total expenditures amounted to 1,152,813 marks (\$274,369), incurred on account of 219,641 days of treatment.

Of the 3,587 tuberculous wage earners treated and cared for during 1910, 1,205 males were provided for with treatment in the sanatorium at Friedrichsheim, 1,049 females in the sanatorium at Luisenheim, and 551 males in Nordrach colony, also 69 females in Nordrach village, the remainder being distributed in a number of institutions which do not require discussion in detail. The average expenditure per patient per case in all institutions was 309.28 marks (\$73.61), and per patient per day, 5.20 marks (\$1.24). The average duration of treatment during 1909 was 83 days for patients of both sexes, or, respectively, 79 days for males and 90 days for females.

#### THE HANSE TOWNS.

The territory of the Invalidity Insurance Institution of the Hanse Towns includes the three free cities of Bremen, Hamburg, and Lübeck. The area of Bremen is 256 square kilometers (98.8 square miles); that of Hamburg, 414 (159.8 square miles); and that of Lübeck, 298 (115.1 square miles). In 1910 the population of Bremen was 298,736; that of Hamburg, 1,015,707; and that of Lübeck, 116,533. The domicile of the insurance institution is at Lübeck. The rate of annual increase in population during the last decade has been 2.82 per cent for Bremen, 2.77 per cent for Hamburg, and 1.85 per cent for Lübeck, against an average annual increase for the German Empire of 1.41 per cent. The density of population is 1,165 per square kilometer (3,017 per square mile) for Bremen, 2,454 (6,356 per square mile) for Hamburg, and 391 (1,013 per square mile) for Lübeck. The free city of Bremen includes the port of Bremerhaven, which, in 1910, had a population of 24,140, the population of the city of Bremen proper being 246,827.

The average death rate of Bremen during the 10 years ending with 1909 was 16.5 per 1,000, the rate having decreased from 18.1 in 1900 to 14.4 in 1909. The average death rate for the city of Hamburg during the same period was 15.8 per 1,000, the rate having decreased from 17.4 in 1900 to 14.8 in 1909. The average death rate of the city of Lübeck during the same period was 16.2 per 1,000, the rate having decreased from 18.2 in 1900 to 14.7 in 1909. The average death rate from tuberculosis, of males, ages 30 to 60, inclusive, during the year 1908, was 24 per 10,000 for the city of Bremen, 25 for the city of

<sup>1</sup> For 721 patients, or 24.3 per cent, the treatment was prematurely discontinued. (See p. 96 of the Annual Report for 1910.)

Hamburg, and 18 for the city of Lübeck. The corresponding tuberculosis death rates for females were, respectively, 19 per 10,000 for the city of Bremen, 15 for the city of Hamburg, and 13 for the city of Lübeck. The tuberculosis death rate for the total population has decreased in the city of Bremen from 39.7 per 10,000 in 1880 to 15.1 in 1909, and in the city of Hamburg from 26.4 per 10,000 in 1890 (earlier data not being available) to 13.1 in 1909. For Lübeck the information is not available.

The actual mortality from tuberculosis of the lungs in the city of Hamburg has decreased from 1,314 in 1901 to 1,152 in 1910. The importance of the disease from an economic point of view is emphasized by the statement that in the decade ending with 1910 there were 12,294 deaths from tuberculosis. In the year 1910 the tuberculosis death rate was 12.5 per 10,000 for the city proper, and 9.2 for the rural portions included within the territory of the Hanse Towns. The death rates, by divisional periods of life, with distinction of sex, in the urban and rural portions, are given in the table following:

**DEATH RATES FROM TUBERCULOSIS OF THE LUNGS IN THE CITY OF HAMBURG, GERMANY, IN 1910, BY AGE PERIODS AND SEX.**

[From the Annual Sanitary Report of the Medical Council of the City of Hamburg for 1910, p. 48.]

Age period.	Death rates per 10,000 living persons.					
	Urban territory.		Rural territory.		City of Hamburg.	
	Males.	Females.	Males.	Females.	Males.	Females.
Under 1 year.....	12.9	7.1	10.0	10.5	12.6	7.4
1 to 14 years.....	2.3	4.0	3.2	4.1	2.4	4.0
15 to 29 years.....	13.0	14.9	9.9	11.1	12.7	14.6
30 to 59 years.....	22.3	12.9	13.3	11.3	21.6	12.8
60 to 69 years.....	22.3	20.1	24.4	4.9	22.5	18.8
70 years and over.....	19.2	9.8	.....	15.6	19.2	10.3
Total.....	13.9	11.2	9.5	8.8	13.5	11.0

According to this table the mortality of males was higher than the mortality of females in both the urban and rural territories, but the mortality of females was in excess of the corresponding mortality of males at ages 1 to 29, inclusive. At ages 30 to 59, inclusive, the mortality of males from tuberculosis of the lungs was decidedly in excess of the corresponding mortality of females.

Of the total mortality from tuberculosis, 32.8 per cent occurred at ages 15 to 29, inclusive, and 16.4 per cent at ages 30 to 59. An analysis by districts disclosed wide variations in the incidence of tuberculosis, the death rate having been as high as 2.3 per 1,000 in one district and as low as 0.51 in another in 1910. Of the 1,151 deaths from tuberculosis of the lungs in the city of Hamburg 151 were

persons who were common laborers. The evidence is quite conclusive that the relative death rate from tuberculosis was highest among the poor, as measured by the income-tax returns. The details for the year 1910 are given in tabular form below:

DEATH RATES FROM TUBERCULOSIS OF THE LUNGS IN THE CITY OF HAMBURG, ACCORDING TO TAXABLE INCOMES, FOR THE YEAR 1910.

Taxable income.	Population.	Deaths from tuberculosis.	
		Number.	Rate per 10,000.
\$214 to \$286 .....	47,371	241	50.9
\$286 to \$476 .....	91,449	389	42.5
\$476 to \$833 .....	32,598	74	22.7
\$833 to \$1,190 .....	11,044	23	20.8
\$1,190 to \$2,380 .....	9,565	12	12.6
\$2,380 to \$5,950 .....	5,382	4	7.4
\$5,950 to \$11,900 .....	1,806	1	5.5
Over \$11,900 .....	1,335	.....	.....
Total .....	200,550	744	37.1

Granting the limitations of the method of determining the relation of tuberculosis to poverty on the basis of the income-tax returns, which, of course, exclude the large proportion of the population not paying taxes of this kind, the table confirms the widely accepted conclusion that the mortality from tuberculosis of the lungs varies proportionately to the material well-being of the population.

During 1910 the number of tuberculous patients treated in general hospitals in the city of Hamburg was 3,330, and of this number 635, or 19.1 per cent, died. The number of homes disinfected on account of tuberculosis during the year was 3,101.

In the experience of the Invalidity Insurance Institution of the Hanse Towns the ratio of tuberculosis of the lungs as a cause of invalidity, according to the investigation of 1896 to 1899, was 24.4 per cent for males, against 15 per cent for all insurance institutions, and 8.3 for females, against a general average of 9.5 per cent. The rate of insured persons treated and cared for on account of sickness from all causes by the Invalidity Insurance Institution of the Hanse Towns during 1910 was 8.8 per 1,000 of the population subject to the insurance laws, against 7.8 for the German Empire as a whole. The number of patients under treatment on account of tuberculosis of the lungs during the year was 1,731, or 4.6 per 1,000 of the insured population. This, however, is only the number of cases for which the treatment was commenced and completed during the year. The amount expended on account of treatment and care during the year 1910 for tuberculosis was 696,660 marks (\$165,805), or an average expenditure of 402.46 marks (\$95.79) per case per annum.

The Invalidity Insurance Institution of the Hanse Towns maintains three sanatoria for the treatment and care of its members—1 for males, established in 1897 at Oderberg, in the Harz Mountains, with 180 beds; 1 for females, established in 1901 at Glückauf, also in the Harz Mountains, with 100 beds; and a convalescing home at Gross-Hansdorf, in Holstein, with an accommodation of 37 beds for male patients.

The Invalidity Insurance Institution of the Hanse Towns was one of the first to actively interest itself in the systematic institutional treatment and care of tuberculous wage earners. Under the direction of the managing director and privy councilor, Dr. Bielefeldt, numerous reports have been prepared which afford a means for a thorough study of the methods by which the best obtainable economic results have been secured. In addition to the annual report for 1910, which contains a wealth of statistical information, a special souvenir volume for the 20-year period 1891 to 1911 was published for the purpose of presenting the results obtained, together with a descriptive account of the sanatoria owned and maintained by the institution. According to the annual report for 1910 the institution granted 25,957 disability annuities, in conformity to paragraph 15 of the invalidity insurance law. Of this number, 3,790, or 14.6 per cent, were granted on account of tuberculosis of the lungs and 165 on account of tuberculosis of other organs, including scrofula. The number of applications for institutional treatment and care, including all causes, increased during 1910 to the extent of 13 per cent over the number of cases considered during the previous year. The total number of applications during 1910 was 6,218, of which 3,396 were approved. Of the 3,396 approved applications, 1,693, or 49.9 per cent, were on account of tuberculosis of the lungs, including 964 males and 729 females. The number of tuberculous military recruits brought to the attention of the institution during the year was 26.

In addition to the treatment and care of tuberculous members in special institutions, the Invalidity Insurance Institution of the Hanse Towns extends pecuniary aid to the five tuberculosis dispensaries, the amount provided for the city of Hamburg being 9,000 marks (\$2,142); for Bremen, 2,000 marks (\$476); and for Lubeck, 1,500 marks (\$357).

According to an investigation made in 1910, with a due regard to the results of the occupation census of 1907, the number of insured persons in the Hanse Towns was estimated at 420,000, or 29.3 per cent of the total population. The number of contributions per insured member was 49.40 weekly payments, amounting to 14.63 marks (\$3.48) per annum.

In appreciation of the intimate relation between housing conditions and the local incidence of tuberculosis, the Invalidity Insurance Institution of the Hanse Towns, with the approval of the imperial insurance office, provided 1,000,000 marks (\$238,000) for building purposes for the year 1911.<sup>1</sup>

The number of disability annuities for all causes granted each year subsequent to 1891 is given in tabular form below :

DISABILITY ANNUITIES GRANTED BY THE INVALIDITY INSURANCE INSTITUTION OF THE HANSE TOWNS, 1892 TO 1910.

Year.	Number.	Year.	Number.	Year.	Number.	Year.	Number.
1892.....	104	1897.....	904	1902.....	2,222	1907.....	1,555
1893.....	220	1898.....	1,209	1903.....	2,283	1908.....	1,763
1894.....	418	1899.....	1,408	1904.....	2,225	1909.....	1,874
1895.....	623	1900.....	1,587	1905.....	1,813	1910.....	1,788
1896.....	637	1901.....	1,852	1906.....	1,475		

Since 1891 a total of 25,957 disability annuities have been granted, the maximum having been attained in 1903, when the number was 2,283. Considering the increase in the insurable population, the decrease during recent years in the total number of disability annuities granted would seem to sustain the conclusion that this result is, in part at least, due to the thoroughgoing methods of treatment and care of invalid members, including a relatively large proportion of tuberculous wage earners. The ratio of annuities granted for all causes in proportion to the number of applications made has varied considerably, having been highest during the year 1892, when 32 per cent were declined, and lowest in the year 1900, when only 7.9 per cent were declined. The average for the period 1892 to 1910 was 17 per cent; or, accurately, out of 36,687 applications for disability annuities, 6,250 were declined.<sup>2</sup>

Of 16,301 disability annuities granted to males by the Invalidity Insurance Institution of the Hanse Towns up to December 31, 1910, 3,002, or 18.4 per cent, were on account of tuberculosis of the lungs. The corresponding numbers and proportion for females were 9,656 disability annuities granted for all causes and 788, or 8.2 per cent, for tuberculosis of the lungs. The numbers and proportion by divisional periods of life, for both sexes, are given in tabular form below.<sup>3</sup>

<sup>1</sup> Annual Report for 1910, p. 29.  
<sup>2</sup> Idem, p. 39.  
<sup>3</sup> Idem, pp. 50, 51.

DISABILITY ANNUITIES GRANTED BY THE INVALIDITY INSURANCE INSTITUTION OF THE HANSE TOWNS, 1892 TO 1910, ON ACCOUNT OF ALL CAUSES, AND TUBERCULOSIS OF THE LUNGS, BY SEX AND AGE PERIODS.

Age period.	Annuities granted to--					
	Males.			Females.		
	Total all causes.	On account of tuberculosis of lungs.		Total all causes.	On account of tuberculosis of lungs.	
		Number.	Per cent.		Number.	Per cent.
20 to 24 years.....	427	265	62.1	307	168	54.7
25 to 29 years.....	920	481	52.3	432	161	37.3
30 to 34 years.....	978	460	47.0	287	79	27.5
35 to 39 years.....	1,009	391	38.8	268	73	27.2
40 to 44 years.....	1,156	383	33.1	324	57	17.6
45 to 49 years.....	1,220	340	27.9	497	59	11.9
50 to 54 years.....	1,547	253	18.3	958	55	5.7
55 to 59 years.....	2,028	212	10.5	1,485	75	5.1
60 to 64 years.....	2,800	136	4.9	2,233	38	1.7
65 to 69 years.....	2,696	39	1.4	1,752	19	1.1
70 years and over.....	1,520	12	.8	1,113	4	.4
Total.....	16,301	3,002	18.4	9,656	788	8.2

According to this most interesting and instructive comparison the largest number of disability annuities for all causes in the case of males was granted at ages 60 to 64, inclusive, but the largest number granted on account of tuberculosis of the lungs was at ages 25 to 29, or 52.3 per cent of the total number of disability annuities granted at this period of life. For females the largest number of disability annuities for all causes was granted at ages 60 to 64, inclusive, but the largest number granted on account of tuberculosis of the lungs was at ages 20 to 24, or 54.7 per cent of the total number of disability annuities granted at this period of life. The table emphasizes precisely the economic importance of tuberculosis of the lungs as a cause of disability and the peculiar interest which invalidity insurance institutions have in the prevention of the disease. It may be stated in this connection that the average value of the disability annuities granted in 1910 was 211.92 marks (\$50.44) for males and 161.85 marks (\$38.52) for females.<sup>1</sup> According to the experience data for 1892 to 1910, tuberculosis of the lungs was the cause of invalidity in the case of 18 per cent of the males favorably considered and 8 per cent of the females; but for 1910 only, the proportion was 15 per cent for males, remaining at 8 per cent for females. The great importance of tuberculosis of the lungs as a cause of invalidity suggests the inclusion of the following table, which shows the actual and relative diminutions in the number of disability annuitants on account of this disease since 1892.

<sup>1</sup>Annual Report for 1910, p. 57.

DISABILITY ANNUITIES GRANTED FOR ALL CAUSES, AND FOR TUBERCULOSIS OF THE LUNGS BY THE INVALIDITY INSURANCE INSTITUTION OF THE HANSE TOWNS, 1892 TO 1910.

Year.	Number of disability annuities granted on account of all causes.			Number of disability annuities granted on account of tuberculosis of the lungs.			Per cent of disability annuities granted on account of tuberculosis of the lungs.		
	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.
1892.....	74	30	104	5	.....	5	6.67	.....	4.81
1893.....	178	42	220	25	2	27	14.04	4.76	12.27
1894.....	320	98	418	80	10	90	25.00	10.20	21.53
1895.....	475	148	623	127	17	144	26.74	11.48	23.11
1896.....	470	167	637	120	12	132	25.53	7.18	20.72
1897.....	636	268	904	138	19	157	21.73	7.09	17.39
1898.....	794	415	1,209	151	34	185	19.02	8.19	15.30
1899.....	854	554	1,408	149	27	176	17.45	4.87	12.50
1900.....	915	672	1,587	174	42	216	19.02	6.25	13.61
1901.....	1,135	717	1,852	227	51	278	20.00	7.11	15.01
1902.....	1,346	876	2,222	282	60	342	20.59	6.85	15.39
1903.....	1,435	848	2,283	243	57	300	16.93	6.72	13.14
1904.....	1,351	874	2,225	237	74	311	17.54	8.47	13.98
1905.....	1,108	705	1,813	178	62	240	16.06	8.79	13.24
1906.....	928	547	1,475	194	68	262	20.91	12.43	17.76
1907.....	910	645	1,555	154	58	212	16.92	8.99	13.63
1908.....	1,091	672	1,763	168	58	226	15.40	8.63	12.82
1909.....	1,199	675	1,874	182	81	263	15.18	12.00	14.03
1910.....	1,082	703	1,785	158	56	214	14.60	7.97	11.99

<sup>1</sup>Annual Report for 1910, p. 64.

According to this comparison the maximum percentage of disability annuities granted on account of tuberculosis of the lungs to males was 26.74 in 1895, and the minimum, leaving out the first year, was 14.04 per cent in 1893. For females the maximum was 12.43 per cent in 1906 and the minimum 4.76 per cent in 1893. For both sexes combined, leaving out of consideration the year 1892, the maximum was 23.11 per cent in 1895, and the minimum was 11.99 per cent in 1910. The table, therefore, fully confirms the conclusion that there has been a marked reduction in the actual number and relative proportion of disability annuitants on account of tuberculosis of the lungs during recent years, although the insured population or membership of the Invalidity Insurance Institution of the Hanse Towns substantially increased in the meantime.

The memorial volume commemorative of the twentieth anniversary of the Invalidity Insurance Institution of Hamburg contains a large amount of information, much of which, however, is too technical to permit of extended consideration. The volume, however, is a treatise of exceptional value, and should be consulted by all who desire to obtain a thorough understanding of the methods and results of German invalidity insurance institutions in their efforts to provide adequate treatment and care for tuberculous wage earners.

During the period 1891 to 1910, 30,748 applications were received on account of treatment and care of persons suffering from tuberculosis of the lungs, and of this number 17,057, or 55.5 per cent, received favorable consideration. The number of male applicants was 19,754, and the number favorably considered in this group was 10,338, or

52.3 per cent. The number of female applicants was 10,994, and the number favorably considered was 6,719, or 61.1 per cent. The inadequacy of the present system, however, is best emphasized in the statement that 11,789 tuberculous applicants could not receive treatment for various reasons, which do not require to be considered in detail. The number of male applicants declined for treatment and care on account of tuberculosis of the lungs was 8,309, and the number of female applicants declined was 3,480.

Special efforts have been made since 1907 to improve the diagnosis of tuberculosis, and for this purpose a special tuberculosis station was established at Gross-Hansdorf. It was ascertained that out of 1,968 assumed tuberculous patients, only 1,693, or 86 per cent, were tuberculous, the remaining persons being affected with nontubercular lung diseases. Obviously, the results of treatment depend very largely upon the accuracy of the diagnosis, and for this reason the establishment of a special station for the purpose of a thorough and qualified examination is likely to prove a most valuable innovation. Out of 1,666 patients known to be tuberculous, the evidence of the disease was determined by means of bacteriological examinations in 23 per cent of the cases, by means of physical examination only in 19 per cent of the cases, and by means of other methods, including the tuberculin test, in 58 per cent of the cases. The average cost of treatment and care on account of tuberculosis of the lungs during 1910 was 402.46 marks (\$95.79) per patient per annum, or 5.72 marks (\$1.36) per patient per day. For males the cost of treatment per patient per day was 7.01 marks (\$1.67), and for females, 4.41 marks (\$1.05).

The sanatorium for male patients at Oderberg, in the Harz Mountains, is an institution of considerable magnitude, providing 180 beds. There are 14 rooms with 1 bed each, 4 rooms with 2 beds each, 7 rooms with 3 beds each, 9 rooms with 4 beds each, 9 rooms with 5 beds each, 4 rooms with 6 beds each, and 4 rooms with 8 beds each. The per capita cost of maintenance has slightly decreased, or from 7.42 marks (\$1.77) in 1908 to 6.50 marks (\$1.55) in 1909 and 6.26 marks (\$1.49) in 1910. The average duration of treatment attained a maximum of 83 days in 1898, but by means of rigid selection the average duration has been gradually reduced to 55 days in 1910. It is explained that this reduction in the average duration is due entirely to the fact that about one-fourth of the patients are treated in a preliminary way for the purpose of observation and study at the tuberculosis station at Gross-Hansdorf.

An interesting statement is made with regard to the dismissals on account of violations of rules, the proportion having been 5 per cent in 1910 and as high as 10 per cent in 1906.

The economic results have been very satisfactory, the proportion successfully treated having increased from 81 per cent in 1897 to 99 per cent in 1910. The improvement in results is due in part, however, to a more careful selection of patients on admission. Leaving out the year 1897 on account of small numbers, the results, as measured by the proportion of patients still able to provide for their own support, were 53 per cent in 1898, 55 per cent in 1899, 60 per cent in 1900, 57 per cent in 1901, 71 per cent in 1902, 63 per cent in 1903, 68 per cent in 1904, 55 per cent in 1905, and 61 per cent in 1906. Of 857 tuberculous patients treated in 1910, 11 per cent were from 1 to 30 days in the institution, 42 per cent from 31 to 60 days, and 47 per cent from 61 to 90 days. According to ages on admission, 60 per cent were under 31 years of age, 33 per cent from 31 to 45 years, and only 7 per cent were of ages 46 and over.

Of the 857 tuberculous patients, only 27 per cent had rendered full military service, 56 per cent were disqualified for military service, and in 17 per cent of the cases the point as to military fitness had not been determined. According to conjugal condition, 55 per cent of the patients were married, 44 per cent single, and 1 per cent widowed or divorced.

The so-called "Brehmer'sche" taint was ascertained for 210 of the 857 tuberculous patients, or 24.5 per cent of the total. But, also, in the case of the nontuberculous patients 15, or 26 per cent, were ascertained to be last-born children, which would, therefore, according to the report, warrant the conclusion that the importance of the so-called "Brehmer'sche" taint was not substantiated.

A hereditary taint was ascertained with certainty in 24 per cent of the cases, and in 66 per cent the result was certainly in the negative and in 10 per cent undecided. The hereditary taint was traceable to the father in 13 per cent of the cases, to the mother in 9 per cent, and to both parents in 3 per cent of the cases.

The commencement of the disease was alleged to have occurred during a period of less than 6 months in 53 per cent of the cases, during from 7 to 12 months in 19 per cent, during 1 to 5 years in 21 per cent, during 5 to 10 years in 5 per cent, and over 10 years in 2 per cent of the cases of tuberculosis treated during 1910. The average duration of illness, including 58 cases of nontuberculous patients, previous to admission was 1.6 years.

The duration of incapacity for work previous to admission was up to 1 month for 20 per cent of the cases, from 1 to 3 months in 42 per cent, and from 3 to 12 months in 11 per cent. The remainder, or 27 per cent of the cases, were not incapacitated for work previous to their admission to the sanatorium.

Classified according to the Turban stage of the disease, 64 per cent were in the first stage on admission, 33 per cent in the second stage, and 3 per cent in the third stage. A tuberculin reaction occurred in 514 out of 573 patients treated by the tuberculin method. Of the 857 tuberculous patients 30 per cent had tubercle bacilli in the sputum on admission, 51 per cent had no bacilli in the sputum, and 19 per cent had no expectoration at all. On discharge 20 per cent of the patients had tubercle bacilli in the sputum; in 34 per cent of the cases the result was negative and in 46 per cent there was no expectoration at all. In 35 per cent of the cases of patients having bacilli in the expectoration on admission the bacilli disappeared during treatment.

The average gain in weight during treatment was 5.8 kilograms (12.8 pounds). In the case of 42 per cent of the patients the gain was from 0.1 to 5 kilograms (0.2 to 11 pounds), in the case of 43 per cent from 5.1 to 10 kilograms (11.2 to 22 pounds), and in the case of 12 per cent of the patients from 10.1 to 20 kilograms (22.3 to 44.1 pounds). The weight was stationary in 2 per cent of the cases and decreased in 1 per cent of the cases.

Of the 857 tuberculous patients 65 per cent were discharged in a materially improved condition, 29 per cent in a fairly improved condition, 5 per cent in about the same condition as when received, and in only 1 per cent was the condition decidedly worse.

The economic results were satisfactory in 83 per cent of the cases—that is, the earning capacity was restored for a reasonable period of time; the results were also fairly satisfactory within the meaning of paragraph 5 of section 4 and paragraph 15 of the invalidity insurance laws, and in only 5 per cent of the cases were the patients discharged with their earning capacity not at least partially restored.

Much the same results, medical and economic, were secured at the other institutions maintained by the Invalidity Insurance Institution of the Hanse Towns, and it would serve no practical purpose to enlarge upon the details, which are conveniently available to anyone who may desire to inquire further into the facts.

The aggregate results are summarized for the period 1893 to 1910 for males, and for 1894 to 1910 for females, including in the former 10,067 patients under observation at least one year, and in the latter 6,485. The results are given in tabular form below, showing respectively the number of patients retaining their earning capacity for a stated period of time of from 1 to 12 years.

ECONOMIC RESULTS OBTAINED BY SANATORIUM TREATMENT FOR TUBERCULOSIS OF THE LUNGS AT INSTITUTIONS MAINTAINED BY THE INVALIDITY INSURANCE INSTITUTION OF THE HANSE TOWNS, 1893 TO 1910.

[From Twenty Years' Experience in the Treatment and Care of Tuberculous Wage Earners by the Invalidity Insurance Institution of the Hanse Towns, 1891-1911, p. 179.]

Years after discharge.	Patients successfully treated and discharged, with earning capacity restored.							
	Number under observation.		Number still at work.		Number not traced.		Per cent successfully treated.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1.....	8,353	5,554	8,060	5,461			96	98
2.....	7,556	4,923	6,196	4,313	326	192	86	91
3.....	6,726	4,320	4,718	3,391	303	180	73	82
4.....	6,069	3,916	3,792	2,859	277	169	65	76
5.....	5,333	3,432	3,065	2,379	248	145	60	77
6.....	4,105	2,626	2,193	1,755	206	107	56	70
7.....	1,450	796	660	490	46	36	47	64
8.....	1,077	579	446	339	37	30	43	62
9.....	715	367	287	215	28	23	42	63
10.....	481	204	175	124	18	12	38	65
11.....	208	69	60	35	5	8	30	57
12.....	32	6	5	3	2		17	50

This table shows that of the 10,067 male patients under observation at least one year during the period 1893 to 1910, 8,353 were discharged as successfully treated with the anticipation of a continuance of earning capacity for a reasonable period of time. Of the 8,353 patients 8,060 were still at work at the end of the first year, or 96 per cent of the number of successful cases under observation, or 80 per cent of the total number treated and cared for.

The number of male patients under observation for two years was 7,556, and the number still at work at the end of this period was 6,196, excluding 326 for whom the information was not obtainable. The percentage of male patients retaining their earning capacity for two years, therefore, was 86 per cent of those successfully treated and 69 per cent of the total number of cases, including those unsuccessfully treated. In a similar manner the results are traceable throughout the entire experience of 12 years, the percentages becoming gradually reduced to 73 for the third year cases, 65 for the fourth year, 60 for the fifth year, 56 for the sixth year, 47 for the seventh year, 43 for the eighth year, 42 for the ninth year, 38 for the tenth year, 30 for the eleventh year, and 17 for the twelfth year. For females the results throughout are still better, but the facts can readily be determined by reference to the table. The table is subject to the correction that the number of not controlled cases requires to be deducted from the total number of successful cases, the percentages being calculated on the basis of the number of cases for which the information for each year was ascertainable.

The economic results obtained in the treatment and care of tuberculous wage earners by the Invalidity Insurance Institution of the Hanse Towns are a sufficient inducement to believe in the accuracy

of the theory that, in the long run, substantial financial gains must result from adequate and effective methods of prevention and cure. It is, in any event, suggestive to find that of the male patients treated during the period 1893 to 1910, the proportion treated successfully at the outset was 83 per cent, and for the females 86 per cent. These results for tuberculosis of the lungs compare with some other important diseases, as follows: For anemia cases the proportion successfully treated at the outset was 90 per cent for males and 91 per cent for females; for nervous diseases, 83 per cent and 83 per cent, respectively; for rheumatism, 80 per cent and 73 per cent; and for other diseases, 79 per cent and 83 per cent.

Considering the permanent results as measured by a six-year period, the comparison shows that for male patients the wage-earning capacity was retained in tuberculosis of the lungs in 43 per cent of the cases; in anemia, in 48 per cent; in nervous diseases, in 46 per cent; in rheumatism, in 45 per cent; in sciatica, in 38 per cent; and in other diseases, in 42 per cent. For females the respective percentages as regards economic results to the end of the sixth year were for tuberculosis of the lungs, 56; for anemia, 70; for nervous diseases, 54; for rheumatism, 41; for sciatica, 47; and for other diseases, 51.

A very important analysis of the results, extending over a period of from 6 to 15 years, has been made by Dr. F. Reiche in behalf of the Invalidity Insurance Institution of the Hanse Towns by means of a medical reexamination of patients discharged from the sanatoria during the period under observation. Of the male patients discharged in 1895, 36 per cent still retained their wage-earning capacity to the end of 1910, but 8 per cent had undergone a subsequent treatment in the meantime. Of the female patients discharged in 1895, the proportion retaining their wage-earning capacity to the end of 1910 was 67 per cent, but 11 per cent had undergone a subsequent treatment. Combining the results for patients discharged in 1895, 1896, and 1897, it was ascertained that out of 245 males observed and reexamined from time to time to the end of 1910, 52 per cent had retained their full earning capacity and 4 per cent additional had retained a limited wage-earning capacity. For females, the respective percentages were 63 for full earning capacity and 18 for limited earning capacity. Of these proportions, however, 20 per cent of the males and 24 per cent of the females who had retained their full or limited earning capacity had undergone a subsequent treatment.

Of the patients under observation from 1895 to 1904, excluding, however, all patients less than four weeks in the institutions, the results, according to ages on admission, were as follows: Of the male patients admitted at ages 15 to 24, the proportion retaining their full

earning capacity to the end of 1910 was 63 per cent, and a limited earning capacity was retained in 7 per cent of the cases. The respective percentages for females were 69 and 14. For male patients at ages 25 to 49 on admission, a full earning capacity was retained to the end of 1910 in 52 per cent of the cases and a limited earning capacity in 9 per cent of the cases. For females, the respective percentages were 57 and 18. The numbers at ages over 50 are very small, but of the males 19 per cent had retained their full earning capacity, and of the females 5 per cent. It is shown, therefore, that the economic results are most favorable in the case of men and women admitted for treatment at ages under 25.

Considering the results by duration of disease previous to admission, it is shown by the investigation referred to that of the male patients from 1 to 6 months under treatment 62 per cent retained their full wage-earning capacity to the end of 1910; with a stay of from 6 to 24 months the percentage was 56; with a stay of from 2 to 6 years it was 44; from 6 to 12 years it was 49; and over 12 years it was 44 per cent. For females the economic results were as follows: For a duration of the disease of from 1 to 6 months the percentage was 73; from 6 to 12 months it was 62; from 2 to 6 years it was 64; from 6 to 12 years it was 65; and for over 12 years it was 49 per cent. It is therefore shown that the economic results were most satisfactory in the case of patients with a comparatively short duration of the disease previous to admission.

The economic results did not vary materially for patients with or without a family taint of tuberculosis, having been 54 per cent for male patients having a family history of tuberculosis, and 57 per cent for those not having a family history of the disease. For female patients the respective percentages were 63 and 66.

Finally, it may be stated that the Invalidity Insurance Institution of the Hanse Towns loaned 8,075,400 marks (\$1,921,945) in the form of building loans for wage earners' homes, and it may also be stated that in appreciation of the social service rendered by the institution a dock laborer by the name of Gustav Küssner, who had since June 3, 1897, been in receipt of a disability annuity, left at the time of his death, on March 26, 1904, the sum of 3,700 marks (\$881) as a legacy to the institution for welfare purposes to be used at its discretion. It is clearly shown by the admirable analysis of the results, statistical or otherwise, that the aim and efforts to advance in the most important directions the well-being of wage earners insured with the Invalidity Insurance Institution of the Hanse Towns have been realized.

**APPENDIX I.—TREATMENT OF TUBERCULOUS WAGE EARNERS IN PUBLIC INSTITUTIONS, 1902 TO 1904.<sup>1</sup>**

During the present year the Imperial Board of Health has published a supplementary report on the results of sanatorium treatment for the period 1902 to 1904, which confirms in all essentials the experience data for 1896 to 1901. The results of this supplementary investigation are briefly summarized, as follows:

1. The statistical investigation includes 34,071 male and 12,632 female patients treated and cared for on account of tuberculosis of the lungs, with an average duration of treatment for males of 86.6 days and for females of 95.8 days.

2. The cost of treatment was provided for by social insurance institutions in the case of male patients to the extent of 85.4 per cent and of female patients to the extent of 75.7 per cent.

3. Of the male patients 44.3 per cent and of the female patients 59.3 per cent were of the age period 20 to 29 years, and of the male patients 31.8 per cent and of the female patients 18.8 per cent were of the age period 30 to 39 years.

4. A parental history of tuberculosis was ascertained in the case of 25.2 per cent of the male patients and of 36.7 per cent of the female patients. Tuberculosis among brothers and sisters was ascertained in the case of 19.6 per cent of the male patients and of 24.4 per cent of the female patients. In addition thereto, in the case of 2.6 per cent of the male patients and of 2.9 per cent of the female patients, respectively, the wife or the husband was ascertained to be tuberculous. The proportion of families with tuberculous children was only 0.5 per cent in the case of male patients and only 0.4 per cent in the case of female patients.

5. About two-thirds of the patients, or 61.9 per cent for males and 64.7 per cent for females, entered the sanatorium during the year in which the disease first became apparent. In the case of 16.9 per cent of the male patients and of 12.3 per cent of the female patients receiving institutional treatment, a previous treatment had been had in sanatoria, in hospitals, or in air-cure establishments.

6. The nutrition of the patients on admission for institutional treatment was ascertained to be good in the case of 19.1 per cent of the male patients and of 18.9 per cent of the females. For 51.2 per cent of the males and for 50.5 per cent of the females the condition as regards nutrition was considered average, and in 29.7 per cent of the male patients and in 30.6 per cent of the female patients the condition as regards nutrition was bad. An improvement in the bodily condition took place in the case of 95.9 per cent of the male patients and of 94.1 per cent of the female patients during treatment,

<sup>1</sup> Tuberkulose-Arbeiten aus dem Kaiserlichen Gesundheitsamte. Deutsche Heilstätten für Lungenkranke. Verlag von J. Springer, Berlin, 1912. 13. hft.

and the average gain in weight was 6.6 kilograms (14.6 pounds) for males and 5.8 kilograms (12.8 pounds) for females.

7. The general condition of patients on admission was apparently good in the case of 23.1 per cent of the males and of 20.7 per cent of the females. The condition was average in the case of 49.5 per cent of the males and of 42.6 per cent of the females, and the condition was bad in the case of 27.4 per cent of the males and of 36.8 per cent of the females. An improvement in the general condition during the period of institutional treatment took place in the case of 64.2 per cent of the males and of 66.1 per cent of the female patients.

8. On admission the proportion of patients with cough and expectoration was 92 per cent for males and 65.9 per cent for females. The proportion of dry cough was 3.3 per cent for males and 17.6 per cent for females. Of the patients with cough and expectoration 26.3 per cent of the males and 32.7 per cent of the females were relieved therefrom entirely, and a partial result was obtained in the case of 14.3 per cent of the males and of 7.7 per cent of the females. Of the male patients 69.9 per cent were relieved from dry cough as the result of institutional treatment and of the female patients 66.1 per cent.

9. The bacilli of tuberculosis was bacteriologically ascertained to be present in the case of 35.1 per cent of the male patients and of 21.8 per cent of the female patients. As the result of treatment 33.4 per cent of the male patients and 29.4 per cent of the female patients were free from bacillary evidences on discharge.

10. Fever was present on admission in the case of 14.5 per cent of the males and of 14.9 per cent of the females. On discharge 71.9 per cent of the male patients and 57.3 per cent of the female patients were free from fever.

11. Night sweats on admission were present in the case of 25.4 per cent of the male patients and of 18.3 per cent of the female patients. Of the males 91.7 per cent were free from night sweats on discharge and of the females 85.8 per cent.

12. Of the male patients on admission 37.3 per cent were in the first Turban stage of the disease, 46.2 per cent in the second, and 16.5 per cent in the third. Of the female patients 51 per cent were in the first Turban stage, 37.4 per cent in the second, and 11.6 per cent in the third. In the case of 23.3 per cent of the male patients and of 25.8 per cent of the female patients only one lung was affected with the disease on admission. The right lung only was affected in the case of 67.5 per cent of the male patients and of 65.7 per cent of the female patients.

13. A complete cure was obtained on discharge in the case of 4.5 per cent of the male patients and of 6.7 per cent of the female patients. An improvement in the condition of the lungs was secured in the case of 86.7 per cent of the male patients and of 81.7 per cent of the female patients, and of these, in the case of 27 per cent and 23.1 per cent,

respectively, the improvement was so decided that there was a change to a more favorable Turban stage of the disease. In only 6.3 per cent of the male patients and in only 8.8 per cent of the female patients was there no change in the condition of the lungs during treatment. The proportion of deaths during treatment was only 0.3 per cent for male patients and only 0.2 per cent for female patients.

14. A complete economic result—that is, restored wage-earning capacity—was obtained in the case of 53.9 per cent of the male patients and of 60 per cent of the female patients. But, in addition thereto, in the case of 28.6 per cent and of 24.2 per cent, respectively, a fairly satisfactory economic result was secured—that is, restored wage-earning capacity of limited extent for a reasonable period of time.

The comparative statistical facts for the investigations of 1896 to 1901 and 1902 to 1904 are conveniently summarized below:

COMPARATIVE RESULTS OF TREATMENT FOR TUBERCULOSIS IN GERMAN PUBLIC SANATORIA.

	1896 to 1901		1902 to 1904	
	Males.	Females.	Males.	Females.
Number of patients.....	15,809	4,008	34,071	12,632
Average duration of treatment..... days..	39.2	94.4	86.6	95.8
Ages on admission:				
Under 20 years..... per cent..	10.5	20.4	8.5	16.6
20 to 29 years..... do.....	44.0	57.8	44.3	59.3
30 to 39 years..... do.....	30.1	17.6	31.8	18.8
40 years and over..... do.....	15.4	4.4	15.4	5.3
Tuberculous parents..... do.....	26.4	36.7	25.2	36.7
Tuberculous brothers and sisters..... do.....	16.5	21.2	19.6	24.4
Previous duration of disease less than 1 year..... do.....	54.4	54.6	61.9	64.7
Previous sanatorium treatment of at least 6 weeks..... do.....	9.8	8.2	16.9	12.3
Good nutrition on admission..... do.....	17.9	18.0	19.1	18.9
Average nutrition on admission..... do.....	48.9	44.6	51.2	50.5
Poor nutrition on admission..... do.....	33.2	37.5	29.7	30.6
Gain in weight..... do.....	93.6	92.3	95.9	94.1
Average increase in weight..... pounds..	13.0	11.5	14.6	12.8
Physical condition on admission:				
Good..... per cent.....	32.9	28.2	23.1	20.7
Average..... do.....	36.8	31.7	49.5	42.6
Poor..... do.....	30.2	40.1	27.4	36.8
Physical condition during treatment:				
Improved..... do.....	57.5	59.0	64.2	66.1
Unchanged..... do.....	40.1	38.4	34.0	32.4
Worse..... do.....	2.4	2.6	1.8	1.5
Cough and expectoration on admission..... do.....	91.1	65.7	92.0	65.9
Cough only..... do.....	4.5	18.5	3.3	17.6
No cough and expectoration on discharge..... do.....	1 22.8	1 26.2	1 26.3	1 32.7
Bacillary diagnosis positive on admission..... do.....	45.3	30.0	35.1	21.8
Bacillary diagnosis negative on discharge..... do.....	2 34.4	2 25.0	2 33.4	2 29.4
Fever on admission..... do.....	13.8	19.4	14.5	14.9
No fever on discharge..... do.....	3 68.6	3 63.3	3 71.9	3 57.3
Night sweats on admission..... do.....	29.8	27.3	25.4	18.3
No night sweats on discharge..... do.....	4 90.7	4 85.2	4 91.7	4 85.8
Turban stage on admission:				
First..... do.....	31.3	28.4	37.3	51.0
Second..... do.....	52.9	58.4	46.2	37.4
Third..... do.....	15.8	13.2	16.5	11.6
One lung affected..... do.....	25.0	19.7	23.3	25.8
Condition of lungs on discharge:				
Improved..... do.....	34.2	75.7	91.2	88.4
Stationary..... do.....	10.3	17.0	6.3	8.8
Worse..... do.....	5.1	7.1	2.2	2.6
Deaths..... do.....	0.4	0.2	0.3	0.2

<sup>1</sup> Of those having cough and expectoration on admission.

<sup>2</sup> Of those showing positive bacillary diagnosis on admission.

<sup>3</sup> Of those having fever on admission.

<sup>4</sup> Of those having night sweats on admission.

## APPENDIX II.—MEMORANDUM ON TUBERCULOSIS.

[Compiled and published in English by German Imperial Board of Health at Berlin.]

## A. WHAT IS TUBERCULOSIS?

Tuberculosis is the most destructive of all infectious diseases. It attacks various parts of the body, chiefly, however, the lungs; it spares no nation, no age, no vocation, no class of people. More than 100,000 persons die each year in Germany from the effects of it, the number of patients afflicted by it being estimated as 10 times as numerous. Every third person who dies between the ages of 15 and 60 years succumbs to tuberculosis.

Tuberculosis is caused by the tubercle bacillus discovered by Robert Koch. This is a minute creature of the lowest scale, visible only when very highly magnified. It thrives best at blood temperature (about 98° F.) and multiplies in the interior of the body. It reaches the outer world chiefly in the sputum of sick persons and in the milk of diseased animals.

Every person is exposed to the danger of taking up the germs of tuberculosis into his own system, and many harbor them a long time without knowing it.<sup>1</sup> Everyone must therefore be prepared for battle with this enemy.

The tubercle bacillus is most efficiently destroyed by burning, boiling, or steaming. It can not long resist the action of sunlight. Other means of disinfection, such as cresol water, a solution of carbolic acid, formaldehyde, require a special previous knowledge for safe and effective use.

## B. HOW DOES THE INFECTION TAKE PLACE?

Hereditary tuberculosis is rare.

Tubercle bacilli enter the human body mainly by the respiratory organs and the digestive system.

Tubercle bacilli are taken up—

1. By inhaling with the air germs either from the dried sputum of tuberculous persons in the dust, whirled by winds and drafts while sweeping out, or carried on clothing or shoe soles; or from the minute moist drops which invalids diffuse in their immediate vicinity by coughing or talking.

2. With the food, first through unboiled milk, also, in case of unsatisfactory inspection of meat through the flesh of tuberculous animals, which, admitted in trade, was not afterwards thoroughly cooked before being eaten.

3. By means of unclean hands and unclean utensils, e. g., in the case of children crawling on the floor, seizing soiled objects (clothing, handkerchiefs, and the like) and immediately afterwards putting the fingers into the mouth (sucking fingers, biting nails, licking fingers when turning over leaves), picking the nose, and similar bad habits as putting into the mouth toys, drinking glasses, eating utensils, wind instruments used by others.

Tubercle bacilli may also enter through injured or diseased places in the skin or in the visible mucous membrane (unnoticed small sores, scratches, eruptions).

The result of the absorption of tubercle bacilli usually in the case of children at first a disease of the glands (e. g., of the neck and abdomen) and, in connection therewith, of the lungs, the bones, and joints (scrofula of the bones, tubercular excrescences, voluntary limping), the cerebral membrane, etc. In the case of adults infection by inhalation predominates and leads to tuberculosis of the lungs, more infrequently of the larynx (consumption). Through absorption

<sup>1</sup> One-fourth of the corpses of persons who have died from other diseases show internal traces of tuberculosis that had been overcome.

of the tubercle bacilli into the skin there is arising tuberculosis of the skin (e. g., lupus, corrosive herpes.)

Most usually tuberculosis progresses slowly (chronically); exception, galloping consumption.

### C. HOW DOES ONE PROTECT ONESELF AGAINST TUBERCULOSIS?

Each person, even the weakest and poorest one, will highly contribute to guarding himself against tuberculosis by merely combining judgment with self-control.

#### *1. Measures against contracting tuberculosis.*

1. Let every person, whether well or sick, provide for the safe removal of the sputum, since one can not detect from the simple appearance whether sputum is tuberculous or not. Do not spit on the floor of closed rooms (including street cars and railway coaches) or on frequented thoroughfares. Place in convenient corners spittoons filled with water which, to insure safety, should be cleansed at short intervals by disinfecting methods. Hold your hand before your mouth when coughing. Turn away from a coughing neighbor that does not do so. Articles of clothing should always be kept clean, the trailing of garments should not be tolerated. The clothes, beds, linen, eating and drinking utensils of tuberculous persons may be used by others only after thorough disinfection. Dry sweeping should give place to moist; if need be, scour with hot soda or a hot solution of soft soap. The raising of dust in the dwelling room, the work place, and on the street should be avoided whenever possible. Shun bars or refreshment rooms where spitting on the floor is allowed. Children should be kept out of dusty workshops and from work that develops dust (carpet beating).

2. Let the strictest cleanliness prevail in the preparation and preserving (guard against flies) as well as in the eating of food, especially of that which is eaten raw. Milk should be boiled and meat cooked thoroughly before being eaten; the boiled milk should be covered and kept as cool as possible.

3. The hands, including the nails, the teeth, and mouth, should be cleansed frequently and thoroughly. Putting the fingers into the mouth or nose and also scratching the face should be discontinued. Every sore should be protected against impurities by suitable bandages.

4. With regard to the tuberculosis of animals it will suffice to say that in cattle it usually affects the lungs, in pigs usually the glands of the neck or the intestines; in the former, commonly, through inhalation, in the latter through the food, chiefly through the unboiled refuse and skim milk of dairies. Proper means of extirpation are—gradual sorting out of tuberculous cattle, chiefly of those that betray visible signs of the disease (tubercular knots on the udder, coughing, with emaciation and rough hair, and the like) from special dairies for children's milk and establishments for breeding; but also removal of all other animals feverish from the injection of tuberculin; separation of calves from tuberculous mothers; frequent exercise of the calves and young cattle, if possible of the older animals, too, in the open air should be encouraged; the use of boiled milk only; and boiled dairy residues for the feeding of pigs;<sup>1</sup> keeping the stalls clean.

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<sup>1</sup> Many large dairies now heat all the milk before manufacture so that all danger is removed.

*II. Measures for strengthening the body.*

It will be impossible to extirpate all tubercle bacilli, therefore it is indispensable so to strengthen and harden the body that the absorbed germs can not take hold upon it. The principal means<sup>1</sup> are:

Plain and wholesome food, which by judicious selection need not be expensive. Dainties and intoxicating drinks should be avoided.

A dwelling accessible to the entrance of air and light; rather in the suburbs than in the heart of the city; the best room selected as a sleeping room.

Plain, durable clothing made of material not too thickly woven, neither too warm nor too cool; in the case of a person in repose or of a sedentary occupation warmer than in that of someone frequently in motion; discarding the follies of fashion that hamper the free movement of the body, e. g., the corset and belts.

Only after defraying the necessary costs of dwelling, eating, and clothing, other expenses may be considered.

Let order and cleanliness have the first place in the whole conduct of life. Wash the whole body daily with moderately cold water or rub it vigorously with a rough, damp cloth, bathe in pure river or sea water, or take a shower bath (sparing the head), keep hair and beard, teeth and mouth, also the nails clean. Breathe through the nose keeping the mouth shut; the former is the natural filter for impure and injurious substances. If breathing through the nose is difficult, be examined by a physician; it is often easy to remove the impediment.

Seek to perform your work in accordance with your health. Take advantage of prescribed measures for protection. Avoid a bent position in intellectual work. If you are an employer, consider how you may remove noxious substances or prevent such from arising (dust, smoke, etc.). The time for work and rest should be in proper proportion.

Devote the hours free from work to the strengthening of those parts of the body that had little opportunity to be exercised during work. Take exercise outside of your dwelling. Draw in long, deep drafts of fresh air while holding the hands pressed against the sides. Accustom yourself also to being in the open air in unfavorable weather. Change wet clothing and shoes. Gymnastic exercises—especially when out of doors—suited to the conditions of the body, together with tramps on foot, games, moderate cycling, rowing, swimming, and the like are the best allies in the fight with tuberculosis.

Go to bed at a reasonable hour. Avoid excesses of every sort. They destroy in a few minutes what has been gained in years. As little as a glass of moderately cool beer, a cup of moderately strong coffee or tea, a cigar—enjoyed at the proper time—injure the normal adult body as much as every intemperance injures it.

Finally, shun intercourse with persons who are suffering from infectious diseases; if duty or profession demands such intercourse, then bear constantly in mind the prescribed measures of precaution. If you move into a house where a tuberculous person has lived recently, have it first disinfected.

**D. ADVICE TO PERSONS IN GREAT DANGER.**

Every one should study the foregoing rules of health, but especially all those persons who, from any reason whatever, have cause to fear tuberculosis more than others; weakly persons, such as have a long and slender figure with a flat

<sup>1</sup> Further particulars are contained in the "Gesundheitsbüchlein," compiled in the Kais. Gesundheitsamt. 13. Ausgabe, Berlin, J. Springer, 1908.

chest, particularly if they descend from tuberculous parents; again, such as have a reason for the assumption that they have already taken up the germs of tuberculosis through intercourse with consumptive persons (relatives, guardians, fellow workmen, or playmates) or in consequence of their own sickness in childhood from scrofula and the like; also those whom their vocation endangers (who work indoors or in the midst of dust, etc.); finally, those recovering from a severe sickness, from measles, whooping cough, influenza, and generally such as have suffered or are still suffering from diseases of the lungs or chronic affections of the throat, diabetes, chlorosis, or are inclined to severe losses of blood (nose bleeding and the like).

Let him who possesses a body little capable of offering resistance have regard to this fact when he chooses an occupation: An occupation that leads into fresh air and steels the body through exercise is better than a business that confines within doors. Persons with sensitive respiratory organs have to avoid not only dust (and consequently dusty trades) but also smoke (tobacco smoke included) and cold, rough winds or else to take corresponding measures of precaution; talking in the cold air or while walking should be discontinued, and one should guard against catching cold and excessive bodily exertion.

Not less important is the sensible observance of general measures of precaution in every place where people assemble in large numbers through their occupation or from other causes (in schools, boarding schools—corresponding conduct of tuberculous teachers—factories, hotels, poorhouses, orphanages). Neglect of tuberculosis by individuals endangers the general public.

#### E. ADVICE TO DISEASED PERSONS.

If symptoms appear that arouse the suspicion of a not merely transient disease of the respiratory passages, repeated coughing (dry or with sputum), frequent pains in the throat, breast, or back, lasting depression or tendency toward exhaustion, recurring fever, especially in the evening, with night sweats (though the covering be light), traces of blood in the sputum or even a discharge of blood from the throat, then a radical examination by the physician (also of the sputum for tubercle bacilli) should be made as soon as possible. If the suspicion is not confirmed, yet the advice given under D should be carefully followed. If the suspicion is confirmed, then the regulations prescribed by the physician are first of all to be observed. No cure is of avail if the patient himself does not contribute thereto by his general hygienic conduct and rigid observance of the prescribed measures of precaution. The patient should realize the double duty of taking thought for his own cure, in order to become once more a useful, earning member of human society, and also of preserving his family, servants, and neighbors from infection by heeding the precautionary regulations. Incipient tuberculosis is often curable; advanced seldom. Success depends chiefly on timely anticipation.

Especial attention should be paid to the sputum; it should neither be cast upon the floor nor swallowed, but rather be vented into a separate, suitable vessel, which should be regularly disinfected; better still are the saliva bottles (something like the Dettweiler) which the patient takes with him. Should it be necessary at times to vent the sputum into the handkerchief, the latter should be boiled before becoming dry.

The disease can also be communicated by kissing. An evidently consumptive person should be urgently dissuaded from marrying; let him wait until he is cured. Tuberculous women should not suckle or nurse children.

The cure is most surely effected in a sanatorium devoted especially to the restoration of consumptives and directed by an experienced physician. After

not too short a sojourn (not under 3 months), the obedient and attentive patient often regains not only his health, but appropriates to himself also the rules of living necessary to avoid relapses.

To poor consumptive people advice and help is given free of charge by the information and care offices recently so often established (Auskunfts- und Fürsorgestellen) and by dispensaries for tuberculous people.

### APPENDIX III.—DEFINITION OF GERMAN TERMS RELATING TO TREATMENT AND CARE OF TUBERCULOUS WAGE EARNERS.

1. **Heilbehandlung**: This term has been interpreted as "treatment and care." There is no exact equivalent of this term in the English language.
2. **Heilverfahren**: This term has been interpreted as "systematic institutional treatment and care." There is no exact equivalent of this term in the English language.
3. **Landes-Versicherungsanstalt**: This term has been interpreted as "invalidity insurance institution." In German law the term, however, is more inclusive, since the insurance provides also for annuities on account of old age.
4. **Fürsorge**: This term has no exact equivalent in English, and the word "care" very inadequately gives expression to the German meaning of the word. In brief, the term comprehends the whole German paternal solicitude of the State toward wage earners and others in all matters summed up in the approximate English equivalent of "welfare work."
5. **Dauererfolg**: This term has been interpreted as "permanent economic results of treatment and care," but in actual practice the observed results are generally limited to five or six years. By results is meant the retained earning capacity of the patient after his or her discharge from the sanatorium.
6. **Walderholungstätte**: This term has been interpreted as "forest day and night camps," and on some occasions as "forest convalescent homes."
7. **Invalidentensionen**: This term has been interpreted as "homes for incurables." The use of the term varies with different institutions, but in the present sense applies to homes provided for tuberculous wage earners in a stage of the disease too far advanced to warrant the anticipation of a successful recovery of health, strength, and wage-earning capacity. Insured members provided with accommodation in homes of this kind pay for their support by means of their invalidity or disability annuities.
8. **Erwerbsfähigkeit**: This term has been translated as "wage-earning capacity," which, in the strict sense of the German invalidity insurance law, means the ability to earn at least one-third of the normal daily wages of the employment usually followed.
9. **Erwerbsunfähigkeit**: This term has been translated as "incapacity for work," which, in the strict sense of the invalidity insurance law, means inability to earn one-third of the usual wages in the occupation followed.
10. **Volkshelilstätten**: This term has been translated as "public sanatoria," irrespective of whether owned and maintained by invalidity insurance institutions or by States, provinces, municipalities, etc., provided the accommodation is primarily for wage earners, whether free or on payment of rates within the paying ability of wage earners and their dependents.
11. **Privatheilanstalten**: This term has been interpreted in the usual sense of private sanatoria maintained for the accommodation of pay patients, but in many of these wage earners are provided with accommodations at reduced rates.

12. **Kinderheilstätten:** This term has been interpreted as "sanatoria for children," which is about the equivalent of the term "preventorium," since the object is not only to treat tuberculous children, but also to treat children of tuberculous wage earners who are scrofulous, anemic, or otherwise impaired in health.
13. **Schulsanatorien:** This term is practically the equivalent of No. 12 (Kinderheilstätten), except that the accommodation is limited to tuberculous school children.
14. **Waldschulen:** This term has been interpreted as "open-air" or "forest" schools. In the strict interpretation of the term the schools are open-air schools, located in forests, and the provision is for tuberculous children of school age, the treatment being combined with teaching methods adapted to the situation.
15. **Ländliche Kolonien:** This term has been interpreted as "agricultural colonies" which provide treatment and care for convalescing tuberculous wage earners, together with possibilities for light outdoor work under medical supervision.
16. **Invalidenheime:** This term is the equivalent of No. 7 (Invalidenpensionen).
17. **Genesungsheime:** This term has been interpreted as "convalescing homes," but the meaning is somewhat indefinite and the accommodation may be for tuberculous as well as nontuberculous wage earners, chiefly, however, for convalescing patients who have received previous and systematic treatment in sanatoria, hospitals, etc.
18. **Beobachtungsstationen:** This term has been translated as "observation stations" established for the purpose of ascertaining the patients' condition and to safeguard against the admission of the nontuberculous to institutions provided for the treatment and care of tuberculous wage earners.
19. **Polikliniken:** This term has been translated "tuberculosis clinics," usually conducted in connection with hospitals and medical schools.
20. **Auskunfts- und Fürsorgestellen:** This term has been translated as "information bureaus and tuberculosis dispensaries," in clear distinction to polyclinics and tuberculosis clinics, which provide medical treatment and medicines, which is not the case in German tuberculosis dispensaries on the so-called Pütter plan.
21. **Tuberkulose-Vereine:** This term has been translated in the usual sense of tuberculosis associations, chiefly such as are maintained by private subscriptions, but also such as are under official patronage and subsidized by State and municipal contributions, or the financial aid rendered by invalidity insurance institutions, sick funds, etc.
22. **Deutsches Zentral-Komitee zur Errichtung von Heilstätten Lungenkranker:** This term has been translated, briefly, as "The German Central Committee," which formerly had the subtitle "for the establishment of sanatoria for tuberculous wage earners," but which now bears the subtitle "for the warfare against tuberculosis." This committee sustains the efforts throughout Germany to increase the number of public sanatoria and to further financially the establishment of tuberculosis dispensaries, etc.
23. **Invaliden-Versicherungs-Gesetz (Juli 13, 1899):** This term has been translated as the "invalidity insurance law." The text of the law used is the English translation published by the foreign office under date of December, 1899, No. 518 of the miscellaneous section of diplomatic and consular reports and reprinted in Bulletin of the Bureau of Labor, No. 91.

**APPENDIX IV.—LEGAL PROVISIONS REGARDING TREATMENT OF ACTUAL OR PROSPECTIVE INVALIDS.**

The special treatment of actual or prospective invalids was provided for in section 18 of the German Invalidity and Old Age Insurance Law of 1899,<sup>1</sup> as follows:

**SECTION 18.** If an insured person is so ill that incapacity to earn a livelihood is to be apprehended as a consequence of the illness, which would constitute a claim to a pension, in accordance with the laws of the Empire, the insurance institution is entitled to cause him to undergo a cure to the extent it may think desirable in order to avert this loss.

The insurance institution can effect the cure by placing the sick person in a hospital or in an establishment for convalescents. If the sick person is married, if he has a household of his own, or if he is a member of the household of his people, his consent to this step is required.

If the insurance institution orders a cure to be entered upon, the obligations of the sick fund toward the insured person pass to the institution from the commencement of this curative course to its conclusion, in the case of such insured persons as come under the provision against illness, under the laws either of the Empire or State.

The sick fund has to indemnify the insurance office to the amount of the payment which the insured person could claim from it.

During the cure, relief has to be paid to such persons as are dependent upon the insured person, and for whose maintenance the insured person has hitherto provided out of his earnings, as also when the insured person does not come under the provisions for sickness under the laws of the Empire or State. Relief of this nature, in so far as the insured person had to be tended under the provisions for sickness of the laws of the Empire or State, amounts to the half of the money he ought to receive during the legal time of the sick relief, and otherwise to a fourth of the standard daily wages of ordinary day laborers in the locality of his last employment or of his last abode. If the insured person is in receipt of an infirmity pension, the same can be also reckoned for the relief of persons dependent upon him.

The cooperation of the invalidity insurance institution and the sickness insurance association in connection with the special treatment of invalids was provided for in section 19 of the law, as follows:

**SECTION 19.** The insurance institution which causes a cure to be entered upon is authorized to transfer the provision for the sick person to the sick fund to which he belongs or last belonged, to the extent which the insurance institution considers fitting. If a burden is thereby imposed on the funds which exceeds the extent of the provision to be made by it according to law or statute, the insurance institution has to make good the surplus costs arising. If the obligation of provision on the part of the sick fund no longer existed, the insurance institution, by awarding the services specified in section 6, paragraph 1, of the sickness insurance law, has to indemnify it with half of the money paid to the sick person; and if the insured person is placed in a hospital or in an establishment for convalescents, one and a half times the amount of that money, in so far as greater expenses are not proved.

The cooperation of industrial accident associations was provided for in section 21 of the law, as follows:

**SECTION 21.** If the illness, on account of which the cure is entered upon, is due to an accident which entitles to compensation under the imperial laws on accident insurance, and if the entering upon a state of incapacity to earn a livelihood is prevented by the curative course, and, at the same time, a burden to the person upon whom the cost of indemnification in cases of accident insurance has taken place from the fact of the accident compensation having been withheld altogether or granted in part only, then the insurance institution has a claim

<sup>1</sup> For text of this law see Bulletin of the Bureau of Labor, No. 91, p. 966 et seq.

against this person for reimbursement of the costs of the cure to the extent provided in section 19, sentence 3. A reimbursement of the costs of the cure, which arose before the beginning of the fourteenth week after the accident occurred, can not be claimed.

It was further provided by the law of 1899, under section 22, that:

**SECTION 22.** If the insured in consequence of the illness becomes incapable of earning a livelihood, he can, in cases where he has declined without good cause to follow the measures adopted by the insurance institution in accordance with sections 18 and 19, be deprived for a time of the infirmity pension either wholly or partially, in so far as these consequences were pointed out to him, and if it is proved that his incapacity to earn a livelihood is the result of his own conduct.

Under section 45 of the law of 1899 authority was granted to the invalidity insurance institutions to advance loans for the establishment of sanatoria or to erect such sanatoria on their own account. The section follows:

**SECTION 45.** By unanimous decision of the directors and of the committee it can be decided that the surpluses of the special capital of an insurance institution over the permanent requirements for covering their obligations can be applied to other services than those provided for in the law in the economic interest of the pension recipients of insured persons, and of their dependents provided for by the insurance institution.

Such decisions require the sanction of the Federal Council. The sanction can be withdrawn if the special capital of the insurance institution no longer suffices to permanently cover their obligations.

In addition to the above provisions the following articles of the Workmen's Insurance Code of July 19, 1911, provide for medical treatment for the prevention of invalidity:<sup>1</sup>

#### V. MEDICAL TREATMENT.

##### ARTICLE 1269.

In order to prevent impending invalidity of an insured person or of a widow resulting from sickness, the insurance institute may inaugurate a course of medical treatment.

##### ARTICLE 1270.

**PARAGRAPH 1.** The insurance institute may in particular place the insured person in a hospital or in an institution for convalescents.

**PAR. 2.** If the sick person is married and lives together with his family or has a household of his own, or is a member of the household of his family, then his consent thereto shall be required.

**PAR. 3.** In the case of a minor person, his consent shall be sufficient.

##### ARTICLE 1271.

The relatives of the sick person whose support he has either wholly or principally defrayed out of his earnings shall, during the course of treatment (art. 1270) receive house money even in cases where he has no claim against the sick fund, the miners' sick fund, or the substitute fund. It shall amount to one-fourth of the local wage for an adult day laborer. If, however, up to the

<sup>1</sup> For text of this law see Bulletin of the Bureau of Labor, No. 96, p. 514 et seq.

assumption of the matter by the insurance institute, the sick person was subject to the sickness insurance, the house money shall be based on the provisions of the sickness insurance for that time also for which the obligation of the sick fund no longer exists. An invalidity pension or widow's pension may be either wholly or partly refused for the duration of the course of treatment. The house money shall not be paid, for the time and to the extent that wages or salary are paid, on the basis of a legal claim.

## ARTICLE 1272.

If the sick person without legal or other reasonable ground declines to receive the medical treatment (art. 1269) and if the invalidity could probably have been prevented through the medical treatment, then the pension may, for the time being, be refused either wholly or partly if the sick person has been notified of this consequence.

## ARTICLE 1273.

In regard to controversies which have not been settled on the determination of the pension, the superior insurance office shall decide finally upon the appeal.

## ARTICLE 1274.

With the approval of the supervisory authority, the insurance institute may expend its funds to promote or to carry out general measures for the prevention of premature invalidity among insured persons or improve the health conditions of the population subject to the insurance. Approval may also be granted for the expenditure of lump sums.

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# INDEX.

	Page.
<b>Administrative control of tuberculosis</b> .....	98-116
Agricultural colony at Stübeckshorn for tuberculous wage earners.....	111, 112
Building loans by invalidity insurance institutions.....	114-116
Dispensaries and information bureaus.....	99-111
Housing reform.....	112-114
Sanatorium treatment, limitations of.....	98, 99
Town planning and sanitary progress.....	116
<b>Admission to, and discharge from, sanatoria of tuberculous patients according to Turban stage of disease, statistics of</b> .....	84-87
<b>Agricultural colonies and forest homes for tuberculous patients</b> .....	37
<b>Agricultural colony at Stübeckshorn for tuberculous wage earners</b> .....	111, 112
<b>Annuities, disability, granted on account of tuberculosis by invalidity insurance institutions:</b>	
Berlin.....	118
Hanse Towns.....	153-155
Rhenish Prussia.....	182
<b>Army recruits, rejection of, on account of tuberculosis, report of, to invalidity insurance institutions required</b> .....	66
<b>Augsburg, tuberculosis dispensary in</b> .....	109, 110
<b>Baden, invalidity insurance Institution of, experience data of</b> .....	143-149
<b>Berlin, invalidity insurance Institution of, experience data of</b> .....	117-125
<b>Berlin invalidity insurance institutions, per cent of disability annuities granted by, on account of tuberculosis, 1910</b> .....	118
<b>Berlin, tuberculosis dispensaries in</b> .....	102-104
<b>Bibliography</b> .....	173-179
<b>Board of Health, Imperial, at Berlin, memorandum on tuberculosis by</b> .....	165-169
<b>Building loans made by invalidity insurance institutions to aid in control of tuberculosis</b> .....	114-116
<b>Children, tuberculous, measures for treatment and care of, advised by German Central Committee</b> .....	86
<b>Cost of treatment and care of tuberculous patients:</b>	
Distribution of.....	39
Per capita.....	75, 76, 78-80
To specified territorial and employees' insurance institutions, 1910.....	25
<b>Deaths from tuberculosis:</b>	
German cities and American cities compared, 1880 to 1909.....	18
Germany.....	11-15
Hamburg.....	150, 151
Kingdom of Wurttemberg.....	138
United States, registration area, 1900 to 1909.....	16, 17
<b>Disability annuities granted on account of tuberculosis by invalidity insurance institutions:</b>	
Berlin.....	118
Hanse Towns.....	153-155
Rhenish Prussia.....	182
<b>Discharge from, and admission to, sanatoria of tuberculous patients according to Turban stage of disease, statistics of</b> .....	84-87
<b>Dispensaries and information bureaus, control of tuberculosis through</b> .....	99-111
<b>Dispensaries and information bureaus instituted by German Central Committee</b> .....	35, 86
<b>Dust and fumes as predisposing causes of tuberculosis</b> .....	41, 42
<b>Earning capacity, restoration of, through treatment</b> .....	26-32, 55, 84-89, 96, 124, 129, 159
<b>Economic loss (estimated loss of earning power) from tuberculosis in United States</b> .....	18, 19
<b>Economic value, estimated, of sanatorium treatment in Germany</b> .....	20-22
<b>Employment, suitable, of tuberculous patients</b> .....	78
<b>Experience data of representative invalidity insurance institutions in treatment and care of tuberculous wage earners, 1910</b> .....	117-161
Baden.....	143-149
Berlin.....	117-125
Hanse Towns.....	149-161
Rhenish Prussia.....	130-136
Westphalia.....	125-130
Wurttemberg.....	136-143
<b>Family support, contributions to, during treatment of wage earners in public sanatoria</b> .....	68, 69
<b>Forest homes and agricultural colonies for tuberculous patients</b> .....	37
<b>Fumes and dust as predisposing cause of tuberculosis</b> .....	41, 42

	Page.
German Central Committee for the Prevention of Tuberculosis, organization and activities of	34-38
Dispensaries and information bureaus	35, 36
Forest homes and agricultural colonies	37
Homes and institutions for advanced cases	37
Sanatoria	36, 37
Treatment and care of tuberculous children	37, 36
Work of the organization, conclusion as to	37, 38
German Imperial Board of Health at Berlin, memorandum by, on tuberculosis	165-169
German invalidity insurance institutions, in treatment and care of tuberculous wage earners, experience data	58-98
Army recruits, rejection of, on account of tuberculosis, notice of, required	66
Cost and duration of treatment	75, 76, 78-80
Employment, suitable, of tuberculous patients	78
Expenditures on account of treatment and care	61-65
Family support, provisions for, during treatment of wage earner in sanatorium	68, 69
Financial aid given in campaign against tuberculosis	67
Loans by, for the erection of public sanatoria	77, 78
Methods of treatment and care	69-75
Patients treated, number of, by sex	60, 61
Proportion of insured population treated in 1909	65
Proportion of patients treated, by selected States	65, 66
Sanatoria owned by, financial statistics of	76, 77
Sanatorium treatment, general conditions as to value of	96-98
Sanatorium treatment, postdischarge results of	87-94
Sanatorium treatment, successful and unsuccessful, financial statistics of	94-96
Treatment, effect of premature discontinuance of	81
Treatment, statistics of readmission for	81-83
Turban-Gerhardt method of classifying tuberculous patients	83, 84
Turban stage of disease, statistics of admission and discharge of patients according to	84-87
German terms relating to treatment of tuberculous wage earners, definition of	169, 170
Hamburg, death rate from tuberculosis in	150, 151
Hamburg, tuberculosis dispensaries in	105, 106
Hanse Towns, invalidity insurance institutions of, experience data of	149-161
Homes and institutions for advanced cases of tuberculosis	37
Hospital and sanatorium treatment, comparative results of	33, 34
Housing reform, control of tuberculosis through	112, 114
Imperial Board of Health at Berlin, memorandum on tuberculosis by	165-169
Indoor and outdoor workers, proportion of, among tuberculous patients	41
Information bureaus and dispensaries instituted by German Central Committee	35, 36
Institutional and noninstitutional treatment of tuberculous patients, comparative results of	32, 33
Institutions and homes for advanced cases of tuberculosis	37
Invalidity insurance institutions. (See German invalidity insurance institutions.)	
Invalidity insurance institutions, treatment and care of tuberculous patients by, legal sanction for	22, 23
Legal provisions regarding treatment of actual or prospective invalids	171-173
Leipzig, tuberculous dispensaries in	106, 107
Mortality from tuberculosis:	
German cities and American cities compared	18
German Empire	11-15
Hamburg	150, 151
Hospitals and sanatoria compared	33, 34
United States, registration area	15-17
Munich, tuberculosis dispensary in	107-109
Occupational conditions of tuberculous patients	42, 43
Outdoor and indoor workers, proportion of, among tuberculous patients	41
Patients treated for tuberculosis. (See Tuberculosis, statistics of patients treated for.)	
Public institutions for treatment of tuberculous wage earners, experience data of	38-58, 162-164
Causes, predisposing or complicating, in tuberculosis	41, 42, 44, 45
Condition of patients, changes in, during treatment	49-52
Condition of patients on admission	47, 48
Cost of treatment, provisions for defraying	39
Occupational conditions of patients	42
Previous duration of disease	45, 46
Previous sanatorium treatment	45
Patients with family history of tuberculosis	43, 44
Patients treated, proportion of indoor and outdoor workers	41
Patients treated, age, sex, and conjugal condition of	40, 41
Sanatorium experience, 1896 to 1901, summary of	56-58
Social condition of patients	43
Treatment, duration of	52, 53
Treatment, economic results of	54, 55
Treatment in incipient stage of disease, importance of	55, 56
Treatment, medical results of	53, 54
Treatment of tuberculosis in relation to gain in weight of body	48, 49
Treatment of tuberculosis in relation to stage of disease	46, 47
Prussian-Hessian railways pension fund, average membership of, tuberculous patients treated, cost, etc	28
Rhenish Prussia, Invalidity Insurance Institution of, experience data of	130-136
Sanatoria experience data:	
German invalidity insurance institutions	58-98
Public institutions for treatment of tuberculous wage earners	38-58

	Page.
Sanatorium treatment of tuberculosis, Germany:	
Comparative results of, with treatment at home.....	32, 33
Comparative results of, with treatment in hospitals.....	33, 34
Cost of, per person, in 1910.....	24-26
Earning capacity of wage earners, restoration of, resulting from.....	26-32
Economic value of.....	20-22
Legal sanction for, to invalidity insurance institutions.....	22, 23
Limitations of.....	98, 99
Results of.....	87-98
Wage earners treated, 1910, number of.....	23, 24
Sanitary progress and town planning, control of tuberculosis through.....	116
Silesia, tuberculosis dispensaries in.....	109
Tuberculosis, administrative control of.....	98-116
Tuberculosis, memorandum on, by German Imperial Board of Health at Berlin.....	165-169
Tuberculosis, special institutions for treatment of, owned by invalidity insurance institutions, number, financial, and other statistics of.....	71-74
Tuberculosis, statistics of patients treated for, in German institutions:	
Age at discharge, number and per cent of patients of each classified.....	123
Cost of treatment per day and per person.....	80, 96
Cost of treatment, Prussian-Hessian railways pension fund.....	28
Cost of treatment, total and per capita amount of, by districts.....	25
Days of treatment in each year, 1897 to 1900, number of.....	80
Duration of disease previous to admission, patients admitted in each specified year of.....	46
Earning capacity restored, patients having..... 28, 55, 86, 88, 89, 96, 124, 129, 159	159
Expenditures on account of treatment.....	62, 64
Expenditures per day for board and drink of patients, special institutions.....	76
Expenditures per day for board of patients, itemized.....	119
Mortality of patients in hospitals and in sanatoria compared.....	33
Patients discharged as cured, number and per cent of, by sex and by age on admission.....	54
Patients treated, number of, etc..... 24, 28, 40, 60, 61, 70, 96	96
Readmissions for treatment after discharge, number of.....	82, 83
Sanatoria, general, financial, and other statistics of.....	77
Treatment lasting each classified number of weeks, patients discharged after receiving.....	52, 133
Treatment, sanatorium, comparative results of, for two specified periods.....	164
Turban stages of the disease, sanatoria patients in each of the—	
admitted, number of.....	47
bacilli in sputum, number having.....	51
discharged, with and without earning capacity restored, number of..... 55, 86, 87	87
Tuberculosis. ( <i>See also</i> Deaths; Mortality.)	
Turban-Gerhardt method of classifying tuberculous patients.....	83, 84
United States and Germany, comparative mortality from tuberculosis in.....	15-18
United States, estimated economic loss in, from tuberculosis.....	18, 19
Wage earners, tuberculous, treatment and care of, experience data:	
German invalidity insurance institutions.....	58-98
Public institutions.....	38-53
Westphalia, Invalidity Insurance Institution of, experience data of.....	125-130
Westphalia, tuberculosis dispensaries in.....	110-111
Württemberg:	
Invalidity Insurance Institution of, experience data of.....	136-143
Mortality from tuberculosis, by age, 1908.....	138
Population in each age group, per cent of, insured.....	138
Tuberculosis of lungs, disability rate from.....	139

