

A study of the relation between the treatment of tubercular patients in general institutions and the reduction in the death-rate from tuberculosis : report / by Arthur Newsholme.

Contributors

Newsholme, Arthur, 1857-1943.
Royal College of Surgeons of England

Publication/Creation

[Paris] : [Masson], [1905]

Persistent URL

<https://wellcomecollection.org/works/mc7t259b>

Provider

Royal College of Surgeons

License and attribution

This material has been provided by This material has been provided by The Royal College of Surgeons of England. The original may be consulted at The Royal College of Surgeons of England. where the originals may be consulted. The copyright of this item has not been evaluated. Please refer to the original publisher/creator of this item for more information. You are free to use this item in any way that is permitted by the copyright and related rights legislation that applies to your use.
See rightsstatements.org for more information.

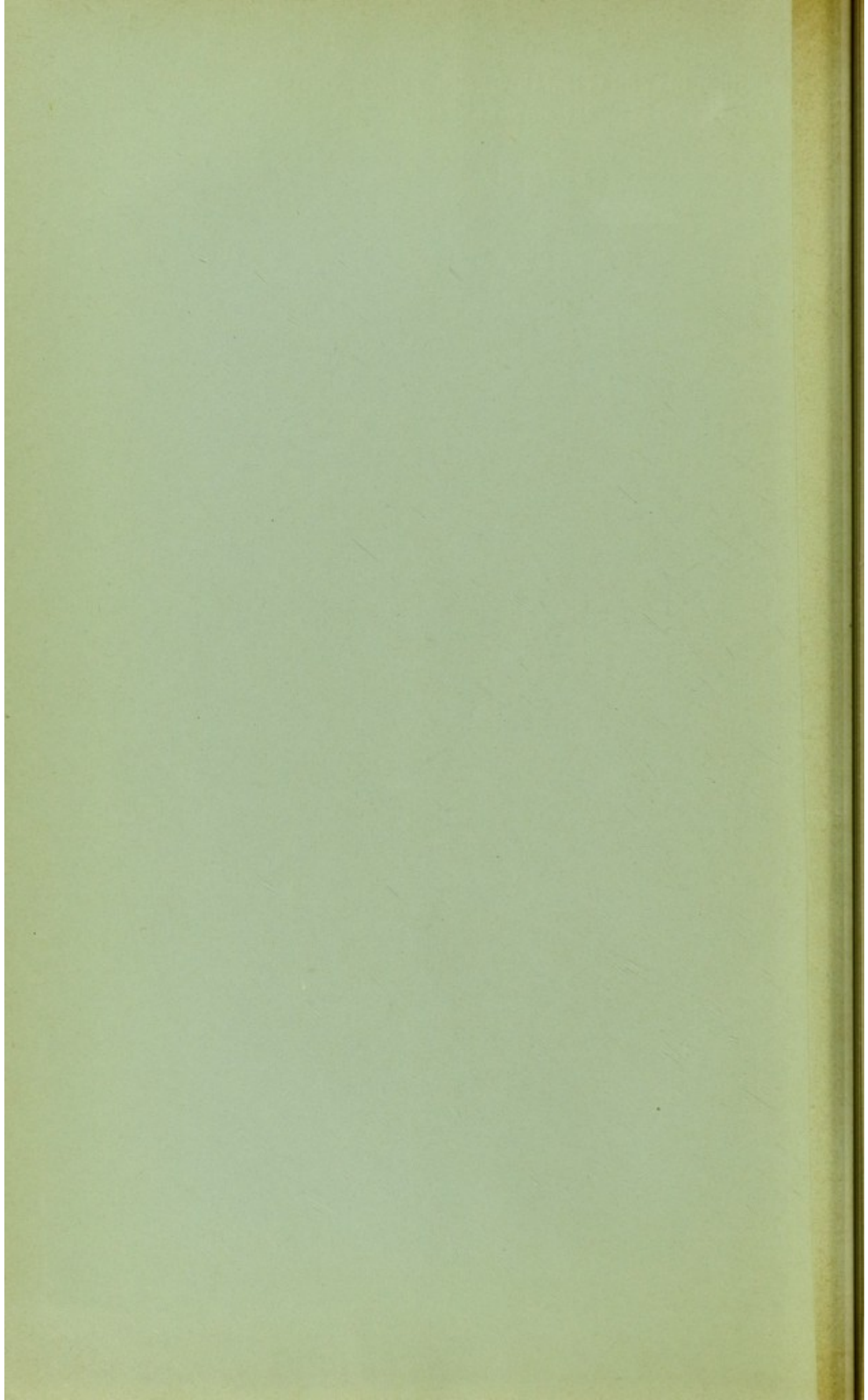
P. 6/10
CONGRÈS INTERNATIONAL DE LA TUBERCULOSE

PARIS, 2-7 OCTOBRE 1905

(10)

EXTRAIT

MASSON ET C^{ie}, ÉDITEURS



A STUDY OF THE RELATION BETWEEN
THE TREATMENT OF TUBERCULAR PATIENTS
IN GENERAL INSTITUTIONS AND THE REDUCTION
IN THE DEATH-RATE FROM TUBERCULOSIS

Report by Arthur NEWSHOLME. M.D., F.R.C.P.

Medical Officer of Health of Brighton.

This report is intended to direct attention to a means for the control of tuberculosis which, adopted for reasons wholly independent of that object, has operated to an important extent in that control; and to indicate broadly certain lines of an enquiry, still incomplete, which have led me to this conclusion.

The death-rate from Pulmonary Tuberculosis has steadily declined in England from 256 per 100,000 of population in 1861-65 to 125 in 1901-05, a decline of 52 per cent, and in Scotland from 255 in 1861-65 to 147 in 1901-02, a decline of 42 per cent. In Massachusetts it has declined from 565 per 100,000 in 1861-65 to 167 in 1901-02, or about 56 per cent. In some other countries the decline in the death-rate from tuberculosis began later, and in others there has been little or no decline, or even an increase of the death-rate from this disease.

The course of events can be better seen from the following table, which shows the death-rate in each quinquennial period since 1861-65 or since some later period when statistical returns were first available. The period 1861-65 is taken as the starting point, as it is doubtful if earlier statistical returns are trustworthy. Even during and possibly after the quinquennial period 1861-65, there is reason to believe that there may have been some confusion in the returns between Bronchitis or other diseases and Pulmonary Phthisis; but on the whole the returns may be taken as indicating within certain limits the actual course of events.

The facts roughly indicated by the following table emphasise the necessity of studying the subject from an international standpoint, in order to arrive at a sound judgment as to the cause or causes of the remarkable declines of the death-rate from tuberculosis shewn in the table, of the equally remarkable differences both in time and degree of these declines, and of the present differences in the death-rate from this disease. A careful study of the economic, social, and sanitary circumstances which historically have been associated with these variations in the death-rate from tuberculosis, ought to furnish us with some guidance in further action against the ravages of this

DEATH-RATE PER 100,000 OF POPULATION FROM

PERIOD	PULMONARY TUBERCULOSIS IN											TUBERCULOSIS IN		
	ENGLAND AND WALES	LONDON	SCOTLAND	IRELAND	PARIS	HAMBURG	BERLIN	COPENHAGEN	BELGIUM	BRUSSELS	MASSACHUSETTS U. S. A.	PRUSSIA	SWITZERLAND	NETHERLANDS
1861-1865	256	280	255	178 (1864-1865)	"		"	507	"	"	565	"	"	"
1866-1870	245	286	259	182	451 (1865-69)	500	"	297	"	"	565	"	"	"
1871-1875	222	251	248	190	612 (1870-71)		"	542	"	"	546	"	"	"
1876-1880	204	240	250	200	406 (1872-75)	500 (1872-1880)	557 (1877-80)	514	"	"	510	517 (1877-1880)	"	"
1881-1885	185	211	211	208	441	525	552	280	"	"	514	512	211	501
1886-1890	164	188	188	215	440	291	294	251	181 (1888-1890)	521	275	290	214	219
1891-1895	146	187	176	214	410	257	251	205	157	291	252	246	197	188
1896-1900	152	180	168	215	579	214	215	185	142	259	199	207	191	164
1901-1905	125	165 (1901-1904)	147 (1901-1902)	215	565 (1901-02)	188	204	149 ¹	125	197	167	195	"	"

1. The Copenhagen figures are for quinquennial periods anticipating by one year the other figures in the table, e. g. 1860-1864, etc.

disease, which still remains the most important cause of death from disease.

It has to be noted however that the gravest differences of opinion exist as to the teaching of the past. It is admitted by all that tuberculosis is an infective disease, that if infection could be prevented, the disease could not occur. It is further agreed that in the presence of a given amount of infection the extent of disease developing in a community depends also on the resistance of its members. By some hygienists means aiming directly at the prevention of infection are regarded as of small importance relatively to means directed towards the increase of resistance. The experience of England is quoted in favour of the thesis that by means of social and sanitary improvement, and without any measures directed against tuberculosis as an infective disease, an almost unequalled decline in the death-rate from tuberculosis has been secured. The success of the "English Method" is similarly quoted by French hygienists as the strongest argument against Sanatoria for Tuberculosis, when regarded not as a therapeutical measure in the treatment of this disease but as a means of preventing its spread. It is urged with some show of reason that the expenditure on Sanatoria will be disproportionate to the economic gain, and that public money will be more advantageously spent in preventing tuberculosis by means of improved housing and sanitation. It should be added in this preliminary statement of the problem, that it is not necessarily a question of choice solely between the Sanatorium treatment of tuberculosis and the adoption of general measures of sanitation. It may be that other means directed against infection, as for instance the treatment of advanced cases of phthisis in hospitals, may have been in the past, and may be still more so in the future, one of the most important means of preventing the spread of tuberculosis. Whether this is so or not, will be seen as we proceed.

My first duty is to analyse for each country the past conditions, so far as they can be ascertained, which have been associated with a declining or a non-declining death-rate from tuberculosis.

It will be convenient to discuss first those conditions which at first sight can only be regarded as having *increased the resistance* to disease by improved nutrition, etc.

If abundant and cheap food is a predominantly important factor in the prevention of tuberculosis, a close inverse relationship between food and tuberculosis should be found when a general review of foods is taken. I am able to give the data for such a review from 1877 onwards from Government Blue Books recently issued. "Index numbers" are employed in the following table based on the retail prices collected by the Labour Department of the Board of Trade, of bread, flour, potatoes, beef, mutton, bacon, butter, tea and sugar;

value being attached to each of these articles in accordance with the annual amounts spent by households in the purchase of the various articles.

	UNITED KINGDOM CHANGE IN AVERAGE RETAIL PRICE OF FOOD TO A WORKMAN'S FAMILY (1901 = 100)	CHANGE IN DEATH-RATE FROM PHTHISIS (1901-1905) = 100		
		ENGLAND AND WALES	SCOTLAND	IRELAND
1877-1880	155	166	152	95
1881-1885	126	147	144	97
1886-1890	102	154	128	99
1891-1895	98	119	120	100
1896-1900	94	108	114	99
1901	100	100	100	100

Food is not the only item which determines the cost of living. Unfavourable changes in the price of clothing and fuel or of rent might counteract or more than counterbalance the advantages secured in regard to food. That this is not so is shewn by the following relative facts. The proportional costs in 1881-85 and in 1900 respectively were for food 155 and 100, for rent 89 and 100, for clothing 105 and 100, for fuel and clothing 75 and 100, and for all the above four chief items of workmen's expenditure 116 and 100. The cost of living in the United Kingdom has therefore considerably declined. Compare this total cost with the phthisis death-rate in England.

	Years	1881-85	1886-90	1891-95	1896-99	Years
Relative figures for	Cost of living . . .	116	101	99	96	100 (1900)
	Phthisis death-rate.	147	154	119	108	100 (1901-05)

Evidently, therefore, if there is in England a relationship between the cost of living and death-rate from phthisis, it is masked by the operation of some other influences.

In Germany the same fact is shewn. This is clearly indicated in the following table derived from the same official Blue Book.

GERMANY

		1877-80	1881-85	1886-90	1891-95	1896-1900	1901
Relative figures for	Cost of living.	112	105	99	105	99	100
	Death-rate from Tuberculosis in Prussia. .	165	162	150	128	108	100

Between the individual years 1877 and 1886 when the death-rate in Prussia from tuberculosis was stationary, the total cost of living fell from 115 to 95; and in the years 1886-90 of equally cheap food as in 1901 the death-rate from tuberculosis was 50 per cent higher.

Lack of correspondence between cost of living and death-rate from tuberculosis may be due to the disturbing effect of changes in wages. Unfortunately exact comparison of wages is only possible in regard to workmen engaged in skilled trades. It is probable however that these wages give some clue to the corresponding wages of unskilled workmen. First, we may compare different countries in recent years :

COMPARISON OF RATES OF WAGES IN SKILLED TRADES

	UNITED KINGDOM	FRANCE	GERMANY	UNITED STATES	
Number of quotations of wages on which the following results are based.	470	248	184	141	
Mean weekly Wages for 15 skilled trades.	1. Capital cities	s d	s d	s d	s d
	2. Other cities and towns	42-0	56-0	24-0	75-0
Percentage Comparison (United Kingdom = 100). (1. Capital cities	56-0	22-10	22-6	69-4
	2. Other cities and towns	100	86	57	179
		100	65	65	195

British money wages are the highest in Europe, and the margin over the cost of living is probably the greatest in Europe. It is convenient to add here that the above statement of wages takes no account of length of current hours of labour. Speaking generally they are shortest in the United Kingdom, next shortest in the United States, France coming next, and Germany having the longest hours of labour. Germany also has the lowest wages. The same Government Blue Book gives the following *comparison of average family incomes*.

United Kingdom.	France.	Germany.	United States.
100	85	69	125

If in the language of the above report we “ split the difference ” arrived at by two methods, we may conclude that “ the average level of industrial wages in the United States is not far from 1 1/2 times that in the United Kingdom.... In the same way we might without great error take the average for Germany as 2/3, and for France 5/4 of that which prevails in the United Kingdom ’ ”.

1. *Memoranda, etc., prepared by the Board of Trade, Cd 1761, vol. I, p. 290).*

Comparing the past with the present, there has been increase of wages all round. Thus in 1881-85 and in 1900, the relative figures for wages in the United Kingdom were 85,4 and 100, in France 86,9 and 100, in the United States 90,5 and 100. In Germany the comparison does not extend back beyond 1886-90, when the relative figure was 80,9 as compared with 100 in 1900. But we have already seen that the greatest decline in the death-rate from tuberculosis in Germany occurred before this great improvement in wages.

It is clear that in the years which we are considering the cost of living has fallen and wages have increased. An examination of the consumption of food products per head, so far as the material is available, supports this view. These circumstances must have tended to reduce the mortality from tuberculosis; but the preceding statistics show that they have been operating in different countries to an extent and in a manner which are in no quantitative relation with the degrees of decline which have been realised, and at some periods appear to have varied in the opposite direction to it.

In the United Kingdom we have a further index of social comfort and welfare in the amount of pauperism. Paupers receive two kinds of relief, *out-door* or domestic and *in-door* or institutional. Institutional relief is given in workhouses and workhouse infirmaries, and in Great Britain there has been a fairly general enforcement of the regulation that in order that a sick or disabled husband may receive relief to which his destitution entitles him he must enter the infirmary. A sick wife on the other hand is not entitled to parochial relief, so long as her husband is in the receipt of wages sufficient to support her. This explains why, as we shall subsequently see, a much larger proportion of male than of female consumptives are treated in workhouse infirmaries.

	1861-1865			1901-1903		
	NO. OF PAUPERS PER 100,000 OF POPULATION IN RECEIPT OF			NO. OF PAUPERS PER 100,000 OF POPULATION IN RECEIPT OF		
	INDOOR RELIEF	OUTDOOR RELIEF	TOTAL	INDOOR RELIEF	OUTDOOR RELIEF	TOTAL
England and Wales. . .	694	4150	4824	688	1550	2218
London. . .	1078	2646	5724	1540	890	2450
Scotland. . .	255	3645	5896 (1868-1870)	242	1680	1922
Ireland. . .	928	108	1056	947	1525	2272

In the above table the intermediate periods between 1861-65 and

1901-05 are not given, but it may be stated that the changes visible between the two terminal periods have occurred gradually without any sudden transitions.

Pauperism has declined in England and Wales 54 per cent, while phthisis has declined 52 per cent; in London pauperism has declined 54 per cent while phthisis has declined 41 per cent; in Scotland 52 per cent, while phthisis has declined 45 per cent. In Ireland pauperism has increased 119 per cent, while phthisis has increased 21 per cent.

It will be noted that there is at the present time no proportion between the amount of official pauperism and the death-rate from phthisis. Thus in 1901-05.

		England and Wales.	Scotland.	Ireland.	
Per 100,000 of Population.	} No. of Paupers. . .	2218	1922	2272	
		} No. of Deaths from Phthisis.	125	(1901-02)	
				147	215

England and Ireland with an approximately equal amount of official pauperism have widely differing death-rates from phthisis.

If the countries are compared at an earlier period, a different result is obtained.

		England and Wales. (1861-65)	Scotland. (1868-70)	Ireland. (1861-65)	
Per 100,000 of Population.	} No. of Paupers. . .	4824	5896	1056	
		} No. of Deaths from Phthisis.	256	259	178

Here the two countries with the greatest amount of pauperism have the highest death-rate from phthisis. Can pauperism then have any relationship to phthisis mortality? If we are to judge by the amount of indoor pauperism, there does not appear on the face of the two sets of facts any relationship between them. For in England and Wales the proportion of institutionally treated paupers to the entire population has remained about the same from 1861 to 1905, in London it has increased, in Scotland and in Ireland it has remained almost the same. But if we consider the proportion between institutional and domestic pauperism, a very different impression is produced (see table on next page).

In each country in which institutional has replaced domestic relief of destitution, there has been a reduction of the death-rate from phthisis which is roughly proportional to the change. In Ireland, on the contrary, the ratio of institutional to total pauperism has decreased; and this decrease has been accompanied by some increase of the phthisis death-rate, notwithstanding the fact that the amount of institutional treatment of paupers in Ireland remains higher than in England and still higher than in Scotland.

	PROPORTION BETWEEN		
	PHTHISIS DEATH-RATE IN 1861-1865 AND 1901-1905	INSTITUTIONAL AND TOTAL PAUPERISM IN	
		1861-1865	1901-1905
England and Wales.. .	$\frac{208}{100}$	$\frac{14}{100}$	$\frac{51}{100}$
London..	$\frac{170}{100}$	$\frac{29}{100}$	$\frac{64}{100}$
Scotland..	$\frac{176}{100}$ (1866-1870)	$\frac{6}{100}$	$\frac{45}{100}$
Ireland..	$\frac{85}{100}$	$\frac{89}{100}$	$\frac{42}{100}$

It should be noted that the amount of official pauperism depends very considerably on rigidity or laxity of administration. For many years the trend in Great Britain has been towards insisting upon the applicant for relief entering the workhouse infirmary as a condition of receiving relief. This has led to more strenuous self-help by the poor, has given scope to private charity and has stimulated help from relatives and neighbours, before official relief is demanded. Laxity in giving domestic relief has been shewn by experience not only to increase the number of applicants for such relief, but has not been accompanied by a corresponding diminution of the need for institutional accommodation for paupers. In Scotland although the number of paupers institutionally treated has more than doubled, it remains lower than in other parts of the United Kingdom. In Ireland domestic medical relief is given much more readily and extensively than in other parts of the United Kingdom, and the paupers relieved at home probably comprise a much larger proportion of sick persons than in Great Britain. The significance of the varying proportion of institutional and domestic pauperism will be further discussed at a later stage.

There are no statistics of pauperism in foreign countries comparable with those for the United Kingdom.

As in regard to the raising of the standard of wages and the lowering of the cost of food, so also in regard to total pauperism, no proportion can be shewn to exist between its amount and the death-rate from phthisis. Even after ample allowance has been made for variations in method of administration of poor relief, it cannot be regarded as without significance that while the pauperism for equal popu-

lations is at the present time about equal in amount in England and in Ireland, the death-rate from phthisis is 75 per cent higher in the latter country than in the former. In short, *the preceding review of social circumstances in different countries, so far as these can be given statistical statement, does not justify the conclusion that any predominant causative relationship exists between them and the changes in the incidence of fatal tuberculosis which have occurred.*

This statement does not mean that the general nutrition and well-being of a population has no effect on its death-rate from tuberculosis. It is a matter of clinical experience that tuberculosis is most prone to attack those debilitated by some other illness; and rapid improvement of nutrition when a highly nitrogenous diet is given appears to form an important part of the Sanatorium cure of phthisis. Poverty undoubtedly under existent circumstances plays an important rôle in increasing tuberculosis. This is shewn by the higher death-rate from this disease among the poor in every country. *It still remains to be seen, however, in what manner poverty favours tuberculosis.* We have seen that it is not predominantly a question of deficiency of food, at least to an extent which can be shewn by statistics dealing with averages for entire populations. And inasmuch as such averages represent the condition of the majority of the populations in question, they must be regarded as comparable with average death-rates from tuberculosis in the same populations. Similarly it is not a question of wages, whether measured in money or in purchasing power, as the experience of Germany is inexplicable on this view. We must therefore conceive of poverty as acting by leading to the absence of or deficiency in some other factors of improvement, which, as in the case of Germany, may be supplied when there has been no improvement to a corresponding extent in food or wages. The most notable of these factors are :

(1) *Sanitary measures*, increasing the resistance of the population. The chief measures which are usually regarded as having operated in this direction are

(a) improved housing of the people, involving the reduction in the number of unhealthy dwellings, the abolition of courts, culs de sac, &c, as well as regulations for all new dwellings rendering the provision of sufficient ventilation of and air-space around each dwelling compulsory.

(b) The drainage of the subsoil, and the corresponding diminution of dampness of houses. The provision of " damp-proof courses " in all new houses.

(c) Like reforms in all large establishments, such as schools, barracks, etc.

(d) The better ventilation and greater cleanliness of factories and

workshops, and protection of work-people against the inhalation of dust¹.

(2) *Means for diminishing the opportunities for infection by the tubercle bacillus, whether by means of Sanatorium treatment or otherwise.*

Sanitary Measures.—Of the immense importance of the great sanitary measures which have been effected in the United Kingdom and in some other countries during the last fifty years there can be no doubt. To the provision of pure water supply and of main sewerage we owe the great decline of enteric fever which has occurred; and to our improved housing and diminished overcrowding, as well as to the early removal to hospital of notified cases, we owe the almost complete abolition of typhus; and as acute infective diseases open the door to tuberculosis the reduction even under the heading of those diseases must have been a contributory factor in producing the reduction of the death-rate from the latter disease. Doubtless also the general standard of health and well-being, and of that self-respect which accompanies more wholesome and agreeable surroundings and in turn causes greater regard to habits of cleanliness, has been raised by the improvements that have been secured.

Turning to specific points of sanitary improvement, it is extremely doubtful whether the drainage of the subsoil has played the important part ascribed to it in England in the reduction of the death-rate from tuberculosis. I have elsewhere discussed this subject in some detail², and need only give here a single instance in which a marked reduction of phthisis has occurred apart from main sewerage. This is the city of Chichester, in which until 1895 all the houses were drained to cesspools. The soil of the city consists chiefly of coarse gravel of varying depth overlaying clay, and the level of the subsoil water has usually ranged from 8 to 16 feet below the ground surface³.

The statistics of this city are stated below in comparison with those for two other Cathedral Cities. The two latter cities are in the list of towns which were specially investigated by Dr Buchanan with the following result⁴ :

1. See letter from Sir Richard Thorne, *Trans. Brit. Congress on Tuberculosis*, 1901, vol. 2, p. 229.

2. The influence of Soil on the Prevalence of Pulmonary Phthisis, *Practitioner*, Feb. 1901.

3. Report on Enteric Fever in the City of Chichester, by Dr. Thomson and Colonel Marsh (Supplement to 25th Ann. Rep. of Loc. Gov. Bd., p. 71).

4. *Public Health Reports* by Sir Jno Simon, vol. 2, p. 275.

	PERIODS FOR WHICH THE DEATH-RATES ARE COMPARED		DEATH-RATES PER 100,000 OF POPULATION FROM PHTHISIS IN PERIOD		PERCENTAGE REDUCTION SECURED
	A	B			
	BEFORE THE EXECUTION OF SEWERAGE WORKS	AFTER THE EXECUTION OF THESE WORKS	A	B	
Salisbury	1844-1852	1857-1864	445	227	49
Ely	1845-1852	1859-1864	510	167	46

Compare these results with the figures derived from the decennial supplements of the Registrar General.

PERIOD	DEATH-RATES FROM PHTHISIS PER 100,000 OF POPULATION		
	SALISBURY	CHICHESTER	ELY
1851-1860	556	400	229
1861-1870	214	351	254
1871-1880	Alderbury . . { 192 Salisbury . . { 210	279	220
1881-1890	176	224	182
% reduction between 1851-1860 and 1881-1890	50,6 %	44,0 %	20,5 %

Thus main sewerage, which at least in its earlier years would produce dying of the subsoil, may be followed by only a relatively small or by a very great permanent reduction of the death-rate from phthisis, while a great reduction may occur without any drainage of the subsoil. It seems therefore clear that special conditions of the subsoil cannot be regarded as a necessary factor in the reduction of phthisis mortality. It should be added that at the time when this hypothesis was put forward in England and in Massachusetts the only statistics which were available were probably not accurate, civil registration of deaths in England having only been inaugurated in 1857 and the medical certification of causes of death not being compulsory before 1874, though it was generally practised at an earlier date.

In the light of our knowledge of the pathology of tuberculosis, the

sanitary improvements which might reasonably be expected to be most likely to reduce the death-rate from tuberculosis would be concerned with the reduction of overcrowding, and of the inhalation of irritating forms of dust. Is it likely that the improvement under these headings has been competent to more than counterbalance the evil effects of the increased aggregation of the English population in towns? For the present I postpone the issue whether these improvements have acted by increasing resistance to infection or by diminishing specific infection or by both.

Statistics for England as to the numbers living in and overcrowded in tenements of different sizes are only available for 1891 and 1901. Between 1891 and 1901 the percentage of the total tenements containing less than 5 rooms which were overcrowded (i. e. which contained on an average more than 2 persons in each room of the tenement) declined from 11.25 to 8.20. The urban population when subjected to the same test is worse housed than the rural, 8.90 per cent of urban tenements comprising less than 5 rooms being overcrowded in 1901 as compared with 5.84 per cent of rural tenements.

Influence of Urbanisation. — A steadily increasing proportion of the population is being subjected to urban conditions of life. Thus the proportion of the population of England living in places of sufficient importance to exercise urban powers to persons living elsewhere was

	Urban.		Rural.
In 1861.	175	to	100
» 1871.	198	»	100
» 1881.	212	»	100
» 1891.	258	»	100
» 1901.	555	»	100

In Scotland the number of urban to every 100 of rural population increased from 108 in 1861 to 112 in 1871, to 159 in 1881, to 189 in 1891. In Ireland the number of urban to every 100 rural population was 25 in 1861, 29 in 1871, 52 in 1881, and 56 in 1891. At each successive census 1851 to 1901 the proportion of agricultural labourers in England was 11.2, 10.0, 7.5, 5.3, 4.5, and 3.5 per cent of the total population. The actual number of agricultural labourers declined from 1 904 687 in 1851 to 988 540 in 1901. This one instance alone implies an enormous transfer from outdoor to indoor occupations. And yet the English death-rate from phthisis declined from 285 per 100,000 in 1852 and 256 in 1861-65 to 120 in 1905.

In other countries the same change is visible from rural to urban life. In the United States the proportion of the total population living in cities or towns having at least 8000 inhabitants to every 100 living in rural districts has increased from 9 in 1840 and 14 in 1850 to 41 in 1890. In Prussia for every 100 of rural population there

were 45 of urban population in 1864, 52 in 1875, 59 in 1885, 69 in 1895.

In France where urban communes are those consisting of 2000 population or more living in contiguous houses, in 1861 for every 100 in rural there were 41 in urban communities, while in 1871 the proportion was 45, in 1881 it was 55, and in 1891 it was 60.

The effect of urbanisation of population on the general death-rate is indicated by the following figures relating to certain selected counties of England. In these the death-rates have been corrected for variations in the age and sex distribution of the respective populations. No correction can be made for the fact that the towns attract the robust and strong to work in them, while the weakly tend to remain in and return to rural districts. If correction could be made for this fact, the contrast between urban and rural death-rates would doubtless be greater than appears below.

	CORRECTED DEATH-RATE PER 1000 OF POPULATION : ALL CAUSES 1898-1902 ¹		PROPORTIONAL FIGURES (RURAL RATE = 100)	
	MALES	FEMALES	MALES	FEMALES
Urban counties . .	20.6	17.9	157	152
Rural counties. . .	15.1	13.6	100	100

Thus the general death-rate of males is 57 per cent, and of females is 52 per cent higher in the urban than in the rural counties. Compare these results with the corresponding phthisis death-rates :

	CORRECTED DEATH-RATE PER MILLION OF POPULATION FROM PHTHISIS 1898-1902 ¹		PROPORTIONAL FIGURES (RURAL RATE = 100)	
	MALES	FEMALES	MALES	FEMALES
Urban counties . .	1689	1154	154	104
Rural counties. . .	1260	1092	100	100

The death-rate from phthisis among males is 54 per cent and among females is 4 per cent higher in the urban than in the rural counties.

The preceding tables have an important bearing on the problem of *the relationship between aggregation of population and Phthisis mortality.*

If aggregation were the determining influence in causing a higher

1. *Annual Report of English Registrar General for 1905*, p. 45. The urban counties included in the above rate comprise an estimated population in 1905 of 18 039 289; the rural counties of 4 514 254.

phthisis death-rate, it would act in one or both of two ways; 1st. by decreasing resistance to disease, 2nd. by increasing inter-infection. Its operation by the first means would affect many diseases besides phthisis, and supposing men were exposed to it to a much larger extent than women, could not fail to determine a higher ratio between the urban and rural death-rate from all causes among males than holds good for females. But in fact the corresponding ratios only differ as 157/100 differs from 152/100. It is evident therefore that decreased resistance to disease gives no sufficient explanation of the experience as to phthisis, in which the ratios between urban and rural death-rates in the two sexes are as 154/100 to 104/100. We must therefore fall back upon the view that in towns men are much more exposed than women to tubercular infection. Doubtless urban life both increases opportunities for infection and diminishes the power of resistance to disease. Improved factory and workshop conditions have diminished these evil influences; but against these improvements is to be set the fact that indoor must always be less favourable to health than outdoor conditions of life, and the further fact that a rapidly increasing proportion of the total population has been subjected to these indoor industrial conditions of work. We might therefore reasonably expect that, after due allowance has been made for improved conditions of industrial work, the death-rate from tuberculosis among males would have increased. It has however declined in England and Scotland, though to a less extent than the female death-rate. In Ireland the female is higher than the male death-rate from tuberculosis, home conditions which continue much worse in Ireland than in Scotland or England evidently having a predominant influence in the total result.

We have then to deal with two important facts, 1st. the death-rate from tuberculosis is nearly always greater in urban than in rural communities, the excess being greatest among men; 2nd, the countries showing most urbanisation have secured the greatest reduction in and the lowest death-rate from tuberculosis.

To explain these two facts, which would otherwise point to contradictory conclusions, we must invoke the operation of some powerful influence sufficient not only to counteract the maleficent operation of (a) urban life and (b) increasing preponderance of indoor occupations', but also to cause an actual reduction in the phthisis

1. The following remark of Sir Jno Simon (*10th report to Privy Council, 1867*) may be quoted here :

* On these previous occasions pulmonary phthisis was shown to be a disease which undergoes development in proportion as men are *unwholesomely gathered in indoor industries* : now it is shown to be a disease which also develops itself in proportion as men are dwelling upon a humid soil. These two conclusions, no doubt are very great ætiological fragments; but even when together they do not pretend to exhaust, or nearly to exhaust, the subject of the causation of phthisis *. *Republished Reports*, vol. 2, p. 558.

death-rate. Improved sanitation of dwelling houses and of industries has doubtless done much in this direction. We might even assume that it has prevented urbanisation and the associated increase of indoor occupations from producing their natural effect in an increased death-rate from phthisis, though it is doubtful if it can claim, — apart from its indirect influence in preventing infection, — such a large share in the total result as this assumption would indicate. In order however to explain not only the absence of increase, but also the great decline in the death-rate from phthisis, it is necessary to invoke the operation of *increased means by which the opportunities for infection have been diminished*.

I propose to consider this factor in relation to :

(1). Countries like Great Britain, Germany, and the United States in which a great decline of phthisis death-rate has occurred.

(2). Countries like France and Ireland in which the phthisis death-rate is almost stationary or has increased. Were the necessary data available it would be important to discuss fully, also

(5). The later appearance of the reduction of the phthisis death-rate in certain countries than in others.

It is conceivable that *opportunities of infection might be reduced in various ways*. If public opinion reprobated promiscuous expectoration in one country and not in another, and this fact coincided with corresponding phthisis death-rates, we should have a ready explanation of these rates. There are however no such extremely marked differences in national habits in this respect, as to constitute a clear case. The only way in which, so far as I know, opportunities of infection have been materially reduced, has been by the

Institutional treatment of Consumptives.

Is there any relation between such institutional treatment of the disease and its decline as a cause of mortality? Koch has no doubt on this point. He states :

“ The only country that possesses a considerable number of special hospitals for tubercular patients is England, and there can be no doubt that the diminution of tuberculosis in England which is much greater than in any other country, is greatly due to this circumstance¹. ”

In commenting on this statement I have elsewhere said² :

« Malheureusement, le nombre d'hôpitaux spéciaux pour la tuberculose n'est pas du tout grand en Angleterre. Au contraire, la pro-

1. *Trans. Brit. Cong. on Tuberculosis*, Vol. 1, p. 52.

2. « Public Health Authorities in relation to the Struggle against Tuberculosis in England » *Trans. Brussels Internat. Cong. Hyg. and Demog. and Journal of Hygiene*, vol. 5, No. 4, p. 42.

portion de tels hôpitaux au chiffre total des tuberculeux n'est qu'infime et leur influence sur la mortalité par la tuberculose ne peut aucunement avoir joué le rôle qui leur est attribué par M. Koch. »

Thus Dr. Rufenacht Walters¹ has given statistics showing that in 1899 the number of beds in special hospitals devoted to diseases of the chest was 655 in London, 414 in the Provinces, 41 in Scotland and 64 in Ireland. Such a number of beds is utterly insufficient to have an appreciable influence on the mortality from phthisis, which in 1902 caused 56 645 deaths in the United Kingdom.

At Brussels after making the already quoted remarks, I added that :

« Il n'en est pas de même si l'on y ajoute les hôpitaux généraux et surtout les infirmeries des asiles des pauvres et je crois qu'il y a lieu d'attribuer une très haute importance à l'isolement des tuberculeux hors de leurs familles dans ces institutions, où ils sont soignés dans des conditions qui suppriment le danger d'infection personnelle. La majorité des tuberculeux appartient aux classes laborieuses ou inférieures et une très grande proportion d'entre eux se trouve dans les infirmeries des asiles des pauvres. »

It is now my duty therefore to develop the last point and show to what extent this possible means of reducing the mortality from phthisis has been at work; and whether the extent of its operation has been such as to make it a material factor, or as I believe, *a predominant factor in producing this lowered mortality.*

During the 8 years July 1897 to April 1905, 500 phthisical patients were admitted to the Brighton Workhouse Infirmary, of whom 169 died there. Of this number 264 were admitted to the institution once, 35 twice, 10 thrice, 7 four times and 5 oftener. Four patients are still in the institution after an average stay of 1111 days. The average stay in the institution of each of the above 500 patients has been 221 days. Many of them are still living there. Let us consider the consequences which might be expected to follow from the fact that the proportion of phthisical patients in Brighton treated in the Workhouse Infirmary, as indicated by the number of deaths, has increased from 9.6 per cent in 1861-70 to 20.2 per cent in 1901-04.

1. Die Heilstätten-Bewegung in Grossbritannien. *Trans. Cong. Tuberc. Berlin*, 1899, p. 526.

PARISH OF BRIGHTON

DEATH-RATE FROM PHTHISIS PER 100,000 OF POPULATION OF BRIGHTON				PERCENTAGE OF TOTAL MALE OR FEMALE DEATHS OR OF DEATHS OF PERSONS OF BOTH SEXES FROM PHTHISIS OCCURRING IN THE WORKHOUSE INFIRMARY		
PERIOD	MALE	FEMALE	TOTAL	MALE	FEMALE	TOTAL
1861-1870	548	254	295	10.4	8.9	9.6
1871-1880	—	—	247	—	—	11.7
1881-1890	245	155	195	17.5	10.4	14.5
1891-1900	215	122	165	19.5	11.0	15.8
1901-1904	—	—	140	—	—	20.2

The average stay of each phthisical patient in the infirmary is, as we have seen, 221 days. During this time the patient is usually placed in a ward with other phthisical patients, and even if placed with patients suffering from other ailments, is regulated as regards expectoration and is much less likely to spread infection than in the crowded tenement from which he was removed, and where his family would otherwise have been exposed to concentrated infection for a protracted period. We may assume that each phthisical patient is *actively infectious* for a year before his attack ends in death or recovery.

If we assume further that the 221 days is increased to 365, so far as the proportion of total cases treated in the infirmary is concerned, we shall be in a position to calculate what reduction of the total phthisis death-rate ought to be produced by the segregation from their families during the infectious year of their illness of 9.6 to 15.8 per cent of the total consumptive patients. This assumption appears to be justified in view of the facts that this percentage only gives credit for cases ultimately fatal, and gives no credit for the large number of consumptives treated in general hospitals, lunatic asylums, etc. Starting with the phthisis death-rate of 295 in Brighton in 1861-70 we apply to it a theoretical reduction of 9.6 per cent, and so on for the successive periods. The result is as follows :

	1871-80	1881-70	1861-00	1901-4
Calculated Phthisis Death-rate .	267	216	185	157
Actual > > > >	247	195	165	140

It must be understood that in the above calculation the percentage of deaths from phthisis in the workhouse infirmary is taken only as *an index of the total supposed effect of the institutional treatment of this disease*, which has been partly in the infirmary, partly in general and special hospitals, partly in lunatic asylums, etc.

It is not pretended that in every other town, in which conditions as to possibilities of infection, domestic, industrial or other, will be

present in varying proportion, the same approximately exact proportion between institutional treatment of phthisis and the reduction in the death-rate from this disease will be visible. It may be claimed however that if similar facts hold good in other parts of Great Britain, we have indicated here a means of preventing the spread of phthisis which as such has been in unrecognised operation to a steadily increasing extent ever since the causes of death began to be registered and which must have exercised a most beneficial influence to this end.

In Ely, as already seen, the decline in the death-rate from phthisis has been much less than in Chichester. By the courtesy of the Registrar General I am able to state that in Chichester the proportion of total deaths from phthisis occurring in the workhouse was 12.2 per cent in 1861-65 and 24.7 per cent in 1886-90, while in Ely it was 1.6 in 1861-65 and 2.7 per cent, in 1886-90.

Dr. Downes, Medical inspector of the Local Government Board for poor law purposes, states that in 1899, there occurred in the workhouse infirmaries of London 2800 deaths from phthisis, or 55 per cent of the total mortality from this disease in London. In Kensington during the nine years 1894-1902, 51.2 per cent of the total deaths from phthisis occurred in its workhouse infirmary. In Brighton we have seen that the proportion of total deaths of consumptives in the infirmary has increased from $\frac{1}{10}$ in 1861-70 to $\frac{1}{5}$ in 1901-04.

These patients pass a large share of their invalid and pre-eminent-ly infectious life in these institutions before death. As bearing on the value of such a method of treating the sick poor, which has been perseveringly pursued by most Boards of Guardians during the last forty years, it must be borne in mind that the administration of workhouses has steadily improved. Each year in an increasing number infirmary accommodation for the sick has been provided, separate from the workhouse for the able-bodied; and in the infirmary itself there has been an increasing practice of treating the consumptives in wards separate from other patients.

The statistics already given show that in Great Britain the average proportion of institutionally treated paupers to population has remained about the same, *in the midst of a decline of total pauperism*. In 1902 in England and Wales total paupers formed only $\frac{1}{40}$ while in 1848-49 they were $\frac{1}{16}$ of the total population. But it is also true that the proportion of sick to healthy paupers who are institutionally relieved has steadily increased; and we know that tuberculosis is one of the chief causes of sickness. We know furthermore that phthisis is spread to a disproportionate extent in crowded tenements occupied by those who are the most likely to become the recipients of poor-law relief. In view of these considerations, I have no hesitation in attaching great value to workhouse infirmaries as one of the chief

means by which in the past the prevalence of and the death-rate from phthisis have been reduced.

Workhouse infirmaries are not the only institutions concerned in diminishing opportunities for the spread of phthisis. Lunatic asylums have also probably exerted great influence in the same direction.

It cannot be without significance, although no separate statistics of causes of death in institutions are published, that the percentage of total deaths in these institutions has increased as follows :

ENGLAND AND WALES

Percentage of Total Deaths occurring in Public Institutions.

	WORKHOUSES AND WORKHOUSE INFIRMARIES	HOSPITALS	LUNATIC ASYLUMS	TOTAL INSTITUTIONS
1869-70	5,7	1,9	0,7	8,3
1901-05	8,5	5,9	1,8	16,2

In London the proportion of the total deaths which has occurred in public institutions has increased from 16.74 per cent in 1852-55 to 29.26 per cent in 1896-1900.

The same point is illustrated by the following figures derived from the English census returns. The number of patients in hospitals to every 100 000 of population was :

Census Year.	1851	1861	1871	1881	1891	1901
Patients	42	52	86	95	95	120

This does not include the inmates in Workhouse Establishments and in asylums for the insane. The first of these contained in 1901 one in every 151 of the total male and one in 190 of the total female population. The second of these contained in 1901 one in 558 of the total population of both sexes.

In different counties of England the proportion of deaths in public institutions varies greatly and the death-rate from phthisis does not vary in any direct proportion with it. Nor could this be reasonably expected ; for we are not at present in possession of all the facts. A rural county has a lower death-rate from phthisis than a chiefly urban county, irrespective of the question of institutional treatment. Again it might happen that a large percentage of institutional deaths from all causes might coincide with a very large amount of domestic treatment of consumptive paupers. There is strong reason for believing that this is so in Ireland. The key to the difference between Ireland and Great Britain is given by the enormous increase in the former country of pauperism relieved at home, and by the dispensary system of Ireland which favours the treatment of even advanced cases of phthisis at home. Hence crowded and insa-

nitary cottage homes have had their natural effect, — when infectious patients are not removed from them, — of increasing the phthisis death-rate. The fact that the phthisis death-rate of Ireland is higher among women than among men points in the same direction, indicating domestic rather than industrial infection.

Do the statistics of other countries confirm the conclusion that the institutional treatment of phthisis has been largely concerned in the reduction of phthisis-mortality? Among the English colonies, New Zealand has one of the lowest death-rates from phthisis. In 1896, 13.6 per cent and in 1905, 16.8 per cent of the total deaths from phthisis occurred in hospital. Unfortunately in this, as in other cases, except Brighton, Kensington and Copenhagen, I am unable to give the average stay of patients in hospital. It is not suggested that this large proportion of institutionally treated patients is the only cause of the low phthisis death-rate in New Zealand. It is contended however that it must have played a large share in preventing the spread of infection.

Prussian statistics point in the same direction as the English though unfortunately they only extend back to 1877. It will be seen that in 1898-1901 out of every 100 total deaths from tuberculosis in Prussia 14 occurred in its hospitals, while for every 100 deaths 57 patients were at one time or another during the same year under hospital treatment for tuberculosis. In Berlin the figures are even more striking. As early as 1877-80 out of 100 annual deaths from phthisis 44 occurred in hospitals and 151 phthisical patients were treated during the year in hospitals. Without local knowledge I am unable to explain the much higher proportion of patients treated in hospitals in Berlin, whether their treatment is less prolonged than in hospitals in other parts of Prussia, and whether the rapid and somewhat sudden fall in the death-rate from tuberculosis which began in 1886-87, was associated with more protracted treatment in hospital.

Prussia.

		1877-80	1881-84	1886-89	1890-95	1894-97	1898-01
Death-rate from Tuberculosis per 100 000 of population.		316	511	282	260	225	199
Proportion between 100 deaths from Tuberculosis in Prussia and	No. of Patients with tuberculosis treated in hospitals and leaving them alive.	12	15	19	26	29	25
	No. of Patients with Tuberculosis dying in Hospitals.	7	8	9	11	12	14

(Hospital records for 1885 are not available.)

Berlin.

		1877-80	1881-85	1886-90	1891-95	1896-00	1901-05
Death-rate from Phthisis per 100 000 of population.		357	352	294	251	215	204
Proportion between 100 deaths from Phthisis in Berlin and	No. of Patients with Phthisis treated in Hospitals and leaving them alive.	87	90	92	92	108	156 (1901-02)
	No. of Patients with Phthisis dying in Hospitals.	44	55	48	40	41	54 (1901-02)

If we apply the same method to the Prussian statistics as was used for Brighton, assuming that the death-rate from tuberculosis will decline in each group of years according to the percentage of total deaths from tuberculosis occurring in hospitals in the preceding group of years, the following result is obtained :

	1877-80	1881-84	1886-89	1890-95	1894-97	1898-09
Calculated death-rate from Tuberculosis..	—	295	271	246	219	195
Actual » » . . .	316	311	282	260	225	199

The experience of Berlin does not lend itself to the same test, as an impossible result would be obtained if reduction in this city were assumed to occur in proportion to the number of consumptives dying in its hospitals. More knowledge of local conditions is required and particularly of duration of stay in general hospitals, before any attempt can be made at a general quantitative statement, though the above figures for Prussia are curiously similar to figures similarly calculated for Brighton and for Brussels. It cannot reasonably be expected, even if my contention be accepted, that hospital treatment of consumptives and particularly of advanced consumptives has been a prominent means of reducing the death-rate from tuberculosis, that reduction in any given district will always be proportionate to the number of consumptive patients institutionally treated in that district. Migration of patients to and from towns is common, and statistics are greatly needed giving the duration of stay of consumptive patients in the hospitals of each district. *Calculations such as I have made are illustrative and diagrammatic*, but in the complex conditions to which they relate cannot be a quantitative guide. The case must be judged on its general merits, and especially it must be remembered that the probability of a given inference respecting an infective

disease like tuberculosis, must be judged in accordance with our knowledge of the pathology of the disease. In this connection it is I think universally agreed that tuberculosis is most infective in its advanced stages, and that what is most to be feared in the interest of relatives is their protracted exposure to unregulated infection in crowded dwellings, in which the inability to take reasonable precautions has an important adjuvant to infection in the mental depression and physical exhaustion caused by attendance upon the patient.

The decline in the death-rate from Tuberculosis in Prussia began in 1886-87. The Sanatorium treatment of this disease was on a very small scale until about 1892¹, when the first popular Sanatoria were opened, and the latter cause can only have played, at least in the earlier years of decline, a very small part in the reduced death-rate. Of the importance of Sanatorium treatment I am fully convinced, and urge its wide extension; but if choice has to be made, from monetary considerations, between these and hospitals for advanced consumptives, the latter should in my opinion be provided first. It is a mistake to regard either sanatoria or hospitals for advanced consumptives as merely therapeutical and palliative in their operation; these institutions and particularly the latter are the most important of preventive measures by putting an end to continuous and massive infection.

The reduction of tuberculosis in Prussia has been coincident with a great increase of manufactures and much attention to sanitation. The former has doubtless raised the standard of comfort, while at the same time representing a great proportional increase of indoor and relatively dusty occupations; the latter has doubtless raised the resistance to and diminished the opportunities for infection. To enable one to apportion the balanced share of these factors, and of the factors represented by the hospital treatment of consumptives, and the increased attention to the importance of precautions against infection which must have followed on the discovery of the tubercle bacillus by Koch in 1882, in producing the sudden fall in the death-rate from tuberculosis beginning in 1886-87, requires more detailed information than I can at present furnish.

With the experience of Germany may be compared that of Paris, the only part of France for which fairly accurate statistics as to tuberculosis are available. Dr. J. Bertillon informs me that most of the institutional poor in Paris, as well as of those receiving domestic relief are aged persons and infants. Their relief therefore has but little bearing on the prevention of tuberculosis. On the other hand the general hospitals in Paris being in the main State supported, the sick are in a position to demand admission. The result, as described by

1. *Compte Rendu du Cong. Internat. d'Hyg. et Démog. Bruxelles*, tome VII, p. 58.

Dr. Lucas-Champonnière¹ is very serious overcrowding of these hospitals.

In 1902, 4 828 i. e. 41 per cent of the total deaths from tuberculosis of the lungs and larynx in Paris occurred in its public hospitals. The average duration of stay in hospital of all patients admitted to its general hospitals was only 25.6 days in 1901. (Dr. J. Bertillon.) The institutional treatment of phthisis in Paris is probably very short, and can have but little effect in preventing infection. We have already seen that in Paris there is no considerable decline of the death-rate from tuberculosis.

In Brussels on the other hand the death-rate from tuberculosis has declined from 521 per 100,000 of population in 1886-90 to 197 in 1901-05. The following table shows the total deaths from tuberculosis which have occurred in its two great hospitals (St. Jean and St. Pierre).

	1881-85 ²	1886-90	1891-95	1896-1900	1901-05
Out of every 100 total deaths in Brussels from Tuberculosis the number occurring in hospitals was	51.2	12.2	15.6	17.5	58.9

Applying the method already used for Brighton and Prussia, the following result is obtained :

	1886-90	1891-95	1896-1900	1900-05
Calculated death-rate from { Pulmonary Tuberculosis }	—	282	258	197
Actual do.	521	291	259	197

For Copenhagen Dr Hoff has kindly furnished data from which the following table has been prepared.

		1880-84	1885-89	1890-94	1895-99	1900-04
Proportion between 100 Deaths from Phthisis in Copenhagen and	No. of patients with Phthisis treated in hospitals.	77	88	85	80	147
	No. of Deaths from Phthisis in hospitals.	30	27	25	28	45

Dr Hoff informs me that the duration of residence of each patient in hospital has increased much more rapidly than the number of patients. In 1885 the average stay in hospital of 500 patients was 50 days, in 1902-05 it was 92 days. Without more local knowledge it

1. *Lancet*, June 3rd 1905, p. 1480.

2. Prior to 1888 deaths from pulmonary tuberculosis in Belgium included those from other chronic diseases of the lungs (see 66th Ann. Rep. of Reg. General England, p. 201).

is impossible to attempt exactly to gauge the influence of institutional treatment on the phthisis death-rate in Copenhagen, but it clearly fits in with the rule which I have shewn holds good for other communities, that increase of institutional treatment of phthisis is associated with decline of death-rate from this disease.

The case must be left as displayed by the preceding somewhat fragmentary facts.

It will be interesting to discover whether, in any countries for which I have been unable to give data a large decline of the death-rate from tuberculosis has been accompanied by little or no prolonged hospital treatment (involving incidentally segregation) of poor consumptives. It will be still more interesting to ascertain whether, as facts can be collected, the decline of tuberculosis has been proportional to the duration and the total amount of the hospital treatment for tuberculosis. By hospital treatment, I mean especially treatment for actively infective cases, whether these are hopeful for cure or not. I venture to forecast that when further facts are collected, they will not be found to be incompatible with the following summary of the contents of my contribution.

Summary. — Tuberculosis is a chronic infective disease. Pulmonary Phthisis is its most common form, and for the purposes of this paper, statistics of death-rates from the latter disease have been regarded as properly comparable with those of tuberculosis.

Tuberculosis is most prevalent and most fatal among the poor, and among those living in crowded houses.

A considerable reduction of the death-rate from tuberculosis has occurred in some countries during recent years.

Tuberculosis is known to be spread principally by massive and protracted infection derived from a tubercular patient. The extra-domestic treatment of such a patient releases his family from its main exposure to infection. Indirectly it also affects the health of the family favourably by reducing strain and anxiety. This effect would follow from the treatment of tubercular patients in any establishment in which they were separated from the general community.

The reduction of the death-rate from Tuberculosis has been most often ascribed to increased resistance to infection, due to better nutrition and improved sanitation.

Both these factors have been in important and effective operation in the reduction of the general death-rate; and they have doubtless played a part in aiding our control over tuberculosis.

They do not however give a sufficient explanation of the reduction in the death-rate from tuberculosis.

An examination of the figures available for testing the influence of improved nutrition shows no quantitative correspondence between the variations of this factor and those of the death-rate from tuberculosis.

In some instances the two quantities have varied in opposite directions.

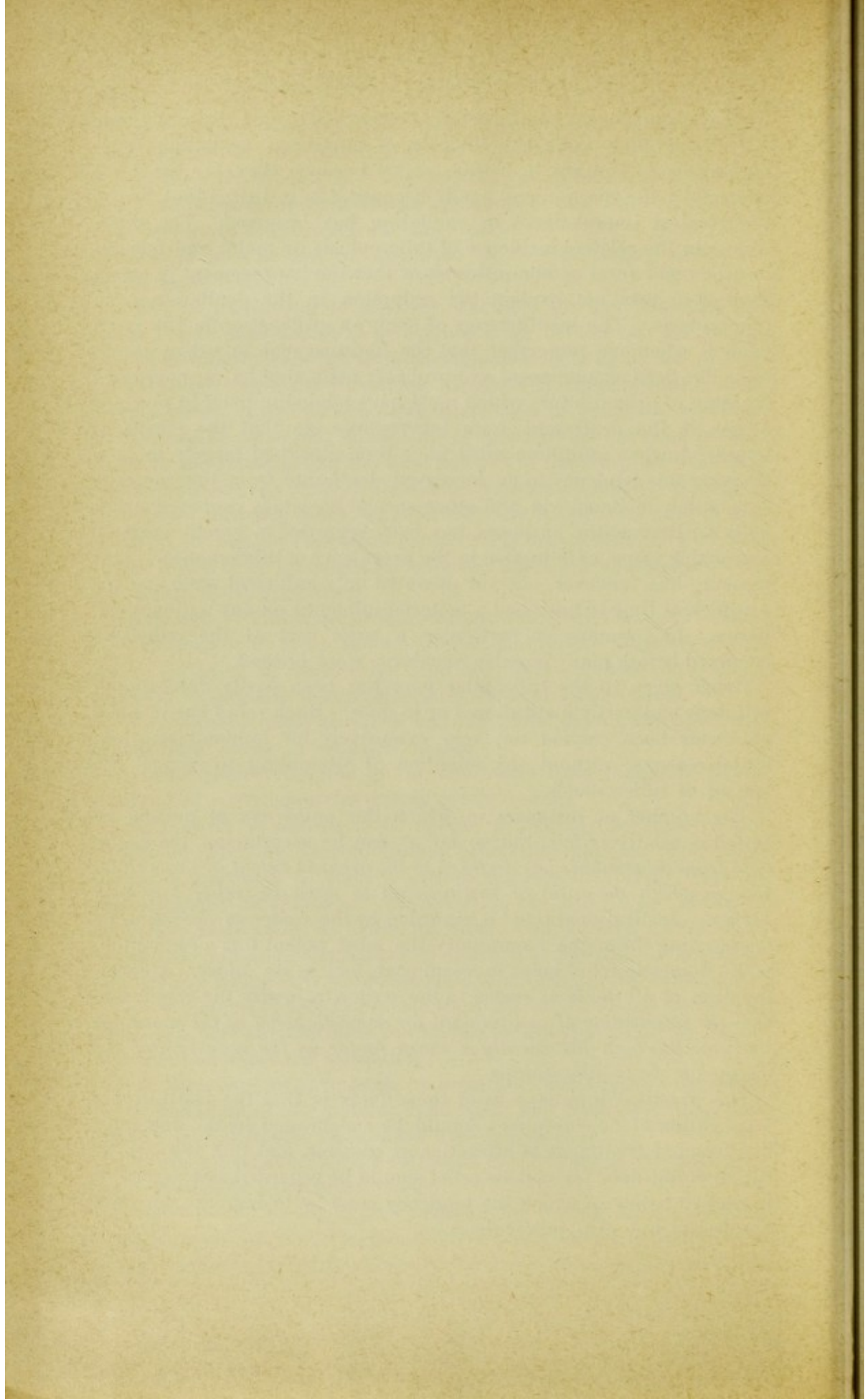
The operation upon tuberculosis of improved sanitation must necessarily be sought in towns, partly because they are the most affected by the disease, and partly because it is in towns that by far the greatest improvement in sanitation has occurred. The differences in the relative incidence of tuberculosis on males and females in urban and rural communities show that the improvement in urban sanitation does not explain the reduction in the death-rate from tuberculosis. The insufficiency of such an explanation is the more evident when we remember that the improvement in urban conditions has been accompanied and probably instigated by an enormous increase of urbanisation, which must have tended in itself to produce a rise in the death-rate from tuberculosis, so that the effects of improved urban sanitation must have been absorbed largely in neutralising this tendency to an increased death-rate from tuberculosis.

Isolation in Sanatoria and other special hospitals, proposed originally for therapeutic purposes, has been regarded in recent years as a probable cause of reduction in the prevalence of tuberculosis. This measure has, however, not yet operated on a sufficient scale and for a sufficient time to have had a material influence on any national statistics. In Germany in particular, a large part of the reduction occurred before many popular Sanatoria were opened.

Relief given to the tubercular poor has been partly domestic or out-door and partly institutional or in-door. Such relief has in some countries been carried out very extensively for humanitarian and social reasons, without any intention of attempting to control the spread of tuberculosis.

The number of instances in which the point can at present be tested is relatively few, but so far as can be ascertained, *the death-rate from tuberculosis has declined to the greatest extent in those countries in which the ratio of institutional to domestic relief has been highest.* Institutional relief is regarded by the writer as operating by segregating from the community the most potent foci of infection, while domestic relief helps to retain such foci in its midst. A consideration of all the facts seems to the writer to justify the conclusion that *the substitution of institutional for domestic relief of the consumptive poor has been historically a main factor in the reduction of the death-rate from tuberculosis.*

The practical inference from these facts is that the institutional segregation of consumptives should be encouraged by making their institutional treatment as attractive as possible, and that any substitution of out-door for in-door relief should be regarded as a reversion to an evil policy of which the tendency must be to increase not only pauperism but also tuberculosis.



56 204. — PARIS, IMPRIMERIE GÉNÉRALE LAHURE
9, rue de Fleurus, 9.

