

Special report on the prevalence of tuberculosis and the measures for its prevention / John Roberston, Medical Officer of Health, Sheffield City.

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City of Sheffield.

SPECIAL REPORT

ON

THE PREVALENCE OF TUBERCULOSIS

AND

The Measures for its Prevention.

JOHN ROBERTSON, M.D., B.Sc.,

Medical Officer of Health.

TOWN HALL,

SHEFFIELD,

May 11th, 1899.

TO THE CHAIRMAN AND MEMBERS OF THE HEALTH COMMITTEE, CORPORATION OF SHEFFIELD.

GENTLEMEN,

I beg herewith to submit a Report upon the Prevalence of Tuberculosis, and the measures which are indicated in order to prevent the spread of the disease. I have thought it right to introduce certain statements which cannot quite be considered as parts of a report, but as the subject is a highly technical one, I thought the explanations may in many cases be necessary and useful.

Since the discovery of Tubercular Bacillus by Dr. Koch, in 1882, the evidence as to the infectiousness of Tuberculosis, and as to the possibilities of preventing its spread, have grown, step by step, until it is now recognised by every person who has studied the subject that the time has come when a great effort should be made to reduce the enormous mortality which Tuberculosis causes. Such effort cannot be made without some expenditure of money, nor can it be successful without a continued, energetic, and well-directed action on the part of the Sanitary Authority.

I am, Gentlemen,

Your obedient Servant,

JOHN ROBERTSON.

REPORT.

GENERAL.

TUBERCULOSIS is an infectious disease due to the action of a specific micro-organism. The disease is always local to begin with, but the local disease is, for the most part, a constantly extending one, infecting neighbouring parts and organs till the death of the person, which is usually due directly or indirectly to the tubercular process.

But while Tuberculosis is undoubtedly an infectious disease, there are, nevertheless, other conditions of the body which predispose persons to its action, and it is, in part, by recognising this most important fact that it is possible to reduce still further the ravages caused by this disease. Most people have been exposed to its infection at one time or another, and yet only a limited number become infected.

I shall have to point out at a later stage what the predisposing conditions are, and, therefore, will here only mention that of *inheritance*. It is now abundantly proved that Tuberculosis is practically never handed down from parent to child. But while this is so, inheritance undoubtedly does predispose to the disease, and the children of tubercular parents are more liable than others to contract some form of the disease, provided they are exposed to infection. This fact is also a very important one, from the point of view of preventive medicine, *e.g.*, it is only necessary to remove the calves of tubercular cows from infected environment to enable them to remain non-tubercular. It is possible (and has been done) to breed healthy cattle from a very tubercular herd by merely removing the calves from all possibility of infection.

The actual specific organism which is the cause of all forms of Tubercular Disease was first discovered by Dr. Koch, of Berlin, in 1882. It is a rod-shaped organism, which is very minute in size; 10,000 organisms placed lengthwise would measure about one inch. It is, therefore, only to be seen by the aid of the most powerful microscope. From this it will be readily understood how easily such a small organism can be spread by wind and other agencies.

It is possible to grow this organism in the warm incubator on certain prepared foods, and after such growth to infect animals. Accidental inoculation has frequently occurred in surgeons and others who have to deal with Tubercular materials. It is not very definitely determined whether the organism grows outside the human body, except under such conditions as used for laboratory experiments, but it is certain that the organism is capable of lying dormant for long periods of time, and for this reason it is not so important to determine definitely whether it will grow outside the human body as does the organism which causes Typhoid Fever. The bacilli may be dried and ground into dust, and yet retain their vitality. They do not thrive in fresh air and sunlight, and soon die out under such conditions. This can be demonstrated by experiment; it is equally obvious in every day experience.

The bacilli gain access to the human body in a multitude of ways, such as by means of infected dust, milk, or other foods, or directly from a person or animal suffering. Should the recipient be by heredity liable to become infected, or should the surroundings be such as to place him in a condition of health liable to take on the infection, it soon commences to grow. Probably for several months after the person becomes infected no marked symptoms are produced, and for this reason it is only in the rarest cases that it is possible to fix the date and source of infection with any degree of certainty.

In the human subject the sputum from cases of advanced Tuberculosis of the lungs contains enormous numbers of living organisms, so also the discharge from tubercular lesions elsewhere, and in a few cases the excreta of patients suffering contains the infecting material. The milk and sputum of animals suffering from Tuberculosis often contain the infecting material.

For practical purposes the sputum of patients suffering from Tubercular diseases of the lungs and the secretions and excretions of tubercular animals may be regarded as the source from which the great majority of human beings are infected.

The tubercle bacillus is capable of attacking, and in many cases destroying, nearly every tissue in the human body. What is popularly known as Consumption is tubercular disease of the lungs—that is the invasion of the lung tissue by the bacillus tuberculosis, with consequent breaking down of the structure of the lungs and general emaciation, but similar processes frequently take place in other parts of the human body—the glandular structures of the bowels are commonly affected, giving rise to Consumption of the Bowels or *Tabes Mesenterica*. So also is the membrane covering the abdominal organs frequently attacked, giving rise to the disease known as Tubercular Peritonitis. The membranes of the brain are also frequently the site of tubercular disease in the form of Tubercular Meningitis and Acute Hydrocephalus. Again, a very frequent site for tubercular disease is in the various glands which are in connection with the skin or mucous membranes. The frequency with which the glands in connection with the mouth are affected must be obvious to all, causing swellings in the neck, and should recovery take place, leaving ugly scars in the neck. Tubercular disease of the various bones and joint structures are of frequent occurrence, and form one of the most important groups of tubercular disease which every surgeon has to deal with, such as hip-joint disease, disease of other joints, and most of the cases of disease of the spine, causing hunchback. The diseases of the skin known as *Lupus* and *Scrofula* are due to invasion of the tissues of the skin by the tubercle bacilli.

It will be obvious to everyone, from the above, how numerous are the diseases due to this bacillus, and how much more extensive are its ravages than is popularly believed. It is only within recent years that the medical profession have realised, as a result of careful post mortem examination of the bodies of persons who have died from diseases other than Tubercular, that a considerable number of persons suffer from Tuberculosis at one or other period, and afterwards become entirely cured. Only by the most careful examination could such cases be discovered.

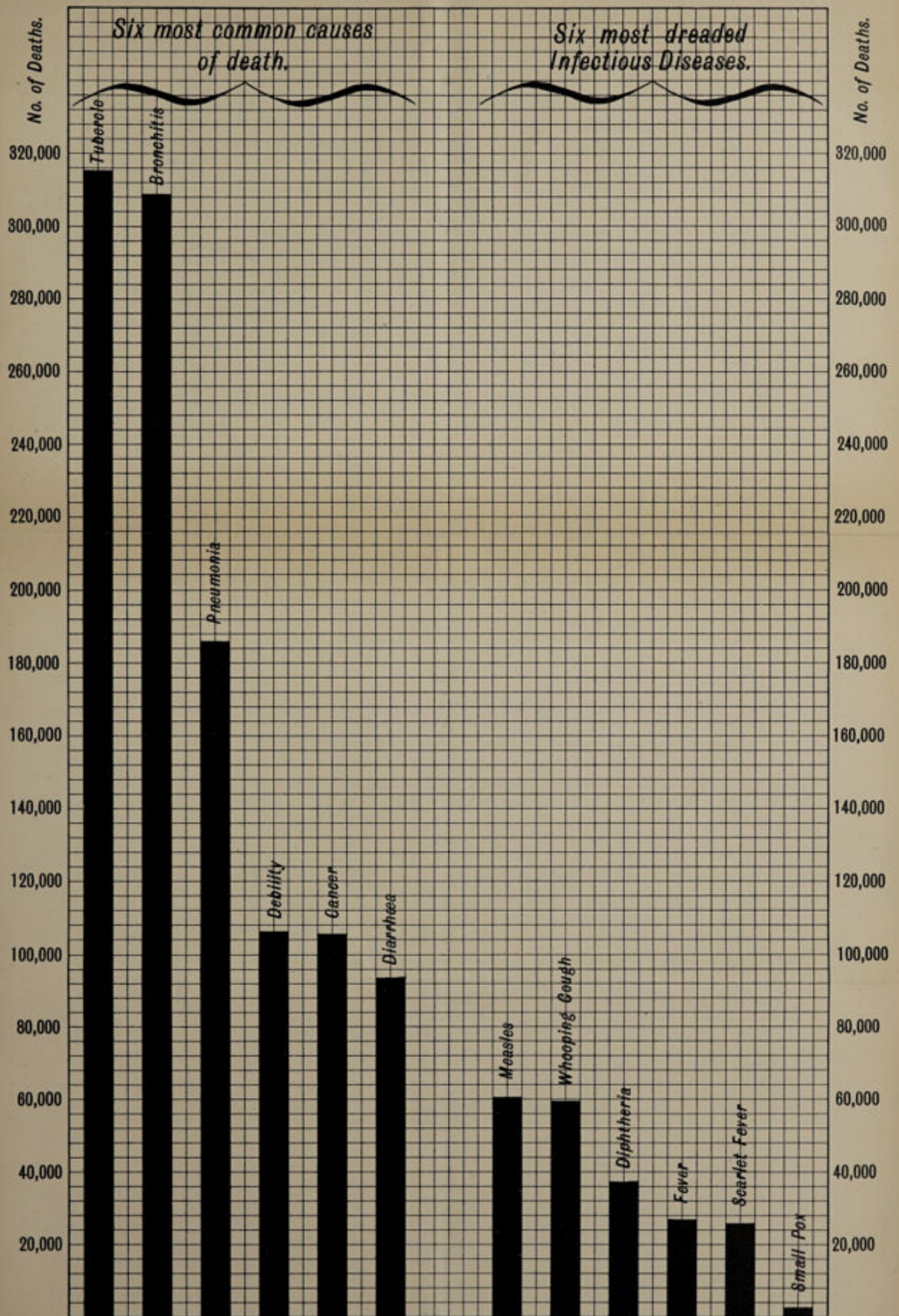
PREVALENCE OF TUBERCULOSIS IN ENGLAND AND WALES.

So far as mortality statistics are concerned, it may be said that during the five years ending 1895, 1 death occurred from Tubercular disease in every 9 deaths from all causes; that is to say 11 per cent. of deaths are due to invasion of the human body by the *Bacillus Tuberculosis*. Comparing these figures with similar figures for the most dreaded of our other infectious diseases, we get the following:—

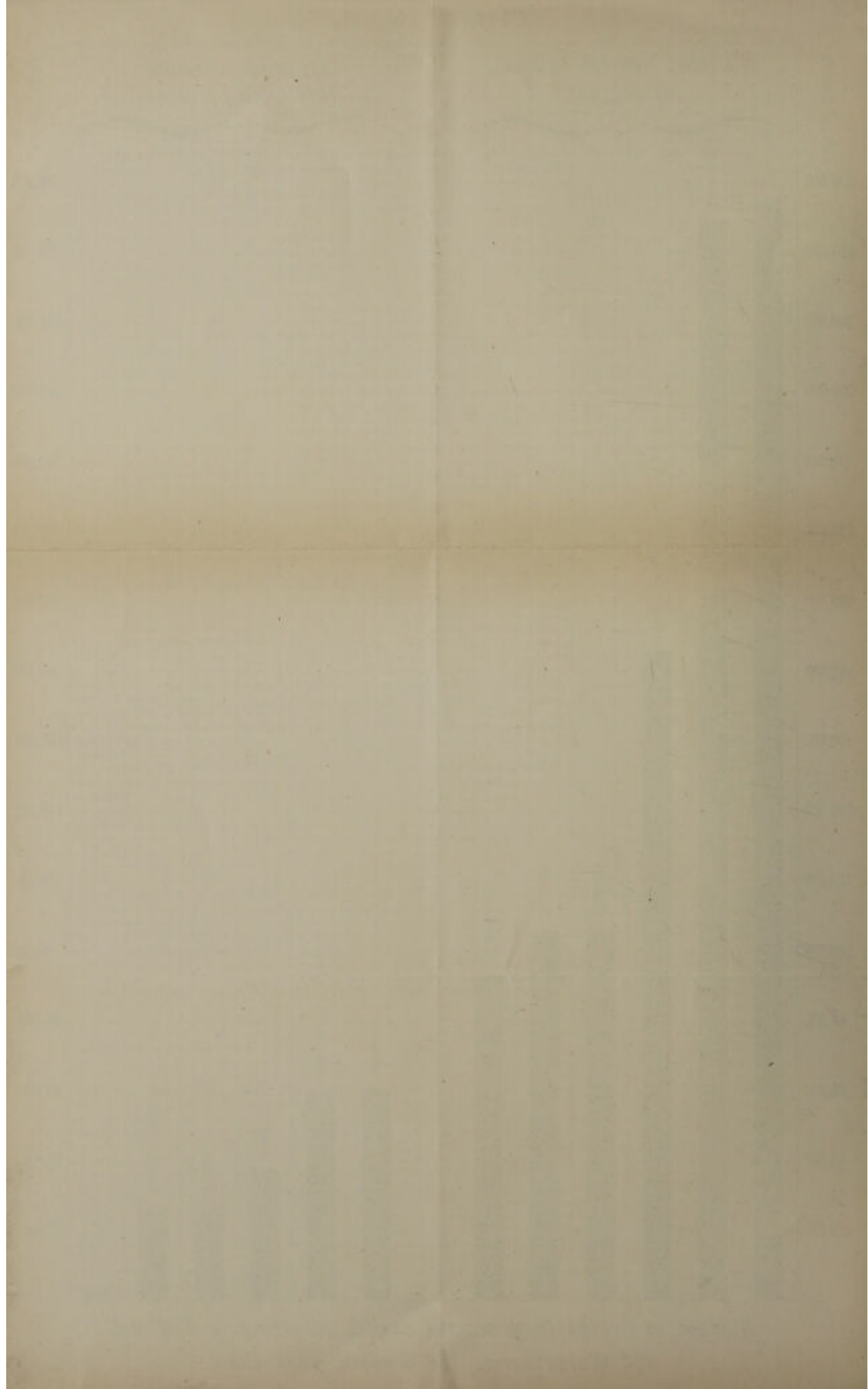
1.	11.3	per cent.	of all the persons who died during 5 years, 1891-1895, died from...	Tuberculosis.
2.	0.1	"	"	...Small Pox.
3.	1.0	"	"	...Scarlet Fever.
4.	1.4	"	"	...Diphtheria.
5.	1.0	"	"	...Fever, &c.
6.	2.2	"	"	...Measles.
7.	2.1	"	"	...Whooping Cough.
8.	3.4	"	"	...Diarrhoea.

Taking the Tuberculoses, and comparing their ravages with those of the 5 other most common causes of death, also with the other infectious diseases during the 5 years, 1891-1895, we get the following:—Chart No. 1:—

CHART No. 1.



Number of Deaths from several causes occurring in England and Wales during the 5 years, 1891-1895.



But progress has to a large extent been made in reducing the mortality to what it is at present. For this purpose I have copied the following from the report of the Royal Commission on Tuberculosis, 1898, Vol. II, page 358, *et seq.*

TABLE I.—ENGLAND AND WALES.—*Mean Annual Mortality from all Forms of Tubercular Disease, in several periods, 1851-1895.*

PERIOD.	PER MILLION LIVING.											
	ALL AGES.	UNDER 5 YEARS.	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	OVER 75
1851-1860	3,483	5,764	1,218	1,359	3,200	4,361	4,463	4,208	3,589	2,986	2,154	929
1861-1870	3,240	5,445	979	1,094	2,833	4,053	4,333	4,102	3,428	2,767	1,724	617
1871-1880	2,863	5,209	861	920	2,205	3,221	3,693	3,807	3,197	2,529	1,572	537
1881-1885	2,540	4,547	874	865	1,923	2,695	3,273	3,413	2,937	2,290	1,441	536
1886-1890	2,322	4,441	819	798	1,652	2,327	2,829	3,099	2,757	2,244	1,450	605
1891-1895	2,122	4,155	762	725	1,510	2,081	2,503	2,912	2,563	2,057	1,252	514
Reduction per cent. between 1851-1860 & 1891-1895.	39.1%	27.9%	37.4%	46.7%	52.8%	52.3%	43.9%	30.8%	28.6%	31.1%	41.9%	44.7%

TABLE II.—ENGLAND AND WALES.—*Mean Annual Mortality from Phthisis in several periods, 1851-1895.*

PERIOD.	PER MILLION LIVING.								
	ALL AGES.	UNDER 5 YEARS.	5-10	10-15	15-20	20-25	25-35	35-45	45-55
1851-1860	2,679	1,305	572	1,025	2,961	4,181	4,317	4,091	3,466
1861-1870	2,475	968	454	825	2,651	3,928	4,243	4,026	3,340
1871-1880	2,116	767	358	664	2,036	3,117	3,619	3,745	3,192
1881-1885	1,830	569	312	560	1,695	2,535	3,154	3,312	2,849
1886-1890	1,635	502	271	488	1,420	2,144	2,691	2,985	2,656
1891-1895	1,463	444	228	410	1,253	1,875	2,342	2,771	2,440
Reduction per cent. between 1851-1860 & 1891-1895.	45.4%	66.0%	60.1%	60.0%	57.7%	55.2%	45.7%	32.3%	29.6%

TABLE III.—ENGLAND AND WALES.—*Mean Annual Mortality from Tabes Mesenterica in several periods, 1851-1895.*

PERIOD.	PER MILLION LIVING.	PER MILLION BIRTHS.	PER MILLION LIVING.
	ALL AGES.	UNDER 1 YEAR.	UNDER 5 YEARS
1851-1860	260	3,169	1,625
1861-1870	295	3,800	1,856
1871-1880	318	4,467	2,028
1881-1885	289	4,356	1,852
1886-1890	265	4,462	1,764
1891-1895	238	4,046	1,577
Reduction or Increase per cent. between 1851-1860 and 1891-1895	-8.5%	+27.7%	-3.0%

It will be noticed in Table I. that the death rate from all forms of Tubercular disease has been reduced from 3,483 per million in the 1851-1860 period to 2,122 in 1891-1895, a reduction equal to 39.1 per cent. Yet this has occurred without any special efforts on the part of Sanitary Authorities, and it is due to improvements in General Sanitation, and to a host of other causes. Such a reduction occurring without effort appears to me to indicate that if special efforts are made a much larger reduction may be anticipated in the near future.

In Table II. it will be seen that the largest reduction occurs among the deaths from Tubercular Disease of the Lungs, the reduction in this group being no less than 45.4 %.

In Table III. it will be noted that there is only a very slight reduction in that form of Tubercular Disease which attacks the glandular structures of the bowels, and which is the form chiefly occurring among children. This is a most important table, as it very clearly indicates that something continues to operate in this group which does not obtain in the other groups. It is now generally admitted that much could be done for this group, as the evidence strongly points to infection by tubercular milk.

SHEFFIELD STATISTICS.

TABLE IV.—SHEFFIELD.—*Mean Annual Mortality from All Forms of Tubercular Diseases during periods 1851-60 and 1891-1895.*

PERIOD.	PER MILLION PERSONS LIVING.											
	ALL AGES.	UNDER 5 YEARS.	5-10	10-15	15-20	20-25	25-35	35-45	45-55	55-65	65-75	OVER 75
*1851-1860	4,088	7,815	1,346	1,373	3,516	4,172	4,685	4,867	4,210	3,448	2,258	1,896
1891-1895	2,359	5,549	725	653	1,341	1,633	2,080	3,213	3,477	3,074	1,279	585
Reduction per cent.	42.3	29.0	46.1	52.4	61.9	60.9	55.6	34.0	17.4	10.8	43.4	69.1

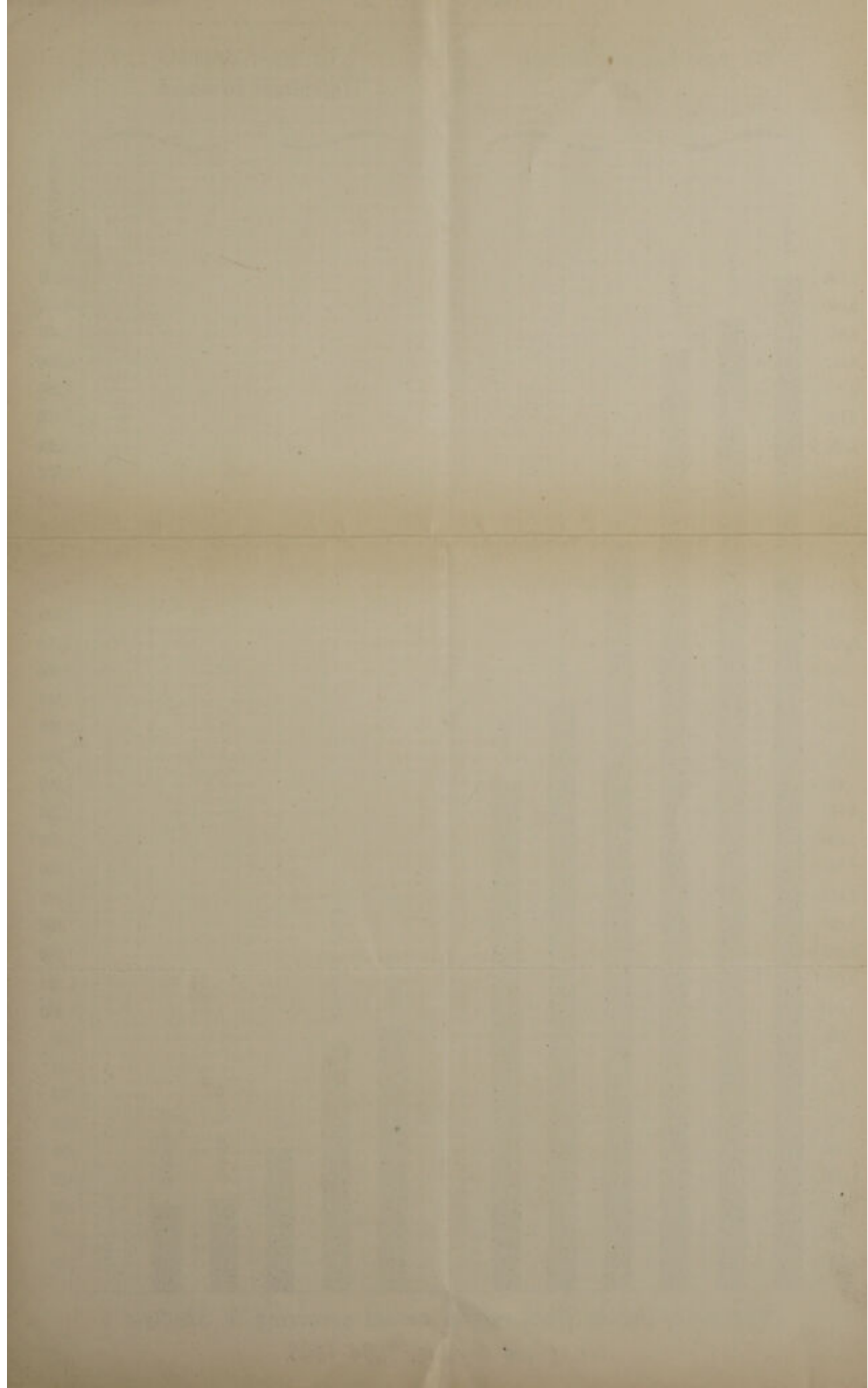
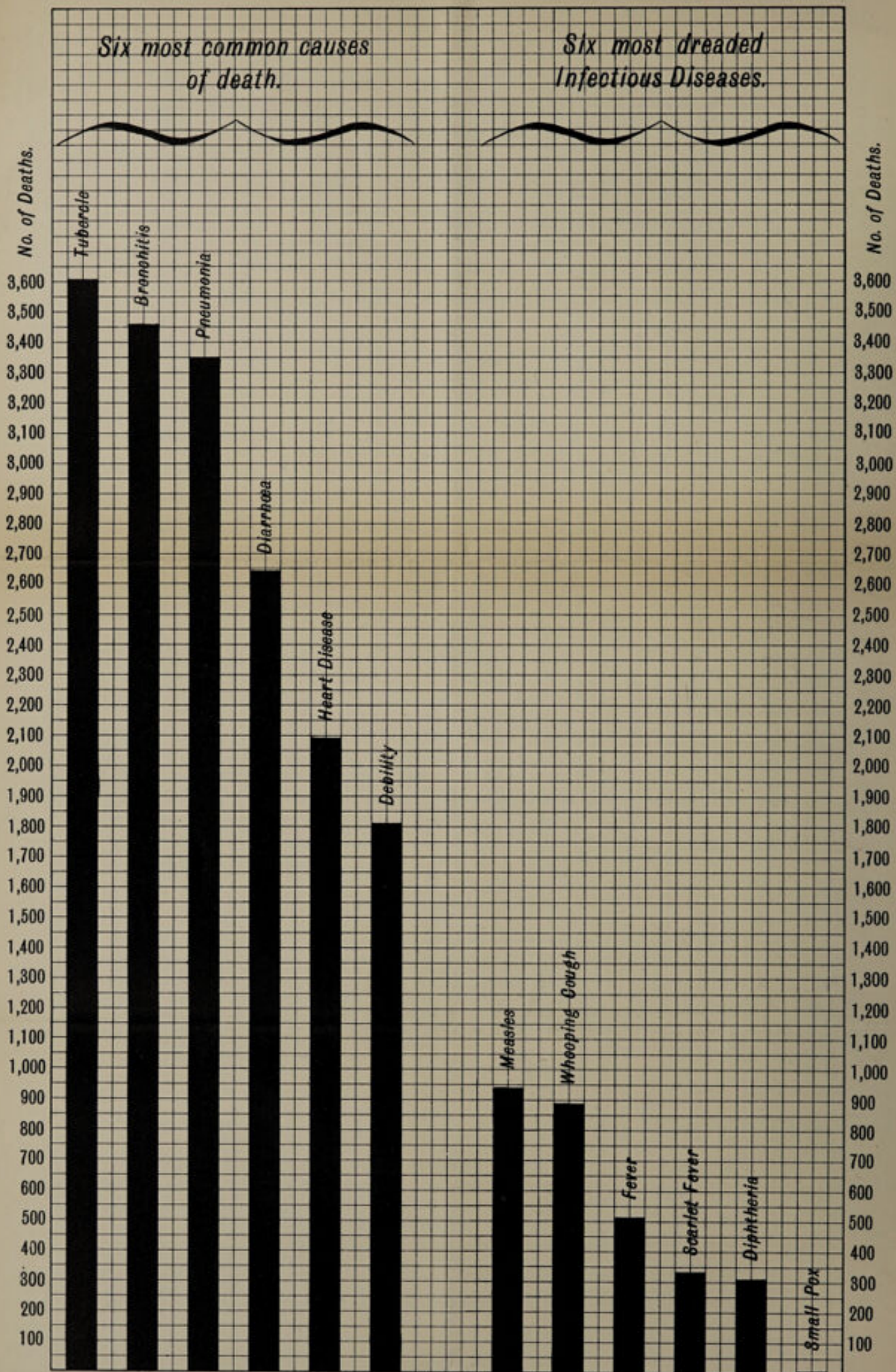


CHART No. 2.



Number of Deaths from several causes occurring in Sheffield during the 5 years, 1894-1898.

TABLE V.—SHEFFIELD.—*Mean Annual Mortality from Phthisis during periods 1851-60 and 1891-95.*

PERIOD.	PER MILLION PERSONS LIVING.								
	ALL AGES.	UNDER 5 YEARS.	5-10	10-15	15-20	20-25	25-35	35-45	45-55
*1851-1860	3,059	2,057	748	1,144	3,265	4,049	4,538	4,768	4,060
1891-1895	1,521	334	238	402	1,165	1,536	1,995	3,089	3,360
Reduction per cent. ...	50·3	83·8	68·1	64·9	64·3	62·1	56·0	35·2	17·2

TABLE VI.—SHEFFIELD.—*Mean Annual Mortality from Tabes Mesenterica during periods 1871-1880, and 1891-95.*

PERIOD.	PER MILLION LIVING.		PER MILLION BIRTHS.		PER MILLION LIVING.	
	ALL AGES.		UNDER 1 YEAR.		UNDER 5 YEARS.	
*1871-1880	471	...	5,458	...	2,829
1891-1895	308	...	5,359	...	2,325
Reduction per cent.	34·6	...	1·8	...	17·8

* These calculations are based upon the figures given by the Registrar-General in his Reports, and refer to the whole Registration District, which embraces Handsworth and Norton (there being no Sheffield Statistics available).

The statistics for Sheffield show very much the same state of affairs as regards the prevalence of Tuberculosis as has already been indicated. Thus, 1 in every 8·9 of the deaths registered is due to Tuberculosis as compared with 1 in 8·8 for England and Wales.

The relative frequency of the various causes of death in Sheffield during the five years ending December 31st, 1898, will be seen in the accompanying Chart. (See Chart II. on next page.)

The essential point which has to be borne in mind in regard to Tuberculosis is, that every year over 700 persons die in the City of Sheffield from Tuberculosis, notwithstanding the reduction in deaths which has been going on during the past 45 years. It appears to be of little consequence how much has been achieved in the past if so many still die every year from a disease which is essentially "preventable." There is undoubtedly ample evidence to indicate that a correspondingly great effort should be made to deal with it.

The mortality-rate for each of the Registration Sub-Districts in Sheffield during the five years, 1894-98, is shown in the following table, together with the average of the five years :—

TABLE VII.—PHTHISIS.

REGISTRATION SUB-DISTRICT.	MORTALITY-RATE PER 1,000 PERSONS LIVING.					AVERAGE FIVE YEARS.
	1894	1895	1896	1897	1898	
West	1.52	2.26	2.19	2.08	2.54	2.12
North	2.35	2.14	1.87	2.77	2.55	2.34
South	1.72	1.34	1.66	1.92	1.60	1.65
Park	1.73	1.22	0.99	1.56	1.07	1.31
Brightside	1.24	1.25	1.08	1.11	1.03	1.14
Attercliffe	1.27	1.39	0.96	1.24	0.71	1.11
Nether Hallam	1.18	1.19	1.44	1.27	1.18	1.25
Upper Hallam	0.00	0.72	1.43	1.05	1.05	0.85
Ecclesall	1.49	1.19	1.18	1.30	1.03	1.24
City	1.48	1.38	1.30	1.48	1.26	1.38

It will be seen from the figures that the average mortality-rate in the poorer districts of West, North, South, and Park has been 1.85, which is .73 higher than the rate for the rest of the City, the figure being 1.12.

Brightside and Attercliffe have together only one-half the rate for West and North.

The dwelling-houses in these poorer and older districts are, speaking generally, less sanitary than those in other districts of the City. They are less sanitary because, first, they are more crowded together; and the individual houses have a larger number of occupants. There are a larger number of houses which do not get direct sunlight; and there are a larger number of back-to-back houses, where good ventilation cannot be obtained; and I believe that, but for these conditions, the four districts named above would not have higher mortality rates than the other districts of the City. This would mean a saving of at least 60 useful lives every year.

I have already mentioned the fact that hereditary predisposition plays an important part in the propagation of Tuberculosis. The other predisposing causes are overcrowding, dark, damp and ill-ventilated houses and workshops, intemperance, insufficient food, fevers, and other debilitating illnesses. Certain trades predispose the worker to consumption, but in the majority of instances it is not so much the trade itself as the conditions under which it is carried on that are at fault.

TUBERCULOSIS IN THE LOWER ANIMALS.

Two Royal Commissions have within the past few years reported on certain aspects of the question as to the part played by the lower animals in infecting man with tubercle. Many of the lower animals are very susceptible to Tuberculosis, but this *only occurs when they are kept under unnatural conditions by man*. Even the forest-bred lion, when kept in a confined cage without proper ventilation, and fed on tubercular beef or milk—perhaps herded with other animals in an infected condition—is liable to fall a victim to the disease. All wild animals in captivity are more or less liable to contract this disease, which is almost unknown among them in their wild state. Some animals are more susceptible than others—cows are more so than horses. The prevention of the disease among our lower animals in this country appears to be a much simpler question than at first it might seem to be. It resolves itself into two requirements. 1st, Removing all infecting material; and, 2nd, keeping the animals under healthy conditions so as to prevent recurrence of the disease. Thus cats and dogs suffer little except when fed on tubercular food. Horses do not suffer to anything like the extent to which milch cows do, as they are less exposed to direct infection; they are more in the open air, and being more costly are kept in better ventilated and better constructed houses than are milch cows. I have on two occasions seen Tuberculosis in foals which had been fed on cow's milk, which was probably tubercular.

Pigs are susceptible animals, but being kept practically in the open air they suffer less than milch cows. It is not uncommon to find at farms where pigs are fed on the separated milk from tubercular cows that they suffer to an alarming extent. I have on several occasions seen three, four, or five tubercular carcasses of pigs from the same farm. Pigs also derive infection from the tubercular offal from slaughter houses, it being the custom in some parts of the country to get offal for them.

But for practical preventive medicine purposes all the above animals may be left out of account—the disease among cattle alone requires to be dealt with. It would appear that so far as danger to man is concerned the disease among the other animals would disappear were cattle, and more especially milch cows, dealt with. By referring to Tables I, II, and III it will be seen that, while tubercular diseases as a whole have been reduced by 39 per cent. during the 45 years there mentioned, and that Phthisis, or tubercular disease of the lungs, has diminished by 45·4 per cent., yet *Tabes Mesenterica* has been reduced only by 8·5 per cent., and that among children under one year it has actually increased in amount. This increase is probably due to the much larger number of infants who are fed on cow's milk now-a-days. In the case of Phthisis the reduction is probably due to the vast strides that have been made in general sanitation, especially in the betterment of the houses of all classes of the people, the better control of unhealthy occupations, and of workshops and factories, and also to improvements in medical treatment.

In the case of *Tabes Mesenterica* young children are mainly affected. The indications are very strong that the infection is caused by tubercular milk. By referring to the table on page 6 it will be noticed that children are affected at ages when milk forms the chief article of diet, and statistics show that so soon as this ceases the mortality from *Tabes Mesenterica* declines to an insignificant quantity. Direct experiment on the human subject is, of course, out of the question, but such experiment has been made on the lower animals, and, to use the words in the Report of the Royal Commission, "the milk of cows with Tuberculosis of the udder possesses a virulence which can only be described as extraordinary."

Not only is this so, but it has recently been proved beyond a doubt that in most of our large towns the milk supply is to a considerable extent infected with the germs of Tuberculosis. The Liverpool City Council caused, in 1897, 144 samples of milk, collected in the City, to be sent to four eminent Bacteriologists for examination, and it was found that 2·8 % of the samples were actively infectious.

The late Professor Kanthack, of Cambridge, found that the milk from 9 out of 16 dairies which he examined contained tubercle bacilli; each of these dairies supplied milk to the public.

It may be asked at once, why do milch cows suffer to such an extent? The answer is, they are kept under the most favourable conditions for the diffusion of the disease. It has been found that cows which are kept warm give more milk than those which are exposed to great variations of temperature. In order to obtain this warmth dairymen crowd their cowsheds and obtain the necessary temperature from the bodies of the animals. It is the custom to feed the animals with a single eye to the production of large quantities of milk. One cow suffering from Tuberculosis introduced into a cowshed and housed under such conditions quickly spreads the disease by its sputum or dung to the other animals, all of whom will soon have their powers of resistance reduced to a minimum by having to breathe foul air. Without exercise and fresh air the cows are milked to obtain the largest possible yield, and this still further reduces their powers of resistance.

It would be a valuable assistance to the Health Committee if a certain number of samples of milk from Sheffield were examined for tubercle. The process of examination is a slow one, but I am certain it would enable the Committee to feel that the need of action in Sheffield is a real one, and would enable the general public to assist in the demand for a milk supply which is absolutely free from Tuberculosis.

The extent to which our cattle are affected with Tuberculosis varies in different parts of the country. It also varies in the different classes of cattle. Bullocks and cattle fed outside suffer much less than stall fed animals, because they are less liable to infect one another.

It may be said that at least 30 per cent. of our milch cows suffer from Tuberculosis. I had statistics kept of the milch cows slaughtered at St. Helens, and found that over 50 per cent. were obviously tubercular; but, in addition to these, there would be many cases where the disease would not be obvious to the naked eye.

SUMMARY OF METHODS OF PREVENTING TUBERCULOSIS.

1. Compulsory Notification of all cases in an infectious condition.
2. Or failing this, Voluntary Notification, with co-operation from public bodies.
3. Instructions to be given to every patient *known to be in an infectious condition* as to methods of preventing the spread of the disease. Visits should be made to see that reasonable precautions are being carried out.
4. Disinfection of house after recovery, removal, or death of an infectious person.
5. The prevention of the sale of milk containing the infecting matter of Tuberculosis.

I.—NOTIFICATION OF TUBERCULAR DISEASE.

Every case of Tubercular disease which is in a condition capable of infecting others should, in my opinion, be notified to the Sanitary Authority. I feel strongly that this power should not be obtained as has been so frequently suggested by adding this disease to the schedule of diseases in the Act of 1889, but special power should be obtained so that Tuberculosis might be dealt with quite apart from such diseases as Scarlet Fever and Small Pox.

I am strongly of opinion that notification is essential if a determined effort is to be made to educate the public to those methods which will do away with the risk of one case infecting those who would otherwise remain healthy. It is the only possible way of reaching all those who are in an infectious condition. Distributing hand-bills over the City once a year may do some good; so also will the disinfection of rooms after death from Tuberculosis. The efforts of the medical profession in instilling prophylactic measures will always be of the greatest value (this, it must be remembered, is in active operation at present). So also such Societies as the National Association for the Prevention of Consumption are of great value. However much the country is roused to the danger that lurks in the person of every consumptive, who does not know (or who does not carry out) the necessary precautions, I am certain that in a few years interest will flag, for by such methods results cannot be obtained which will stimulate repeated efforts on the part of the general public in the case of such a lingering illness as Consumption. However valuable this may be it is too slow a process to rely on. In Manchester, during the past twelve years, more has been done in the way of Popular Lectures, the distribution of leaflets, &c., than in any other city, and yet the result so far has been almost inappreciable.

I am equally certain, too, that legislative measures can be drawn up so that notification and the subsequent action of the Sanitary Authority will not in any way disturb the comfort and happiness of consumptives who desire to take the most reasonable care against spreading infection.

Between the ages of 5 and 55 years, no less than 25 per cent. of all the deaths are due to pulmonary consumption. Now each of these persons is infective for a long time before death, so that the total amount of infecting material is enormous, and could never be reached by voluntary effort, however well organised. In this respect, too, it must be remembered that while Tubercle is infective for a long time, only a minority of the population is naturally susceptible.

It is contended that before the case could be notified the patient would have been discharging myriads of tubercle bacilli for some time, and that, therefore, the notification would not be of much use. Precisely the same applies to the diseases which are at present notified.

Notification would enable dark and damp houses and workshops to be sought out and steps taken to better their condition. So also with the dusty trade. It would enable occasional disinfection of rooms occupied by consumptives.

The essential point in compulsory notification is that it enables definite instructions to be given to every patient as to the reasonable precautions which he should adopt instead of appealing as at present to a more or less indifferent public.

Notification should in all cases be confidential, and the Sanitary Authority which allowed information obtained as a result of notification to become public property to the detriment of the patient, would be liable to damages.

There seems to be no more reason why steps should be taken in a disease like Scarlet Fever when the infection is of short duration than in one of long duration like consumption.

Then at present every case of Lead, Phosphorus, or Arsenic Poisoning, and Anthrax, has to be notified, so that inquiries may be made into the contributory causes of each. Yet the number of victims annually from these diseases is infinitesimal compared with consumption.

It has been said that we should only get a proportion of the cases notified. But in the case of this disease we can get 50 per cent. of good from 50 per cent. of the notifications. This can not be obtained in the case of Typhoid or Scarlet Fever.

I feel that it is only right to state that for some years the Local Government Board have opposed Consumption being made a notifiable disease, and have refused the application of several towns.

It has been said that notification would prevent consumptives being employed or engaging in any remunerative work. It must be remembered that the majority of patients who are in an infectious condition are able to go about their ordinary avocations for considerable periods, often extending to several years before they are cured or become so ill as to be confined to bed. I feel certain that all the necessary information as to the conditions of the dwelling-house and work-place, together with the small amount of supervision which would be required could be carried out by the Sanitary Authority without in any way interfering with the usefulness of the patient.

The cost of compulsory notification is undoubtedly an item which requires consideration. It is impossible to say how much this would amount to per annum if the cases were notified which were in an infectious condition. The deaths from all classes of Tubercular disease amount to about 700 per annum, and if all of these were infectious the cost would be about £90 per annum for notification at 2/6 each. The cost of notification during the first year it was introduced would be much more than this.

There would also be required a certain addition to the staff. Every case would require to be visited at home three or four times per annum, and also visits would have to be paid to workshops. There would be additional work entailed too in the disinfecting department. The additional expenditure would not amount to more than £500 per annum, and, although this is a large amount, everyone will admit that it is insignificant if the disease is reduced.

II.—VOLUNTARY NOTIFICATION.

Until such powers are obtained, or if it is not thought advisable to secure the compulsory notification of all cases of Tuberculosis which are in an infectious condition, it would be well to institute a system of voluntary notification, paying the usual fee of 2/6 for each case so notified. It might also be made a condition of such notification that the sputum be examined, and, if found to be infectious, such examination to be done free of charge. In addition to such voluntary notification similar information could be obtained from Boards of Guardians, Public Hospitals and other institutions, all of whom, I believe, would willingly co-operate with the Sanitary Authority.

In this way a considerable number of cases in an infectious condition would be brought to the knowledge of the Sanitary Authority.

III.—INSTRUCTIONS FOR CONSUMPTIVES.

Nearly every town in this country has adopted some form of leaflet for general distribution on this subject. For general distribution as a means of educating the public in such matters I believe that the one drawn up by The National Association for the Prevention of Consumption is all that is necessary. It is as follows:

CONSUMPTION (with other forms of Tuberculosis) causes one death in every eight in this country. Of all deaths in the United Kingdom between the ages of twenty-five and thirty-five nearly one half are due to consumption.

It gives rise to a vast amount of suffering and permanent ill-health. It is calculated that in Great Britain at the present moment at least a quarter of a million persons are suffering from it.

The disease is preventable.

Its predisposing cause is a low state of health, such as may be inherited, or may be induced by overcrowding; the stuffy air of ill-ventilated rooms; dirty, dark, and damp dwellings; bad or insufficient food; intemperance; and infectious fevers, or other illnesses.

Consumption is, however, contracted by taking into the system the germ or microbe of the disease, either in the dust of the air, or in food and drink (principally unboiled milk).

These germs are only derived from persons or animals already suffering from consumption, or some other form of Tuberculosis. They are found in vast numbers in the phlegm, spit, or expectoration of a consumptive person.

In a moist state this expectoration does not infect the air, but if allowed to dry and become dust it is exceedingly dangerous, and is then the chief means by which the disease is spread from person to person.

There is practically no risk of contracting the disease from the breath of a consumptive person.

There is no objection to a consumptive invalid being closely attended upon by healthy persons, who may also share the same bedroom though not the same bed.

PRECAUTIONS.

For the protection of their own families, and to prevent the spread of the disease among the general public, the following simple precautions must be taken by consumptive persons:—

The consumptive person must not expectorate about the house, nor on the floor of any cab, omnibus, tram-car, railway carriage, or other conveyance. Spitting about the streets, or in any public buildings (churches, schools, theatres, railway stations, &c.), is as dangerous as well as a filthy habit.

The consumptive person must not expectorate anywhere except into a special vessel or cup kept for the purpose, and containing a little water.

When out of doors, a small, wide-mouthed bottle with a well-fitting cork may be used; or a pocket spittoon, which may be obtained from any chemist.

For wiping the mouth a rag or paper, which can afterwards be burnt, should be used instead of a handkerchief.

The collected expectoration must be carefully burnt on the back of the fire, at least once daily; this is the simplest, quickest, and safest way of destroying the germ.

When there is no fire, the expectoration must be washed into the drain, or buried in the earth.

The cup or spittoon must then be well washed with boiling water.

When not provided with a proper vessel, a consumptive person must not spit into a handkerchief, but into a piece of rag or paper, which must be burnt.

Consumptive persons must not swallow their expectoration, as, by so doing, the disease may be conveyed to parts of the body not already affected.

A consumptive person must not kiss or be kissed on the mouth.

GENERAL PRECAUTIONS TO BE OBSERVED.

All rooms occupied by consumptive persons should be as free from damp, and as well lighted and ventilated as possible. Fresh air, light, and sunshine are most important preventives of consumption. Overcrowding should be avoided.

No chimney should ever be blocked up, and windows should be kept open as much as possible.

Cleanliness and good sanitary surroundings are important, both for the prevention and for the cure of consumption.

Rooms, passages, and staircases must be kept free from dust. Where there is dust there is danger. Do not chase dust about, or stir it up. Use damp dusters. Use plenty of tea leaves, or damp sawdust, for sweeping up the floor. Boil the dusters; burn the tea leaves and sawdust.

Milk, especially that used for children and invalids, should be boiled. Meat should be well cooked.

In the event of a death from consumption the room occupied by the invalid should not be used again until it has been thoroughly cleansed; advice may be sought from the local sanitary authority.

For distribution to cases which have been notified more pointed instructions should be drawn up and printed on a card. The following is suggested:

- I. Consumption is, to a limited extent, a contagious disease. It is spread chiefly by inhaling the expectoration (spit) of patients which has been allowed to become dry and float about the room as dust. If the following simple precautions are taken there is practically no danger of spreading infection.

- II. Do not spit except into a cup or bottle, so that the contents can be destroyed before they become dry.

When out of doors a small wide-mouthed bottle with well-fitting cork may be used, or a pocket spittoon may be obtained from any chemist.

For indoor use a cup kept for the purpose, or small paper bags must be used.

The contents of spittoons and other vessels should be carefully burned at the back of the fire at least once every day, and they must afterwards be washed with boiling water.

If ordinary handkerchiefs are ever used, they must be boiled before the spit has become dry, or placed in a disinfecting fluid.

Never, under any circumstances, spit on the floor of a house, or cab, omnibus, tramcar, railway carriage, or on any street, &c.

The rooms you occupy should be dusted with a damp duster. Use plenty of tea leaves or damp sawdust in sweeping up the floors, and see that the rooms, passages, and staircase are kept free from dust.

Sunlight and fresh air are the greatest enemies of contagion. It is therefore necessary to prevent overcrowding, and to keep the rooms occupied by you in a well-ventilated condition.

Consumptives must be careful not to swallow their spit, as, by so doing, the disease may be conveyed to parts of the body not already affected.

A consumptive person must not kiss or be kissed on the mouth.

There is practically no risk of contracting the disease from the breath of a consumptive person, and there is no objection to others sharing the same bedroom, though not the same bed.

Persons in good health have no reason to fear the infection of Consumption.

Overfatigue, intemperance, bad air, dirty, dark dwellings, and dusty occupations favour the spread of the disease.

Every case of Consumption reported would be visited, and the general sanitary surroundings of the home and workplace noted. A record of these would be kept, and if repeated cases of Tubercular Disease occurred in the same place, in many instances, such would form additional evidence of the necessity of taking action.

A copy of the above card would be left, and the patient would be revisited at intervals to see that reasonable precautions were being carried out. From experience in other diseases, I feel certain that the result of such visits would be that in time consumptives (most of whom are adults) would attempt to carry out the preventive measures suggested. I believe that the few who would resent such interference would be scarcely worth taking into account.

IV.—DISINFECTION AFTER RECOVERY, REMOVAL, OR DEATH.

Disinfection of houses where death has occurred is undoubtedly of value as a preventive measure; but too much importance has been attached to this compared with the value of Notification of the Infectious Cases.

I would recommend that the following letter, marked private (copied largely from one used by the Health Department at Brighton), be sent to the head of the household where a death has occurred from Tubercular Disease. Such letter should be sent as soon as the weekly return of deaths is received at the Health Office:—

“ HEALTH DEPARTMENT,

“ TOWN HALL, SHEFFIELD.

“ In connection with the death from consumption registered as having occurred at No....., allow me to draw your attention to the importance of the fact that this disease is chiefly communicated from one person to another by inhaling the dust of rooms occupied by patients suffering. It is most important that the above house should be disinfected and all trace of dust removed.

* "I beg to advise that the following means be taken to prevent the risk of similar cases arising in the house:—

" 1. Rub down the walls, floors, and furniture with a damp duster so as to remove all dust. It is advisable that the wall paper should be stripped off.

" 2. Thoroughly wash the floors and furniture with warm water containing a disinfectant.

" The necessary disinfectant, with directions for its use, will be supplied free of charge by applying at the Town Hall.

" 3. The bed and pillow should be disinfected in the steam apparatus by the Health Department. All bed linen and other articles should be washed.

" The carpet should be hung out of doors in bright sunshine for several hours, and well beaten.

" I shall be obliged if you will let me know when it will be convenient for you to allow the bed and pillow and other articles to be removed for proper disinfection.

" Yours faithfully,

" MEDICAL OFFICER OF HEALTH."

If the above recommendation is adopted it will throw a large amount of additional work on the disinfecting staff, which would certainly have to be increased. At present the work of disinfection can be undertaken by working overtime as a rule rather than as an exception. The additional cost would, however, not be great.

In the foregoing recommendations it will be noted that consumptives are advised not to spit on the floor of buses, railway carriages, or on the street, or other public place. At the present time there is a very common and very unnecessary practice among a large part of the community of spitting on the footpath and other public places. The extent of this filthy habit is apparent to anyone who cares to inquire for himself. Not only are our footpaths covered, but also wherever seats are provided in our public parks the surrounding ground is fouled by expectoration to a large extent. The habit is a most filthy one, and I have no doubt but that infection, not only of consumption, but of other diseases is spread by it. Such spits are mopped up by the dresses of women and spread about; they become dry and are ground into dust and blown or carried about.

In the vast majority of instances such spitting is entirely unnecessary, and in some cases the habit is even prejudicial. Among the better classes, the spittoon, which was formerly found in the smoke room of every house has now gone entirely out of fashion. Among the working classes the unnecessary fashion of spitting on the footpath still prevails, and in dealing with the infectious spit from consumptives the opportunity might be taken of preventing all spitting on public footpaths, tramcars, railway carriages, &c. The street gullies would give sufficient accommodation for those who actually needed to expectorate.

If the habit of spitting on the footpaths, &c., was stopped, there would not require to be made any invidious distinction between a person suffering from consumption and one suffering from such diseases as infectious sore throat, Influenza, commencing Pneumonia, &c.

It is very necessary that the floors of railway carriages, tramcars, &c., should be regularly washed out with a disinfectant, instead of being swept out as at present.

V.—TUBERCULAR MILK.

What is to be aimed at in this respect is the total prevention of the sale of milk from Tubercular cows. It is quite true that it is almost impossible to imagine that the milk from a cow suffering from Tuberculosis of the lungs, but in whom the udder is not affected, should give an infected milk, and this has been used as an argument for limiting the action of the Sanitary Authority to cows suffering from Tubercular disease of the udder. I feel quite certain that the dust

from infected cowsheds plays an important part in the distribution of Tuberculosis by milk. Not only is there infected dust in such cowsheds, but in a limited number of cases (one of which came under my observation recently) the animal was passing dung which was almost certainly infected (due to Tubercular disease of the bowels). In all milk there is a certain amount of cow dung. Then again, if action is limited to the prevention of the sale of milk from cows suffering from Tubercular udder disease, it must be remembered that it is only in its advanced stages that such udder disease can be diagnosed, unless the Tuberculin test could be applied. In practice such a limitation will be found to be of relatively little value.

Certain aspects of the question of dealing with Tuberculosis among dairy cattle have been inquired into by two Royal Commissions. No authoritative statement has yet been made as to how Tuberculosis is to be prevented among dairy cattle. Certain clauses which have been inserted in the Bills promoted by several towns have met with the most powerful opposition, with a result that instead of dealing with the general question of Tuberculosis among cattle the very small question of dealing with tubercular udder disease has alone been allowed to pass. The agricultural interests are so extremely powerful both in the country at large and in Parliament that only the strongest pressure of public opinion will enable the Corporation to deal with the larger question.

While I am of opinion that it is absolutely necessary, in the interests of public health, to prevent the sale of milk from Tubercular cows, and that it is not likely that so desirable an object will be obtained for some years, I still feel strongly that a great deal can be done to improve our milk supplies. I should recommend—

First.—That powers be obtained similar to those asked for by Leeds, Manchester, Salford, and other towns to enable the Corporation to ascertain whether cows were suffering from Tubercular udder disease, and having ascertained the presence of udder disease to require that the milk of such cows be not sold.

Secondly.—I think that the most important action which could be taken is to obtain power to make it a punishable offence to sell milk containing the infecting matter of Tuberculosis, unless it were proved to a Court that reasonable precautions had been adopted to prevent such. I believe that such action would enable the general public and dairymen to realise what a large proportion of our milk is at present sold containing tubercle bacilli; and I believe that such clauses could be drawn so that little or no hardship will fall on the dairymen.

Thirdly.—I have already suggested that it will be advisable to take a certain number of samples from the ordinary milk supplies of the City, and to have the same tested with a view to ascertaining whether there were tubercle bacilli present.

Fourthly.—Within the last few years considerable improvements have been made in the cowsheds in the City in regard to air space, ventilation, etc., in connection with them. There appears to me, however, to be yet a considerable amount of improvement necessary with a view to preventing the infection of Tuberculosis from spreading among cows. It is the general custom in the older cowsheds in the City to have the cows tied up against the wall. Of course, free currents of air are impossible under such conditions, and the cows to a large extent re-breathed the air. In such cases it is extremely difficult to get walls, etc., kept free from Tubercular matter. Cowsheds should, as far as possible, have a fodder passage at the heads of the cows, and the woodwork and mangers could then be washed once a week, and thus kept free from infecting matter. Such a passage, of course, allows of better ventilation. Since the passing of the new regulations a few years ago in regard to cowsheds, it has been possible to get a number of cowsheds made into a reasonably sanitary condition, but there are still certain cowsheds to be dealt with.

Fifthly.—I would recommend that all public institutions, such as hospitals (especially our own Fever Hospitals), should, in the meantime, preferably take milk from cowkeepers who guarantee the milk to be free from Tuberculosis. I append a copy of conditions of a contract used by the Crewe Corporation. Similar conditions are made by the Manchester Corporation in contracting for milk for their Infectious Hospitals.

MILK AND BUTTER CONTRACT.—CREWE CORPORATION.

(a) The contractor agrees to supply the milk from his own cows, kept and fed on his own farms, and if at any time he shall temporarily supply milk from cows other than his own, he shall, if so required by the Medical Officer of Health, furnish him with the name and address of any person from whom such supply is obtained.

(b) The contractor shall at all reasonable times allow the Medical Officer of Health, or veterinary surgeon of the Corporation, with or without assistants, to inspect his cows, cowsheds, dairy, milk shop, milk store, and all receptacles which are used for the production, storage, or distribution of milk, and shall, whether resident within or without the Borough, carry out the provisions of the dairies, cowsheds, and milk shops regulations in force for the time being in the Borough of Crewe.

(c) The contractor shall, at any reasonable time, allow the veterinary surgeon for the Borough of Crewe, in company with the Medical Officer of Health, and with or without assistants, to apply the tuberculin test to any or all of the milch cows on his premises, and in the event of the tuberculin test above-named giving any reaction (thus demonstrating the presence of Tuberculosis), he shall, if this be necessary in the opinion of the Medical Officer of Health or veterinary surgeon, immediately cease to supply the milk of such cow or cows for the purpose of carrying out the contract. If the contractor shall continue to keep any cow after the presence of Tuberculosis in it shall have been demonstrated by the tuberculin test to the satisfaction of the veterinary surgeon of the Borough of Crewe, or the Medical Officer of Health, this shall be held to be *prima facie* evidence that the milk from such cow is used for the purpose of supplying milk under this contract.

(d) The contractor agrees and guarantees that the milk supplied under this contract shall in all cases contain not less than 3.2 per cent. of fat, as ascertained by analysis.

(e) The contractor agrees and guarantees that no preservative of any kind whatever shall be added to the milk or butter supplied under this contract.

Sixthly.—All possible support should be given by the general public to cowkeepers who are able to guarantee that all their cows are free from the infection of Tuberculosis, on the certificate of some competent Veterinary Surgeon. Much can be done by the public themselves in this respect; and the formation of a really good model dairy in the outskirts of Sheffield would do much as an object lesson to teach certain of the dairymen how this should be carried on.