

THE TREND OF TUBERCULOSIS MORTALITY IN SCOTLAND
DURING THE LAST EIGHTY YEARS, AND THE MEASURES ON
WHICH EMPHASIS SHOULD BE LAID FOR THE CONTROL OF
THE DISEASE.

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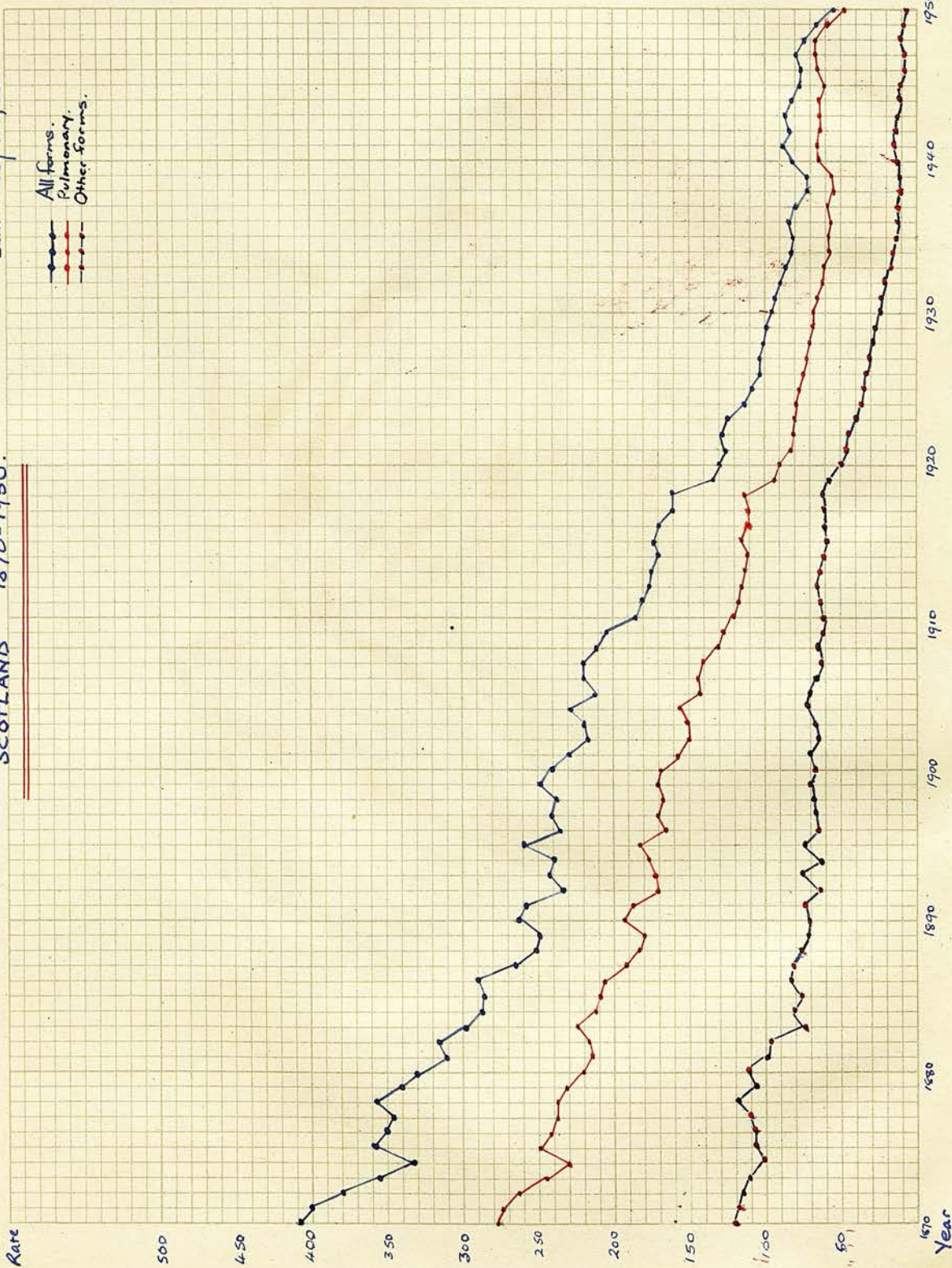
During the last eighty years, there has been a marked decline in tuberculosis mortality. From the accompanying graph, it will be seen that the reduction which has been accomplished in this period, took place mainly in the earlier years. In 1870, the mortality rate was just over 400/100,000; by 1910, it had fallen to 180/100,000; and by 1950, the figure was 54/100,000. Statistics of tuberculosis mortality were first taken in Scotland in the year 1860. From these figures, it would appear that the greatest mortality occurred in the year 1862, and it is not unreasonable to assume that this year marked the peak of an epidemic wave. Similar waves have been noted in other countries, although the peaks were reached at different times. The drop in mortality must therefore be attributed more to the forces of nature, than to the endeavours of man. For example, the first anti-tuberculosis legislation, which was introduced in 1912, did not materially affect the epidemic wave, nor have the more recent measures accelerated the decline in mortality. A closer analysis of the relevant figures is necessary however.

When one compares the death rates from respiratory,

TUBERCULOSIS MORTALITY RATES.
SCOTLAND 1870-1950.

Death rates / 100,000.

All forms.
Pulmonary.
Other forms.



Respiratory Tuberculosis Mortality Rates

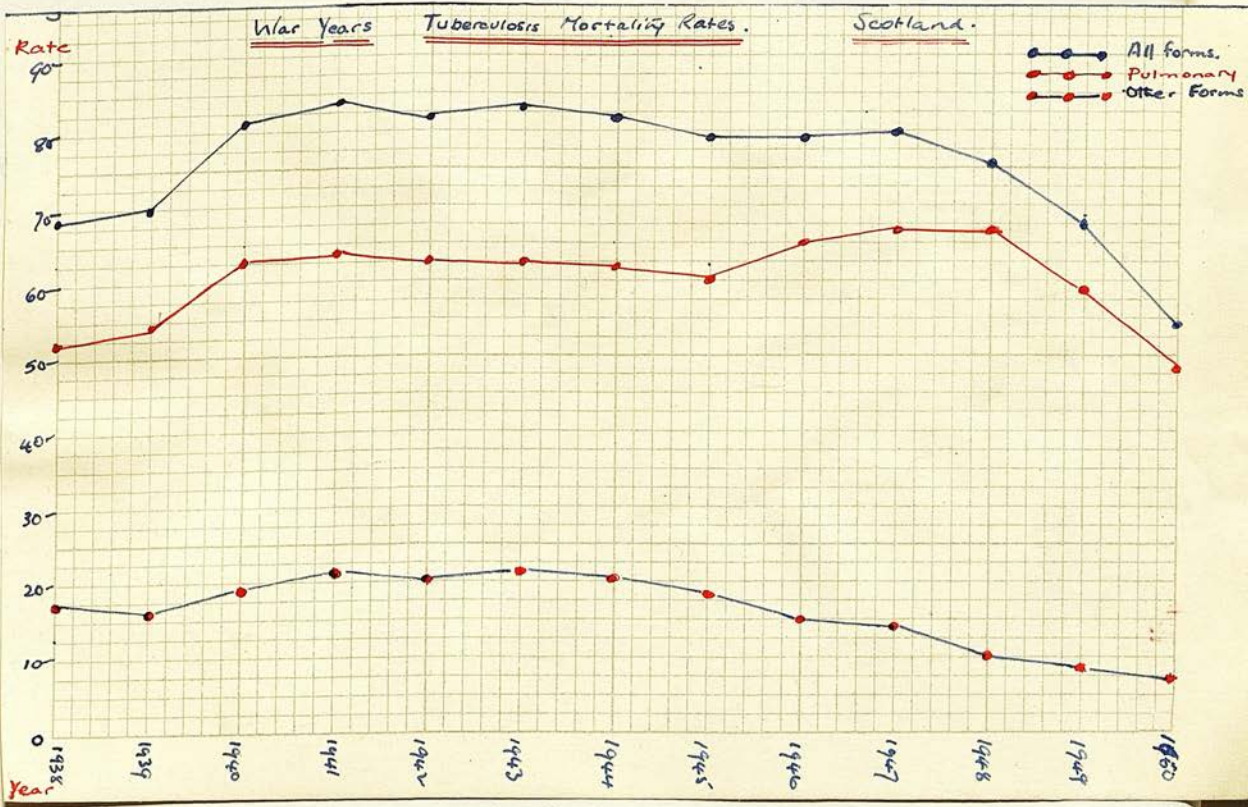
Scotland 1947.



and non-respiratory tuberculosis, one sees that the rapid fall in the latter half of last century, was mainly due to a fall in the mortality from pulmonary tuberculosis. Non-respiratory types have shown a ^{less} spectacular, but steadier decrease. The figures for pulmonary tuberculosis in 1870, were 275/100,000, in 1910, 120/100,000, and in 1950, 47/100,000; the non-respiratory numbers in those years were respectively, 130, 60, and 7/100,000. Thus the pulmonary mortality rate has fallen in the eighty years by 228/100,000, while the non-pulmonary rate fell by 123/100,000.

It may be noted that there is a definite age-sex incidence in the mortality, which is more or less constant each year. Typically the incidence is low throughout childhood in both sexes, but there is a rapid rise in the female mortality rate after the age of ten. It reaches a peak about twenty-five, and thereafter shows almost as rapid a fall. In the figures for males, the rise also starts at the age of ten, but is less abrupt and continues rising till it reaches a more plateau peak between the ages of twenty and fifty.

Similarly there is a significant difference between the figures for large burghs and rural areas. The death rate in large burghs is almost twice that of the other areas, for both forms of tuberculosis.



It is interesting to study the effects that the upheavals of the recent war, had on the Scottish tuberculosis mortality. The figures for the respiratory forms, being larger, show this most markedly. Even in 1939, there was a slight flicker which was considerably amplified in succeeding years, including the immediate post-war period, the actual peak being in 1947, and 1948. In 1949, the figure had fallen to 59/100,000, and in 1950, to 54/100,000. In other words, it seems that the pre-war mortality trend is being taken up again. The non-respiratory rate showed a slight rise in the mid-war period, but fell by 1945, and has since continued to fall, till in 1949 and 1950, it showed the encouragingly low rates of 8, and 7/100,000, respectively.

The lesson to be learned from the rise in mortality during the war, is that although the natural trend is for the death rate to decline, yet any relaxed vigilance, any interruption in the anti-tuberculosis campaign, any decline in social conditions, allows the disease to wreak renewed havoc. Thus any measures at our disposal for the control of the disease, are essential for its ultimate eradication, and to depend on the natural decline alone, is to create an atmosphere of false security, and to bank on useless optimism.

There are three factors which are concerned in the aetiology of tuberculosis; the mycobacterium tuberculosis, the quality and condition of the environment, and the individual constitution. Thus attack may be launched on these three fronts. The multiplication of the bacillus must be checked, the conditions of habitat improved, and the resistance of the stock raised. Special attention must be paid to the groups which the above figures show are most vulnerable.

It is perhaps regrettable that it is often forgotten, that tuberculosis is an infectious disease, and that it should be possible to eradicate it, as smallpox, cholera, diphtheria, or syphilis, are being eradicated. There are two problems involved here, since there are two important types of bacillus, with different modes of spread. The bovine type, which causes mainly non-respiratory forms of the disease, is being adequately dealt with today, and no longer constitutes the problem it once did. The human type, on the other hand, causing as it does mainly pulmonary disease, is disseminated widely in the community by the coughs of its victims, and is the factor on which attention must now be focussed.

To pursue this aim, the prime essential is the isolation of all infective people. If this is to be possible, very many more hospitals, and more beds, must be available

than is at present the case. Sanatoria are full to capacity, but the number of infective people still at large in the community, is still far too great. It would thus appear to be urgently advisable to use emergency methods to secure the isolation of all dangerous sources of infection. This means that a crisis expansion of the available facilities, must be made. As a short term policy, the utilisation of general hospital and isolation hospital beds, (as recommended by the Tuberculosis Standing Advisory Committee,) has much to recommend it. There are, however, many disadvantages in this scheme. The general hospitals have already, in most cases, a long waiting list of persons requiring treatment, who would inevitably suffer in any reduction in the beds available to them. Tuberculosis patients, because they are infective, create more work, in that they require separate dining utensils, dietary arrangements, open-air nursing, and they stay for long periods, so that it is possible that this will be the last straw on the backs of the already overburdened nurses. An added disadvantage is that these patients are not under the constant supervision of medical men, trained in tuberculosis work, and it is a waste of a specialist's time to have to visit a few patients in a large number of widely scattered hospitals. Lack of

facilities for pneumothorax and pneumoperitoneum induction and control, thoracoscopy, and thoracic surgery peculiar to tuberculosis, must also be enumerated in the disadvantages ~~inherent~~ ⁱⁿ ~~to~~ ⁱⁿ such a scheme. Isolation hospitals need less converting for the use of tuberculous patients, ~~than~~ do general hospitals, and they may have more beds because of the reduced incidence and severity of other infectious diseases, but again specialist facilities and attentions are lacking. Nevertheless ~~in~~ ⁱⁿ spite of these faults, these beds should be utilised as a temporary measure because of the supreme importance of isolation, without which prevention is impossible.

It is obvious that even these emergency measures for the hospitalisation of tuberculous patients, will prove inadequate to deal with the numbers involved. At present, therefore, it is necessary to select those patients with the better home conditions, and to arrange for them to be treated at home, under the supervision of the of the family doctor and of the tuberculosis dispensary. This scheme has many obvious disadvantages. It is not possible to ensure that the patient gets complete rest in bed, as sympathetic relatives think that it does him no harm to get up for a short while. It is not always possible to ensure that the patient is kept for the maximum possible period in the day, out of doors. Visitors, and in

particular, small children, have free and ready access to the patient; this both disturbs the patient, and makes for spread of the disease. The danger of the patient using public laundries is obvious. It is unlikely that even the most co-operative relatives, will be either willing or able to under-take such tasks as the disposal of infected sputum, vomitus, and excreta. There are no facilities for adjuvant methods of treatment, such as thoracic surgery. Radiographic supervision of the patient, necessitates frequent visits to dispensaries, and the disturbance caused by journeys in uncomfortable ambulances, the all too frequent unnecessarily long waits, in crowded, draughty, and uncomfortable reception halls, and the frequently dismal and depressing nature of the premises, have a deleterious effect upon the patient's progress. (These remarks are based upon personal observations and contact with patients, who are being treated under this system.) Thus while it is unfortunately the fact, that there is, at the moment, no other solution to the problem, this method of treating patients at home is strongly to be deprecated.

Meanwhile, however, the wheels of a well co-ordinated long term policy, must be set in motion. There must eventually be so many sanatoria in the country, adequately equipped for modern treatment, adequately staffed and reasonably situated, that there need never be any delay between the time of

diagnosis of tuberculosis, and admission to hospital. This is not an impossible ideal, but there are many difficulties to be overcome.

It is a well known fact that even existing sanatoria are not working to their fullest extent, because of shortage of staff. We must therefore inquire into the reasons for this shortage, and the possible methods of overcoming the difficulty. The reasons are not far to seek. For one thing, the fear which the general public has for tuberculosis is a very real thing, and few are willing to put their heads right ~~into~~ into the lion's mouth. For another, so many sanatoria are set in the depths of the country, far from civilisation, and the advantages it has to offer, in the way of amusements and company. In addition, and this applies to doctors as well as to nurses, tuberculosis is a specialised subject, and if the opportunity presents for more general experience, this is quite naturally preferred.

Can these difficulties be overcome? Firstly, propaganda is very important, and must be directed, both to general public and to nurses. Special emphasis must be laid on the fact that the danger run by sanatorium staffs is minimal, and that infection in tram-cars, cinemas, and dance halls, is just as likely if not more so. It has been suggested that nurses in sanatoria be given extra pay, but there is a big disadvantage to this, in that the nurses regard it as "danger money", and the propaganda mentioned

above is not believed. There is the additional danger that the extra pay would attract the wrong type of person. The moral satisfaction gained from nursing tuberculous patients should be stressed.

In answer to the second argument, the new sanatoria to be built, should be planned near big centres, with adequate travel facilities to and from the hospital, not only for the nurses' off duty hours, but also for day workers and visitors. Living quarters should be made as attractive as possible, the nurses each having their own bed-sitting rooms, with individual wirelesses possibly, and adequate recreation facilities, such as badminton, tennis, library, and concert hall provided.

To overcome the objection to "specialism", and to provide the numbers urgently needed, the most fruitful plan will probably be to make three to six months tuberculosis nursing compulsory for every nurse, during her training. If the sanatorium is made attractive to those nurses, it is to be hoped that many will want to come back, to do more specialist training later, and to gain a certificate in tuberculosis nursing. If such a plan is not successfully carried out, it will be worse than useless, because it will deter girls from becoming nurses at all, and all hospitals will suffer.

Day staff might be further augmented by the employment of ex-patients for light duties. It is said, "a fellow feeling makes us wondrous kind", and these people

are probably very useful from the point of view of both work, and psychology.

The sanatorium must also be attractive from the patient's point of view, because there is little sense in having an adequate number of beds, with patients refusing to occupy them. A cheerful atmosphere should be sought, with open-fronted wards, facing south; occupational therapy should play as large a part as possible; and the personality of the staff is an important factor in the maintenance of the patient's morale.

Not only is it important for all known cases to be isolated, but action must be taken to ensure the discovery of all hitherto unrecognised cases. The doctor, in fact, must seek for the sick, among the apparently healthy. This is particularly important in the case of "dangerous" workers, for example, those who work with milk, because they are likely to cause the greatest dissemination of the disease, and nurses and schoolteachers, because they are in contact with the most susceptible portion of the population.

One of the most important methods of detection, is mass radiography. This is not exhaustive at present, because of the few machines so far available. This means that they must be used especially for those groups of the population, where tuberculosis is most likely to be present, and where it does most harm. It should be emphasised that in any such group, all members should be examined. School-leavers are a

vulnerable group, and it should become the practice for these people to be X-rayed, when they leave school, while they should also be encouraged to return of their own accord to the unit, for re-examination, every six to twelve months. Doctors, nurses, and medical students, should all be surveyed at, say, six monthly intervals, because one such person, if infective, could do untold harm. Another group may be found by performing a Mantoux test routinely, on all children coming to school for the first time. Where there are positive reactors, (approximately ten per cent will be,) the assumption is that the infection is most likely to have been picked up at home, and parents of all such children might be offered the chance of mass radiography, in case they are the source.

In addition to the above, the general public should be encouraged to come to the mass radiography units, for examination, and the mobile units sent out to people in outlying districts. Money spent on expanding such services, like money spent on the building of hospitals, and on other measures, is a sound national investment.

There is little relation between tuberculosis and occupation, apart from a socio-economic one, but industries on which a close watch must be kept, are those in which the participants are liable to develop silicosis. These include coal miners, shale workers, stone masons, and tin miners. The reason for this is that tuberculosis is specially liable

to attack a silicotic lung, and so all these workers should be submitted to six monthly or yearly examination, with X-ray, so that if silicosis develops, an even closer watch may be kept for the occurrence of tuberculosis.

There should be a close liason between general practitioners and the radiography unit. If every patient who felt run down, but had little in the way of signs, were sent to hospital for X-ray, the out-patient departments would be flooded out. In consequence, general practitioners tend to hold on to patients far too long, giving tonics and iron and cough mixtures, until suddenly they realise, when it is too late, that signs of advancing disease are present. If then, practitioners were encouraged to send such patients to mass radiography units, when there was the slightest doubt in their minds as to the diagnosis, cases would be picked up much earlier, and the hospital unit would be spared both time and expense. Moreover, patients are much more willing to attend mass radiography units, where the procedure is simple, and delay and waste of time minimal, than to lose a day's pay, while they sit in a busy hospital department, waiting their turn.

The careful instruction of medical students in tuberculosis diagnosis, is very important. The students of today are, after all, the doctors of tomorrow, and they will be required to play a prominent part in the nationwide

campaign to control the disease. A department of tuberculosis in every university, is an ideal to be aimed at, with adequate instruction not only in systematic lectures, but also in practical demonstrations of the ancillary helps available to the practitioner, such as the mass radiography unit, the bacteriological diagnosis department, and the local dispensary, which can, in its way, be a very useful adjunct.

Perhaps the most important task a dispensary can undertake, is the supervision and control of all contacts of known tuberculous patients, both those in sanatoria, and those who are unfortunately required to stay at home. This is not something which should be left to the mass radiography unit, since more close supervision is necessary than is possible in a unit dealing with thousands of people a week. The dispensary should be an attractive building, centrally situated, for the convenience of all who attend, but preferably in an open situation where the ^{sun} ~~sun~~ can penetrate, with some green grass around it, or at least a few window boxes filled with bright flowers to radiate a glow of hope, instead of a shadow of doom and foreboding. To such a place, contacts and others who must attend, will be much more willing to return. The clinic should be adequately staffed, so that little or no waiting is necessary, and an X-ray unit with facilities for screening should be attached. In addition, the facilities of a bacteriological department, should be on the spot, or at

the disposal of the doctors. Arrangements can then be made for contacts, such as children of affected parents, and marriage partners, to be seen regularly at an appointed and convenient hour, at least every three months. They should then be examined, and screened, and if originally Tuberculin negative, given a Mantoux test. Should any disease be found then, it is important that the dispensary can be admitted to hospital for treatment, without delay, before the disease progresses. Therefore, adequate dispensary service, depends on the crisis expansion and future provision of available beds, already discussed.

Dispensaries may also relieve pressure on the sanatoria at the present time, until sufficient staff and beds materialise, by continuing supervision of patients who have had a short term in sanatoria, with induction of collapse therapy, and who are only slightly infective, if at all. The supervision should consist of weekly screening, refills when necessary, and regular sputum examinations. It should be the work of the dispensary, in addition, through its ^a health visitors, to supervise those discharged from sanatoria apparently cured, or in a quiescent phase, so that if they again become infective, they can quickly be isolated.

There is one important fallacy in this going all out for the prevention of tuberculosis, and that is the consequent lack of opportunity for subclinical infection. Thus the immunity which is gradually built up in the majority of people at the ~~pres-~~

present time, will be lacking in an increasing percentage of the population, and if infection eventually does take place, it will be a fulminating one, and death a sure sequel. There is, however, an answer to this, which, though possibly not complete, is probably capable of improvement in future years. This answer is B.C.G. vaccination. This country has been very slow in adopting the practice of vaccination, but it has been proved of value in other countries, notably in Scandinavia, and it is certainly worth a trial. If it can provide a degree of immunity, which will in some cases prevent the onset of the disease, and in others modify its course, it can tide the country over the period of eradication of the disease, and in itself help to speed the departing foe. At present it is not practicable to introduce wholesale vaccination, a rigidly controlled scientific experiment, such as is being carried out, by the Medical Research Council, being a necessary preliminary. The use of B.C.G. is therefore confined at present, to susceptible groups such as Mantoux negative contacts, including newly-born babies of tuberculous mothers, nurses, and students. Later, when its value to this country is proven, if there are no untoward effects to be demonstrated, it should be extended to all tuberculin negative school leavers. Thereafter, it may be considered profitable to extend its use to the whole country, possibly even with legislation, in much the same way as small-pox vaccination was carried out. The main disadvantage of B.C.G.

is the short duration of the immunity, but this may be improved by one or two repeated vaccinations in childhood and adolescence.

It is not, perhaps, out of place here, to emphasise the need for continuing and expanding the present methods employed for the eradication of bovine tuberculosis. This is important, not only in helping to wipe out non-respiratory disease, but in reducing the incidence of pulmonary infection, a small but definite proportion of which, is due to bovine infection. The short term policy here, is the pasteurisation of all "doubtful" milk, but this does not eliminate the source, which must be gradually, but inexorably, removed. It is estimated, that there are about 30 per cent of tuberculous cows in the country, though these are not all infective, and these must be eventually all slaughtered, so that all herds become tuberculin tested, and certified. Areas of the country are gradually being cleaned up,-- the so-called eradication areas,-- and in time the whole of Scotland will earn this title, and bovine infection will disappear.

There are conflicting ideas about what part environment and socio-economic factors play, in the incidence of and mortality from tuberculosis. It is usually found, however, that where these factors are worst, tuberculosis is most prevalent and it is generally accepted that they are worthy of close attention, and that improvement in these factors--- will effect improvement in the tuberculosis picture. Probably

they have their effect in the following ways. Firstly, malnutrition, sub-nutrition, damp, and a generally low standard of living, lower the general resistance of the body to the tubercle bacillus, and secondly, overcrowding facilitates the spread of the disease from person to person, and in particular, increases the number and size of the doses of organism. Poverty often leads to dirt, and slovenly, unsatisfactory methods of personal hygiene. Such factors favour the development of the disease.

Emphasis must then be laid on improving the general standard of living in Scotland, so that all, from the lowest to the highest in the land, are receiving an adequate diet, and are living in congenial and healthy surroundings. With the rising cost of living, and the lack of houses, this is becoming increasingly difficult; it is often the middle classes who suffer most, because they try to maintain their outward appearances, on a relatively smaller wage, at the expense of their diet, particularly of the more expensive nutritious foods. The cost of living must therefore be stabilised, before further progress can be achieved. Wars are the chief cause of the rise in the cost of living, and the ultimate answer is the banishment of wars from the face of the earth, for war and tuberculosis eradication, cannot go hand in hand. It would seem that this is an impossible ideal, but it is obviously ridiculous to urge the wiping out of

tuberculosis because it kills some 8,000 of the youth of the population, in the year, and in the next breath to talk glibly of the 80,000 deaths caused by the one atomic bomb.

Meanwhile however, we must do all we can with the money available in the country, to continue the fight against disease. Attention must be focussed on the need to build many more houses, of reasonable price, and rent, and on the gradual elimination of slum districts, and overcrowding. It must be remembered that this object will to a large extent defeat itself, if the costs of the new houses are too great, and if they are situated too far from the places of work, because a vicious circle arises. The people are better housed, but cannot afford good food. Thus either their nutrition suffers, and their resistance is lowered, or else the family all crowds into the kitchen, and the other rooms in the house are let to boarders, the spread of the disease being again facilitated.

It has already been mentioned that the treatment of tuberculous patients at home, although a regrettable necessity, is a poor method of control, and it might be postulated here that the priority rehousing of tuberculous patients, is not altogether a good practice. It is beneficial in that it provides a nearer approach to sanatorium conditions for the patient, but these will be of no avail, if by virtue of his new surroundings, the patient is unable to afford the nourishing food he requires. Moreover it is carrying infection into a new district, and spread may thereby be facilitated. This is

furthered by the fact that contacts , and possibly the patient himself, when he is ambulant, are travelling longer distances into the centre of the city, and are coming into intimate contact with the other people in the public transport. A more important consideration in the allocation of houses should be the bringing into being of homes into which children from an infected household may be sent, until such time as provision can be made for their tuberculous relative.

The relation of heredity to tuberculosis is not clearly defined. It can be stated, however, that whether the reason is heredity or environment, children~~children~~ of tuberculous parents are more prone to develop the disease. Thus if infective tuberculous patients are willing to forego the pleasures of having a family, in the interests of the public health, they should be instructed in birth control. ~~Since~~ Since there is no proven heritable tuberculous diathesis, it cannot be advised that this policy be enforced by law, and certain religious objections would in any case be too strong.

The importance of health education must be stressed. The public must be encouraged to demand only tuberculin tested milk. A public outcry for more sanatoria would stimulate Parliament to order this provision, far more readily than the recommendation of such an august body as the General Medical Council. Ineffective propaganda on the lines of notices stating " Spitting Spreads Disease " should be augmented by

legislation making it a punishable offence, to spit upon the street, or even upon one's hands. Health education activities, promoted by Local Authorities, such as films, lectures, and exhibitions, can do much to convince the public of the need for early treatment. They also help to combat apathy, and correct misunderstanding and ignorance. Finally, health education can contribute much to dispelling the unreasonably exaggerated fear, which is prevalent in the community, and the stigma which is so often attached to sufferers from tuberculosis.

While prevention is better than cure, it is, of course, imperative for the control of mortality, that modern methods of treatment be exploited to the full, and that research to discover better methods be carried out with the greatest energy and vigour.

The sheet-anchor of treatment has always been, and probably always will be the sanatorium regime, the three basic essentials of which are rest, fresh air, and good food. These act by raising the patient's resistance, so that his natural defences are better able to deal with the bacillus. There is no doubt as to the value of this method. One has only to compare the gaunt miserable appearance of the patients before admission, with the bloom of health which they assume after a few weeks in the institution, to be convinced of this.

To augment the effects of general rest, local rest may be given to the part affected. Many different methods have been used, but the chief ones are, for the lung, artificial pneumothorax, pneumoperitoneum, phrenic crush, and thoracoplasty, and for bones and joints, splintage or other methods of immobilisation. It is imperative, therefore, that all sanatoria be equipped with the apparatus for carrying out these methods, and staffed by experts in their application, who would ensure that the best method is chosen for each patient.

Over a hundred years ago, Sir James Carson predicted that many cases of pulmonary tuberculosis would find their best cure in surgery. This has certainly become more and more true, with the development of better anaesthesia, and aseptic techniques, and thoracic surgery has advanced greatly in the last twenty years. It can therefore be recommended as an integral part of modern treatment for the control of tuberculosis. Emphasis must be laid on the necessity for close and active co-operation between the chest physician and surgeon, for this is of the utmost importance in selecting cases suitable for surgery. In a small sanatorium, where the patients know each other, the repercussions fall not only on the patient, if the case is badly chosen, but on the whole community. The most useful operation is probably thoracoplasty, but lobectomy and pneumonectomy are also

successfully employed. It is therefore advisable that a thoracic surgery unit be available, attached to the largest sanatorium in any one district, and that there are an adequate number of these units in the country. Suitable patients may then be transferred from any sanatorium to the large one, when surgery is to be performed. Surgery is also of use, of course, in ankylosing joints, bone grafting, nephrectomy, removal of tuberculous glands, removal of gut affected by ileo-caecal tuberculosis, or in the late results of an abdominal infection, such as stenosis, but these are cases in the main, non-infective, and can easily be dealt with in general units, and if necessary transferred back to the sanatorium.

The newest field in the treatment of tuberculosis, is that of antibiotics and chemotherapy. The most effective substance in reducing tuberculosis mortality, has been streptomycin, but it is only of use in acute lesions, such as miliary tuberculosis and tuberculous meningitis. It has very little effect on chronic lung conditions, and in fact, it is dangerous to use it in th's connection. The bacilli become streptomycin resistant after two or three months of treatment, and if these bacilli are disseminated in the community, and cause fresh infection, streptomycin is useless for the new case. P.A.S. has proved of value

mainly in that it slows up this development of resistance, if it is given along with streptomycin. It is of little use by itself. Experiments have been carried out on the use of thiosemicarbazones, but these drugs are more toxic than, and of little more use than P.A.S. At present, then, streptomycin should be given to all acute cases, and withheld from all chronic ones, unless they have developed some complication, such as laryngeal, or intestinal tuberculosis, when its use is merely palliative. Meanwhile, research must be made into this promising field, for newer and better antibiotics;; it is possible that the answer to tuberculosis eradication does lie in this direction, and that it may be discovered in the near future,

In passing, it may be pointed out that the answer to the treatment problem, and the provision of beds, does not lie in the Swiss Sanatoria. The numbers which can be accommodated will make little difference to the problem as a whole; contrary to public opinion, the mountain breezes and snow capped peaks, are not of themselves certain passes to health; the patient is taken from home with no hope of seeing friends or relatives for months, or perhaps years, and the money which is required for their travel and maintenance would be better spent on anti-tuberculosis measures at home.

Treatment must be followed by the rehabilitation of discharged patients, so that they can go back to work they are fit for. If they return to heavy work, the disease may well take hold again, and the good work of the treatment is undone. Suitable employment should be reserved, or created for such people, and the salary should be large enough to ensure that worry about family maintenance does not get a chance to pull down the patient's resistance. In addition, the patient should be well instructed about his future mode of life, and the doctrine of "moderation in all things" should be inculcated ⁱⁿ ~~to~~ him, before he leaves the sanatorium. He should be supervised by the local dispensary, through its health visitors, and periodic sputum examinations and X-rays should be made.

It is debateable whether the development of such schemes as villages or colonies to which discharged patients may go, is very satisfactory. They are useful in that suitable work may be provided, supervision can be close and constant, and there is none of the competition of outside life, to cause worry and strain. But, for one thing, these schemes cost a great deal of money, both to initiate and to run, and yet they do not touch on the problem, because there is so little accommodation available. For another, the association of people in a closed community,

is bound to result in many marriages, which, from the point of view of passing on a "tuberculosis diathesis," if there is such a thing, is not a desirable result.

In conclusion, then, the methods on which emphasis should be laid for the control of tuberculosis mortality, include the provision of an adequate number of beds for isolation of all known infective cases, the discovery and isolation of all hitherto unrecognised cases, protection of vulnerable groups by vaccination, and anti-the betterment of social conditions, better health education and better treatment, with recommendations for the furtherance of research into the whole problem, including especially vaccination and anti-biotics. The combination of these methods is expected to accelerate the natural decline of the disease, so that the future, far from being gloomy and despondent, is full of hope and promise for its ultimate eradication.