THE ROLE OF MEDICINE
DREAM, MIRAGE OR NEMESIS?

Thomas McKeown

BASIL BLACKWELL - OXFORD
Peasants and crops, in other words food supplies and the size of the population, these determined the destiny of the age. In both the long and the short term, agricultural life was all-important. Could it support the burden of increasing population and the luxury of an urban civilization so dazzling that it has blinded us to other things? For each succeeding generation this was the pressing problem of the day. Beside it, the rest seems to dwindle into insignificance.

—Fernand Braudel, The Mediterranean and the Mediterranean World in the Age of Philip II

INTRODUCTION

Speaking of the origin of an idea a historian once remarked: 'It is always earlier than you think'; and certainly it is not possible to name the sceptic who first questioned the effectiveness of medical procedures. But at least from the time of Montaigne, the notion that treatment of disease may be useless, unpleasant, and even dangerous has been expressed frequently and vehemently, particularly in French literature. Molière’s Le Médicin Malgré Lui, the famous operation in Madame Bovary and Proust’s account of the psychiatrist’s cursory examination of his mortally ill grandmother ('Madame, you will be well on the day when you realize that you are no longer ill... Submit to the honour of being called a neurotic. You belong to that great family... to which we are indebted for all the greatest things we know') are examples of the irony and bitterness with which some of the greatest writers have expressed their conclusions about the work of doctors.

Remarkably, considering the eminence of the critics, such views have had little effect on medicine or the public’s estimate of it. Perhaps they were not meant to be taken quite seriously; indeed Proust wrote: 'To believe in medicine would be the height of folly, if not to believe in it were not greater folly still, for from this mass of errors there have emerged in the course of time many truths.' Or possibly, being expressed humorously, the criticism incurred the risk of being considered frivolous; it is at least arguable that Shaw’s lively Preface to The Doctor’s Dilemma had less influence than the Webbs’ seriously worded essay on a public medical service in The Report of the Poor Law Commission. Whatever the explanation, until recently the contribution of medicine to prevention of sickness, disability, and premature death was taken essentially at its own evaluation.

I have no difficulty in dating the origin of my own doubts about the conventional assessment of the work of doctors. They began when I went to a London hospital as a medical student after several years of graduate research in the Departments of Biochemistry at McGill and Human Anatomy at Oxford. There were two things that struck me, almost at once. One was the absence of any real interest among clinical teachers in the origin of disease, apart from its pathological and clinical manifestations; the other was that whether the prescribed treatment was
Introduction

of any value to the patient was often hardly noticed, particularly in internal medicine. (On the latter point, although not the former, the approach in surgery and obstetrics was somewhat different.) I adopted the practice of asking myself at the bedside whether we were making anyone any wiser or any better, and soon came to the conclusion that most of the time we were not. Indeed there seemed to be an inverse relation between the interest of a disease to the doctor and the usefulness of its treatment to the patient. Neurology, for example, was highly regarded and attracted some of the best minds because of the fascination of its diagnostic problems; but for the patient with multiple sclerosis, Parkinson's disease, amyotrophic lateral sclerosis, and most other serious neurological conditions, the precision of the diagnosis which was the focus of medical interest made not the slightest difference to the outcome. If the gifted neurologists had private qualms about the usefulness of their efforts they gave no indication of them, at least in the presence of students. Venereology, in contrast, although it provided the valuable treatment of syphilis and contributed to prevention of the spread of gonorrhoea, was held in low esteem; so too were some useful surgical procedures including, remarkably, the surgery of accidents, perhaps the most successful of all therapeutic measures. Endocrinology, in which I had been working, was in an intermediate position; through its researches it had reached Burlington House, although its practice was still not far removed from that of the hygienic stores which dispensed rejuvenants on the Charing Cross Road. I concluded that if I were St Peter, admitting to Heaven on the basis of achievement on earth, I would accept on proof of identity the accident surgeons, the dentists and, with a few doubts, the obstetricians; all, it should be noted in passing, dealing mainly with healthy people. The rest I would refer to some celestial equivalent of Ellis Island, for close and prolonged inspection of their credentials.

The opportunity and incentive to consider more deeply what was initially little more than an undocumented impression, came through my appointment to the Chair of Social Medicine at Birmingham. In the early 1940s some senior teachers had come to the conclusion that a medical school located in the industrial Midlands should have a department of occupational health, and an application was made to the Nuffield Provincial Hospitals Trust which was known to be interested in the subject and had made a grant for the same purpose to Manchester.

1. At that time the home of the Royal Society.
Introduction

Griffith in 1926 and accepted by most social historians, that the increase was due to a decline of the death-rate brought about by advances in medicine. Habakkuk considered that the medical measures of that period looked insufficient to account for the rise of population and turned to the possibility, attractive to some historians, that it resulted from an increase of the birth-rate which was secondary to economic and industrial developments. Our own view (I speak here also for my colleagues subsequently associated with this work) was that Habakkuk's estimate of medical measures was correct, but that nevertheless a fall of mortality was a more plausible explanation for the growth of population than a rise of fertility. A first paper on this subject (in 1953) was followed by others concerned with population growth in the nineteenth and twentieth centuries, and in a recent book (The Modern Rise of Population) I have attempted a comprehensive interpretation of the increase of population from the eighteenth century to the present day. This book was first suggested to me by an Oxford historian, John Cooper, but I did not think seriously of tackling it until 1973, when at a meeting in Pavia I discovered that there was a considerable industry among French and Italian historians working on such unrewarding topics as the decline of plague and inoculation against smallpox in the eighteenth century.

In the meantime I had come to see that recognition of the limited impact of medical procedures was a key which would unlock many doors. My own interest in it was initially, and is still primarily, in its significance to medicine and health services, and this is the theme of the present monograph. To state it simply: misinterpretation of the major influences, particularly personal medical care, on past and future improvements in health has led to misuse of resources and distortion of the role of medicine.

Since this statement may appear to have an affinity with the conclusions reached by Professor Cochrane in his notable Rock Carling Lecture on Effectiveness and Efficiency, I must try to distinguish between our approaches. I think of him as an itinerant preacher who emerges at intervals from his Welsh retreat to admonish the faithful for their failure to submit all aspects of their lives and works to scientific appraisal by randomized controlled trials; myself I see as an academic Billy Graham who bears the glad tidings of health for the taking to a grateful people. The distinction will be worth a closer examination.

Introduction

about the basis of human health. It is assumed that the body can be regarded as a machine whose protection from disease and its effects depends primarily on internal intervention. The approach has led to indifference to the external influences and personal behaviour which are the predominant determinants of health. It has also resulted in the relative neglect of the majority of sick people who provide no scope for the internal measures which are at the centre of medical interest.

This book presents the grounds for these assertions, and examines their significance to health services and to medical education and research.

Part One
Concepts of Health and Disease
cigarette smoking on a significant scale has occurred only in recent decades.

Although the relative importance of behavioural and other influences cannot be estimated accurately, it is possible to assess the ill-effects of one of them, namely smoking. Table 7.2 shows for smokers (25 cigarettes daily and over) and non-smokers of various ages, the increase in expectation of life which occurred between 1838–54 and 1970. From age 25 the increase for smokers was about half or less than half of that

<table>
<thead>
<tr>
<th>Age</th>
<th>Non-smokers</th>
<th>Smokers of 25+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CPD</td>
</tr>
<tr>
<td>0</td>
<td>31.9</td>
<td>26.0</td>
</tr>
<tr>
<td>25</td>
<td>13.2</td>
<td>7.0</td>
</tr>
<tr>
<td>35</td>
<td>10.3</td>
<td>4.1</td>
</tr>
<tr>
<td>45</td>
<td>7.4</td>
<td>2.1</td>
</tr>
<tr>
<td>55</td>
<td>4.6</td>
<td>0.6</td>
</tr>
<tr>
<td>65</td>
<td>2.3</td>
<td>0.3</td>
</tr>
</tbody>
</table>

* Based on mortality experience of (a) British doctors, smokers and non-smokers and (b) estimates of life expectation of males in England and Wales in 1838–54 and 1970.

for non-smokers. This result can be interpreted to mean that in the past century the improvement in expectation of life of mature males from all causes has been reduced by at least half by smoking alone. The fact that so large a reduction has been due to a single practice suggests that in advanced countries behavioural influences are now more important than others; and since the changes in behaviour are characteristic of an affluent society, it seems permissible to conclude that diseases associated with affluence are now predominant. The order of importance of the influences on health has altered to this extent, that personal behaviour is now relatively more significant than food deficiency and environmental hazards.

In Part One I concluded that the contribution of clinical medicine to the prevention of death and increase in expectation of life in the past three centuries was smaller than that of other influences. This is not of course the only index of medical achievement; doctors are also concerned largely with postponement of death (from specific causes) and treatment of non-fatal diseases, as well as with the care of patients for whom little can be done by active intervention. However, while recognizing that all these contributions are important, I think it is desirable to put them into perspective, and this can be done by considering the following question.

Let us suppose that a parent is asked to choose between two possibilities for a new-born child: that it should have the benefit of the increase in expectation of life since the beginning of the eighteenth century (from about 30 years to over 70) with the associated reduction of morbidity from the diseases that have declined, but be denied all other medical treatment; or that it should have such treatment, but return to the former high risk of death in early life, with about 30 per cent of surviving to maturity. The choice here is between the benefits that have resulted from the decline of mortality and all others not reflected in this index. No well-informed person would doubt that the parent should choose the former. This way of looking at things may seem highly theoretical, but it has a considerable bearing on health policy decisions, particularly in developing countries where a choice has to be made between investment in preventive and therapeutic measures.

However, an appraisal of all aspects of medical achievement is needed as a background for discussion of the medical role, and I shall consider it in relation to: prevention of death; postponement of death; and treatment of non-fatal diseases.
PREVENTION OF DEATH

Although the contribution of medicine under this heading has already been examined (Chapters 4 and 5), we must look at it more closely in the period when clinical procedures became effective. This is desirable not only to put the record straight, but also if we are to use medical achievement in the past as a guide to its possibilities in the future. For this purpose the last thirty years are in some respects more instructive than the previous three hundred.

TUBERCULOSIS

Mortality from tuberculosis fell sharply from the time when it was first recorded, so that a large part of the decline occurred before the introduction of effective treatment in 1947 (Fig. 8.1). However, a graph on this scale conceals the large contribution made by chemotherapy in the later stages, so we need to examine the death-rate more closely immediately before and after streptomycin came into use. Since experience of the disease varies by age and sex, death-rates since 1921 are shown separately for males and females in three age groups: under 15; 15-44; and 45 and over (Figs. 8.2 and 8.3). Straight lines have been fitted to the rates for the years 1921 to 1946, and extrapolated to 1971, allowing for the slight increase between 1946 and 1947.

On the assumption that without streptomycin the decline of mortality would have continued at about the same rate as between 1921 and 1946, estimates have been made of the contribution of treatment. The results are given in Table 8.1, for the sexes combined. Chemotherapy reduced the number of deaths in the period since it was introduced (1948-71) by 51 per cent; for the whole period since cause of death was first recorded (1848-71) the reduction was 3.2 per cent.

BCG vaccination was used from about the same time as streptomycin and it is therefore difficult to separate the effects of the two measures. In the examination of the trend of mortality (Table 8.1) it was assumed that the benefit was due wholly to chemotherapy. That this assumption is not unreasonable is suggested by the experience of the Netherlands,
which has never had a national BCG programme, but nevertheless had the lowest death-rates from respiratory tuberculosis for any European country in 1957-9 and 1967-9 (Fig. 8.4).

The history of tuberculosis illustrates, perhaps better than that of any other infection, a general point about the contribution of therapy.

Effective clinical intervention came late in the history of the disease, and over the whole period of its decline the effect was small in relation to that of other influences. But although the problems presented by tuberculosis in the mid twentieth century were smaller than those in the early nineteenth, it was still a common and often fatal disease with a high level of associated morbidity. In two of its forms, tuberculous meningitis and miliary tuberculosis, it was invariably fatal. The challenge
to medical science and practice was to increase the rate of decline of mortality, and, if possible, finally remove the threat of the disease which had been a leading cause of infectious deaths for nearly two centuries. In this it was outstandingly successful, and it would be as unreasonable to underestimate this achievement as to overlook the fact that it was preceded, and probably necessarily preceded, by modification of the conditions – low resistance from malnutrition and heavy exposure from overcrowding – which had made tuberculosis so formidable.

**Pneumonia**

Both clinical trials and clinical experience leave no doubt about the value of antibiotics in treatment of bacterial pneumonia. Unfortunately in national statistics it cannot be separated from viral and other forms of the disease, and indeed, until quite recently, pneumonia (all causes) was not distinguished from other respiratory infections.

In the nineteenth century it was grouped with bronchitis and influenza, and Fig. 8.5 shows the trend of mortality from the three diseases. It increased in the last years of the century, but declined fairly rapidly from about 1900. It is hardly surprising that there is no visible change in the slope of the curve after the introduction of chemotherapy, since the diagram is based mainly on conditions in which antibiotics are not effective.

For England and Wales it is possible to examine the death-rate from pneumonia (all causes) from 1931, and Figs. 8.6 and 8.7 show the rates for males and females respectively in three age groups. Mortality fell during the whole period, and at ages 0–14 and 45–64 the rate of decline increased after the use of sulphonamides and antibiotics; there was little difference in the 15–44 age group. In the same period deaths from pneumonia rose sharply for both sexes at ages over 65, but here interpretation is even more difficult since the many different causes of death included under this heading in old people make the diagnosis wholly unreliable.

These data cast no doubt on the effectiveness of antibiotics in the treatment of bacterial pneumonia. What they do show is that mortality from respiratory diseases certified initially under 'bronchitis, influenza
and pneumonia, and later under pneumonia, was falling from about the beginning of the century, and that its continued decline after 1935 was not due mainly to chemotherapy.

**Diphtheria**

Mortality from diphtheria in England and Wales has fallen fairly continuously since the late nineteenth century (Fig. 8.8), when treatment by antitoxin was introduced. The rate increased slightly at the beginning of the last war, but fell rapidly from about the time when a national programme of immunization began. Diphtheria is now a rare disease, and many doctors trained since the Second World War have never seen it. In the six years from 1963 to 1970, there were only nine deaths from diphtheria in England and Wales.

It is tempting to attribute the decline of diphtheria deaths between 1895 and 1922 to treatment by antitoxin, and the rapid fall since 1940 to immunization. Nothing in the evidence is seriously inconsistent with this interpretation, and if mortality from the other common infections had increased or remained constant in the same period it could possibly be accepted unreservedly. But the fact that, without prophylaxis or treatment, diseases such as whooping cough and measles also caused far fewer deaths, suggests that other influences may also have been at work in diphtheria. With due regard for this reservation it seems probable that immunization had more effect on the control of this disease than of any other, with the exceptions of poliomyelitis and, possibly, smallpox. This conclusion is supported by the high level of immunity which follows the use of a good antigen. Evidence for England and Wales in 1961-3 indicated that the risk of an attack of diphtheria was about six times greater, and the risk of a fatal attack ten times greater, in those not immunized than in those immunized.

**Smallpox**

Fig. 8.9 shows the trend of mortality from smallpox in England and Wales since cause of death was first registered. Unfortunately, there are no reliable data for the eighteenth and earlier centuries, but the London Bills of Mortality suggest that epidemics of the disease caused many deaths, particularly among children. In 1796 one-fifth of all deaths in
London were ascribed to smallpox. Mortality declined rapidly from the late nineteenth century and since about 1910 there have been relatively few deaths in the British Isles.

Vaccination was used first in 1798, made compulsory in 1852, and enforced rigorously between 1872 and 1887, when the acceptance rate for children was about 90 per cent. But parents increasingly took advantage of the conscientious objection clause, and in 1948, when compulsion ceased, less than 40 per cent of infants were vaccinated. In 1971 it was decided that vaccination should no longer be recommended as a routine procedure in early childhood.

It is not easy to assess accurately the contribution that vaccination has made to the decline of mortality from smallpox. Creighton, the historian of infectious disease, considered it useless; but this view is generally regarded as perverse and inconsistent with the evidence. In the light of present knowledge of the high degree of protection afforded by vaccination for a limited period it seems reasonable to believe that the procedure was very effective in the late nineteenth century when a high proportion of children were immunized, and still more in the measures taken more recently to prevent the spread of the disease by identification and vaccination of people exposed to smallpox.

**Poliomyelitis**

Poliomyelitis appears to have been a rare disease before the late nineteenth century, but since that time it has occurred in epidemics in many countries. The number of people infected but with few or no clinical manifestations exceeds greatly (by about 100 to one) the number affected by paralysis.

Because of the crippling disabilities which are common in patients...
who survive, there is some tendency to overestimate the importance of poliomyelitis in relation to other infections. In 1947, when the highest death-rate was recorded in England and Wales, there were 33 deaths per million children under 15, compared with 99 from whooping cough and 69 from measles. In 1871–80, before the decline in mortality began, the last two diseases were responsible for 1415 and 1038 deaths (per million under 15) respectively.

Since the number of deaths from poliomyelitis is small, the reduction in mortality made little contribution to the decline of the overall death-rate. However, the disabling effects are so serious that the trend of notifications is more important than in other infections.

This is shown in Fig. 8.10 for England and Wales. The rate fell sharply from 1956 when immunization was introduced, and by 1964–5 there were few cases. This strongly suggests that immunization was responsible for the reduction of notifications and prevention of disabilities and deaths. Moreover, laboratory evidence indicates that it gives a high degree of immunity, as measured by the titre of circulating antibodies. Results of clinical trials are also impressive. Finally, poliomyelitis has been almost eliminated from countries which have had immunization programmes, whereas it is still common in countries which have not.

**TETANUS**

Before the First World War the annual death-rate from tetanus in England and Wales was 7 per million of population. The rate has fallen almost continuously since that time (Fig. 8.11) and is now well below 0.5 per million.

Passive immunization, in which tetanus antitoxin is given at the time of injury, has been used extensively since the First World War. However, it has certain disadvantages, and during the Second World War it was replaced by active immunization by tetanus toxoid.

Passive immunization is believed to have had a substantial effect on mortality from tetanus, and although routine active immunization of children was introduced only recently, large numbers of adults have been protected since the Second World War, including all those who served in the armed forces. But while it is probable that immunization contributed substantially, other explanations (such as the disappearance of the horse from the roads) must be found for the considerable reduction of deaths before it was used. It should also be mentioned that in recent years there has been a significant improvement in treatment.

**WHOOPING COUGH**

The death-rate from whooping cough in England and Wales (Fig. 8.12) has declined since the seventh decade of the nineteenth century. The effectiveness of treatment is still in doubt, and the more important issue is the contribution of immunization.
As mortality had fallen to a low level before immunization was introduced, its value must be judged in relation to morbidity, of which the evidence is the trend of notifications. This source is notoriously unsatisfactory, because frequently cases are not notified.

The rate has declined almost continuously since 1930 (Fig. 8.13), although there have been periodic, by former experience relatively small, epidemics. Unfortunately for the purposes of interpretation, immunization tends to be introduced gradually and it is not easy to be certain when it was first used extensively. The Annual Report of the Chief Medical Office suggests that the procedure may not have been in general use until at least a few years after the onset of the decline of notifications. It has also been observed that in Germany, where immunization was not used nationally, notifications decreased.

Opinion, including medical opinion, is still divided over the relative advantages and disadvantages of immunization against whooping cough. A decision is important in practice; but it is not essential for this analysis, and in concluding that the matter is still open I recall Haldane's remark, that in a scientific paper one can almost gauge the intellectual honesty of the author by the number of phenomena he or she leaves unexplained.¹

**MEASLES**

With some variation in timing, the history of measles has been rather similar to that of whooping cough. The death-rate fell continuously from about 1915 (Fig. 8.14); treatment (of secondary infections) has been possible since 1935; and mortality was at a low level before immunization was used.

Fig. 8.15 shows the trend of notifications. The rate decreased from 1950 to 1956, was more or less constant to 1960, and declined rapidly

---

after that time. It was not until mid 1968 that vaccination was used nationally and less than a quarter of all children had been protected by the end of 1972. I conclude that the contribution of immunization to the reduction of notifications in the last decade cannot be decided on this evidence.

There are many other infections in which prophylaxis and treatment are effective. Internationally perhaps the most important are tropical diseases such as malaria and yellow fever, which really fall outside the scope of this discussion. Although syphilis had declined for other reasons, it was still important when salvarsan became available early in this century, and mortality fell to a low level before the arsenicals were replaced by penicillin. Other treatable infectious diseases include bacterial meningitis, sub-acute bacterial endocarditis, typhoid, osteo-myelitis, puerperal fever, bacterial infections of the ear, pharynx and larynx, cellulitis, gonorrhoea, carbuncle and cystitis. Some of these conditions are usually fatal if untreated; others are important as causes of morbidity rather than mortality.

This appraisal of some of the most important medical advances leaves little doubt that their impact was much smaller than is generally believed. The infections were declining long before successful intervention was possible, and since that time, with some notable exceptions (especially in the case of tuberculosis and poliomyelitis) immunization and treatment were less effective than other influences. It is significant that some procedures which were carefully assessed by randomized control trials (for example BCG vaccination) do not appear to have had the expected results. The conclusion which seems inescapable is that the influences which determine man's response to infectious disease—genetic, nutritional, environmental and behavioural, as well as medical—are infinitely complex, and we need to be very cautious before assuming that we fully understand the infections, or that we have in our hands the certain means of their control.

NON-INFECTION CONDITIONS

The chief requirement for an understanding of health in the past is an explanation of the rise and fall of infectious diseases. In relation to the future, however, assessment of achievements with non-communicable diseases is, arguably, more significant. In developed countries, they are now the predominant causes of sickness and death, and what has been achieved in the understanding and control of such conditions is therefore a valuable, if incomplete, indication of future possibilities.

Unfortunately it is very difficult to assess the achievements. In the first place, because non-communicable diseases vary greatly in severity, duration and the extent of associated morbidity and disability, mortality is a far less satisfactory index than in the case of the infections, where the outcome is often either death or complete recovery. Secondly, many clinical procedures have never been satisfactorily evaluated, and their use is based on indirect laboratory evidence or on clinical impressions. A short assessment of the medical contribution can therefore be little more than a list of conditions in which clinical intervention is generally believed to be effective.

In his thoughtful examination of medical advances in the period 1950-75, after discussing the management of infectious diseases Thomas
concluded that the list of decisive new accomplishments is not much longer than the contents of the following paragraph.

There have been a few other examples of technology improvement, comparable in decisive effectiveness, since 1950, but the best of these have been for relatively uncommon illnesses. Childhood leukemia and certain solid tumors in children, for example, can now be cured by chemotherapy in a substantial proportion of cases, but there are only a few thousand of these a year in the country. Endocrine-replacement therapy has become highly effective and relatively inexpensive ("relative" considering the cost of caring for untreated endocrine abnormalities) for a variety of disorders involving the adrenals, pituitary, parathyroid, ovary, and thyroid; in particular, the biochemical treatment of thyroid dysfunction has improved markedly. Hematology has offered new and effective replacement treatment for certain anemias. Immunological prophylaxis now prevents most cases of hemolytic disease of the newborn. Progress in anesthesia, electrolyte physiology, and cardiopulmonary physiology has greatly advanced the field of surgery, so that reparative and other procedures can now be done which formerly were technically impossible.\(^2\)

This paragraph provides a reasonable summary of decisive advances, some of which were launched before 1950. To them should be added the treatment of malignant hypertension and, in some cases, essential hypertension. Successful measures also include the treatment of accidents, surgical treatment of cardiac conditions, relief of prostatic obstruction, renal transplants and cure of a minority of cancers. Treatment of obstetric conditions may be life-saving, as the valuable investigations of maternal mortality in Britain have shown. So too is intervention in other emergencies (abdominal obstruction, perforated peptic ulcer). There are many therapies (referred to below) which postpone rather than prevent death from a specific cause, or provide relief of symptoms without affecting expectation of life, which in many disorders is not threatened.

What should be noted about these advances is that they are not restricted to preventable disorders, such as accidents, which in an ideal world would not occur. They include conditions classified in the preceding chapter as relatively intractable. The prevention of rhesus haemolytic disease is a remarkable example of an advance made possible by a combination of genetic and clinical knowledge. The identification and abortion of a foetus affected by Down’s disease is another solution of an apparently intractable problem made possible by application of genetic knowledge. Equally impressive in a quite different way is the immense technical accomplishment which restores a child with a patent ductus arteriosus or an atrial septal defect to a life of normal duration and quality. Such achievements suggest that further investigation may make it possible to prevent, eliminate or treat successfully some of the most difficult disorders with which medicine is now confronted.

POSTPONEMENT OF DEATH

The use of the decline of mortality as the main index of improvement in health is sometimes said to overlook the contribution of medical intervention which postpones death but does not change its cause. Diabetes is cited as an example of a disease in which the extension of life is not reflected in the trend of mortality, because the same cause often appears later on a death certificate.

The interpretation of death-rates is admittedly complex. They are based on the number dying (the numerator) over the total population (the denominator). If deaths from a disease are reduced, the death-rate from that disease and the death-rate from all causes (assuming no other changes have occurred) both fall, because the numerator is smaller and the denominator larger. This is true whether the cause of death is eliminated (as in typhoid) or postponed (as in diabetes). Moreover, in both cases the rates are permanently lowered, because the number dying in a year remains smaller in relation to the population at risk. Hence the postponement and prevention of death from a specific cause are both reflected in the index.

When examining the trend of mortality over a considerable period it is important to standardize for age changes in the population (an approximation to the ideal bases for examination, the age-specific mortality rates). The need for this procedure is evident from a comparison of death-rates from diabetes before and after insulin. In England and Wales the crude rates were 107 (per million) in 1911–20 and 125 in 1973, which would seem to imply that mortality increased over this period. When standardized to the 1973 population, the death-rate in 1911–20 was 188.

However, standardization does not remove all the difficulties of interpretation. Diabetes appears to be more common than in the past, but it is not possible to dissociate the effects of improved survival, better diagnosis and possibly other influences. Survival of diabetics has been

Determinants of Health

Gravely prejudiced by the increased frequency of smoking during the period when effective treatment (by insulin and oral diabetic drugs) has been available. And finally, mortality statistics are very unreliable, because many diabetics die from arterial degeneration and their deaths are often attributed to disease of the kidneys, heart and brain.

With due regard for these difficulties, useful evidence of the effect of treatment can be obtained from examination of age of death of diabetics. Fig. 8.16 shows (for England and Wales) the number of survivors of cohorts of 1,000 females exposed to the mortality rates of 1911-20 and 1973. The difference in mean age at death at the two periods was approximately ten years.

![Figure 8.16](image)

**Figure 8.16.** Survivors from a cohort of 1000 females exposed only to mortality from diabetes at rates of 1911-20 and 1973.

Medical Achievement

It may seem surprising that age at death was so late – nearly 70 in 1911-20 and nearly 80 in 1973. This is explained partly by the fact that even before insulin most diabetics died relatively late in life. (The age at death in 1911-20, and the extension of life which has resulted from treatment, would of course be vastly different if attention were restricted to juvenile diabetics.) But the late age of death is also determined by the fact that deaths of diabetics from all causes other than diabetes were inevitably excluded from the cohort, and those dying from a single cause, diabetes or any other, are highly and favourably selected in respect of length of life. This is merely another way of saying that the risk of death from a single disease already manifested is often less than the risk of death from all other causes taken together. Indeed, it could be said to many people by way of reassurance: you will be fortunate if you live long enough to die from the disease which most you fear.

For assessment of the effect of postponement of death from a single disease whose contribution to the total decline of mortality is small, the change in age-specific death-rates and increase in expectation of life are probably the best indices. But in assessment of the contribution of a large number of causes (as in the case of the non-infective conditions considered in Chapter 3), both the prevention and the postponement of death are reflected fairly accurately in the trend of the age-standardized mortality rates.

Treatment of Non-fatal Diseases

When presenting the results of his experiments on himself a distinguished biologist seemed to say: Take one average human being, for example, J. B. S. Haldane. Adopting the same unconventional statistical approach, we can illustrate the relation between morbidity and mortality by considering the experience of one lakeland poet. William Wordsworth followed most of the rules for health now advocated by life stylists. He did not smoke or drink; unlike some of his best friends he avoided opium; he lived and worked in the open air, added little weight and took an amount of exercise which would have daunted most joggers. De Quincey estimated that Wordsworth walked between 175,000 and 180,000 miles during his life, and if so he must have averaged nearly ten miles a day for sixty years.

Predictably, according to the health rules, he had a long life. However,
he and his sister both suffered a good deal from minor morbidity - headaches, toothaches, bowel upsets and numerous other unspecified complaints - recorded meticulously by Dorothy in her Journals during their years in Dove Cottage. As for his mental health, it has been suggested that he had an abnormal relationship with his sister, but although many of her references to him are highly suggestive, there is no evidence that it was ever consummated. What Wordsworth's history illustrates is that there is no necessary close relation between morbidity and mortality. The diseases that shorten our lives are not usually the ones that diminish their quality from day to day.

Nevertheless, there has been a large reduction in sickness associated with causes of death that have declined. This is particularly true of the chronic respiratory and venereal infections. Their contribution to the reduction of morbidity cannot be measured, but it is possible that it was greater than that from non-fatal diseases. It seems quite likely that the virtual elimination of chronic respiratory tuberculosis was the greatest single influence on declining sickness rates.

In the present context, however, we are concerned with medical achievement through treatment of diseases and disabilities that do not kill. In this assessment account must be taken of both the frequency and the seriousness of a condition: the common cold affects most people fairly frequently; rheumatoid arthritis and schizophrenia are much less common but far more disabling for those who are afflicted.

With one notable exception, there is no wholly effective treatment for the non-fatal illnesses which trouble most people from day to day. These are the acute respiratory infections, digestive disorders, the skeletal and muscular disabilities referred to as rheumatism, and a variety of mental illnesses, particularly the neuroses and psychoneuroses. The exception is dental disease. As the history of many famous people illustrates, dental diseases were formerly among the most common causes of serious discomfort; today they can be prevented and treated, and in the 1949 Survey of Sickness in Britain they accounted for only four per cent of the illnesses of which people complained most frequently. It would be interesting to have an estimate of their frequency in the past, say in the age of Pericles or the court of Louis XIV. Louis himself suffered grievously from his teeth, and no doubt would gladly have exchanged his painters, dramatists, one or two mistresses and several Peers of France for a modern dentist.

Of course a good deal can be done to relieve discomfort from the common complaints; it might also be said that many, although by no