

THE NEXT FORTY YEARS IN PUBLIC HEALTH

THOMAS McKEOWN, M.B., PH.D., F.R.C.P.^{1, 2}

INTRODUCTION

ALL prophecy is hazardous, and we may begin by enquiring whether predictions concerning trends in public health are likely to be of value if attempted for more than very short periods. Would it have been possible in 1860, for example, to have anticipated either the rate or direction of developments in the second half of the 19th century?

The answer to this question is not encouraging. At that time no one could have been certain of the profound impact of the sanitary revolution on the death rate. No one could have foreseen that the birth rate would begin to decline, and so compensate for the effect of reduced mortality on population growth. And in the field of curative medicine it would have been impossible to predict the advances brought about by the discovery of anaesthesia and antisepsis, or that improved hygienic standards would at last enable patients in hospital to die from the diseases for which they were admitted.

It can hardly be doubted that the changes of the next forty years will be even more rapid and complex than those of the past hundred. Unless as a result of some undesirable development—for example the destructive use of atomic power—it seems unlikely that we shall see any change in the spectrum of mortality as dramatic as that which resulted from control of infectious disease. But we have scarcely begun to make an impact on many forms of morbidity, particularly in the field of mental illness. Methods of investigation and treatment of established disease will become incomparably more complex and, it may be hoped, considerably more effective. And it will

¹ Professor, Department of Social Medicine, The Medical School, Edgbaston, Birmingham, England.

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probably be necessary to make radical changes in the National Health Service, which still reflects origins in a period when most medical services were privately financed.

Nevertheless, there are some reasons why anticipation of future trends may be somewhat less hazardous now than a hundred years ago. First, national statistics have been available since 1840 and provide a numerical base which is being increasingly supplemented from other sources. Second, we have a very much better grasp of the nature of disease processes, and even where we are still relatively ignorant we have some knowledge of the nature of the problems and of the possible direction of future enquiry. And third, the long-standing argument about public and private finance of medical services has been settled and attention can be focused on the form of the service.

Even with these advantages, however, it seems essential that we should set limits to the field of discussion and acknowledge some of the obvious hazards which may make nonsense of our predictions. First as to restrictions. The term public health is commonly used in one of two ways. Traditionally it refers to those health problems and services with which public authorities were concerned in the 19th and early 20th centuries; that is, with the environmental and personal health services provided by local authorities. For many people this usage, which excludes the curative services, has survived the creation of a comprehensive service. There are others, however, who interpret the term literally, to embrace all matters which may affect the public health. These include not merely the preventive and curative medical services, but any agent which now or later can be shown to have an influence on health. For the present purpose the first definition, restricted to the work of local authorities, is too narrow; and the second, which has no obvious limits, is too wide. In the discussion which follows we shall consider the problems of public health reflected in morbidity and mortality, and the medical services designed to deal with them.

The second restriction is related to the problems and services of the British Isles, which are in many respects characteristic of the developed countries. Trends in underdeveloped countries are of the greatest interest, and may have a profound impact on problems elsewhere. But a discussion of the future of public health at a world level would be too ambitious.

Next, as to the difficulties. Since speculation is inevitably limited by existing knowledge, or by conceivable extensions of existing knowledge, it may be disturbed by future developments of which today we know nothing. No prophet at the beginning of the 18th century could have anticipated the industrial revolution with its profound impact on mortality and population growth. In the early 19th century, when the true nature of infectious disease was scarcely suspected, it would have been impossible to foresee the discovery of bacteriology and antisepsis which transformed the work of hospitals. And at the beginning of the present century a critical observer, confronted with the fact that vaccination against smallpox was the only specific measure which had much effect on mortality, might have doubted whether "curative" medicine could be expected to extend its usefulness beyond palliation.

But even from present knowledge it is not difficult to suggest possibilities whose effects on public health are quite unpredictable: the use, even the peaceful use, on a wide scale of atomic power; the creation of living things from inorganic matter; contact with other planets, and possibly with other forms of life. Moreover, examples need not be restricted to the realms of space fiction. It is not unlikely that it will become possible to determine sex by separating the two types of sperm. (The effect on public health may depend upon whether the means of doing so is expensive and restricted to governments, or cheap and available to the general public at the chemist's shop. Recent history does not make it certain that the former would be preferable.) There is also the ominous possibility of the return in virulent form of infectious diseases which are now either uncommon or trivial. In some cases, such

as cholera and typhoid, this risk is probably negligible because their disappearance has resulted from human intervention and the means of spread is well understood and controlled. In other cases, such as tuberculosis, the decline appears to have been secondary to a general advance of the standard of living and again no reverse need be feared. But in still other examples, such as measles, scarlet fever and influenza, the present trivial nature of the diseases appears to have been independent of human intervention and it is by no means certain that they will not occur again in virulent form, or that if they do so they can be effectively controlled. Another influenza epidemic like that of 1918 is only one of a number of unforeseeable events which might profoundly affect public health.

Another difficulty is that the development of services is not always logical, so that what should happen—if logic were the only consideration—is not necessarily what will happen. For example, the views about the medical services expressed in the Minority Report of the Poor Law Commission in 1907 appear in retrospect to have been broadly right. It was recommended that in extending public responsibility, then limited to control of the environment, into the field of personal health, the opportunity should be taken to create a comprehensive medical service publicly financed and controlled. In response to pressure from various sources the extension was restricted to personal health services of a preventive character, a decision which established prevention of disease as a public responsibility and cure as a private one. Nearly forty years later a comprehensive public medical service was created; but the preventive and curative services are still separated in consequence of the decision to reject the advice of the Minority Report of the Poor Law Commission.

In time, many such errors are no doubt corrected. But even when predictions are proved to be essentially correct, estimates of time-scale may be hopelessly wrong. The Webbs' judgement about public provision for relief of need was sound, but they could not have foreseen that it would take nearly half a century

to replace the Poor Law. There are parts of the world in which Malthus's expectation about the relationship between resources and population growth is now being fulfilled, but it did not occur in Great Britain because in a literate society, even without the widespread abstinence which he recommended, other means of limiting family size were utilized.

The discussion which follows is divided into three parts. The first examines the problems which may confront us, in the light of existing knowledge of the principal causes of morbidity and mortality. The second part is concerned with the methods which will be needed, having regard to conclusions about the nature of the problems. We enquire to what extent advance may depend on control of inheritance and whether in man such control is possible or desirable. An attempt is also made to evaluate the importance of the major classes of environmental agents. Finally, in the third part we consider the future organization of the medical services. The present day services are examined critically in relation to contemporary needs and suggestions made about the ways in which they may be changed.

1. PROBLEMS

As stated previously our examination of future problems will be restricted to consideration of mortality and morbidity. For the former the main sources of information are the national mortality statistics established in the nineteenth century. For the latter, except in the case of the small number of notifiable diseases, the available data are still scanty, and we must rely largely on inference from the behaviour of mortality.

MORTALITY

As a preliminary to assessment of the future problems associated with mortality we shall examine its relationship to age. From national life tables it is possible to estimate the proportions of liveborn individuals expected to die at stated ages, but this of course gives no information about pre-natal

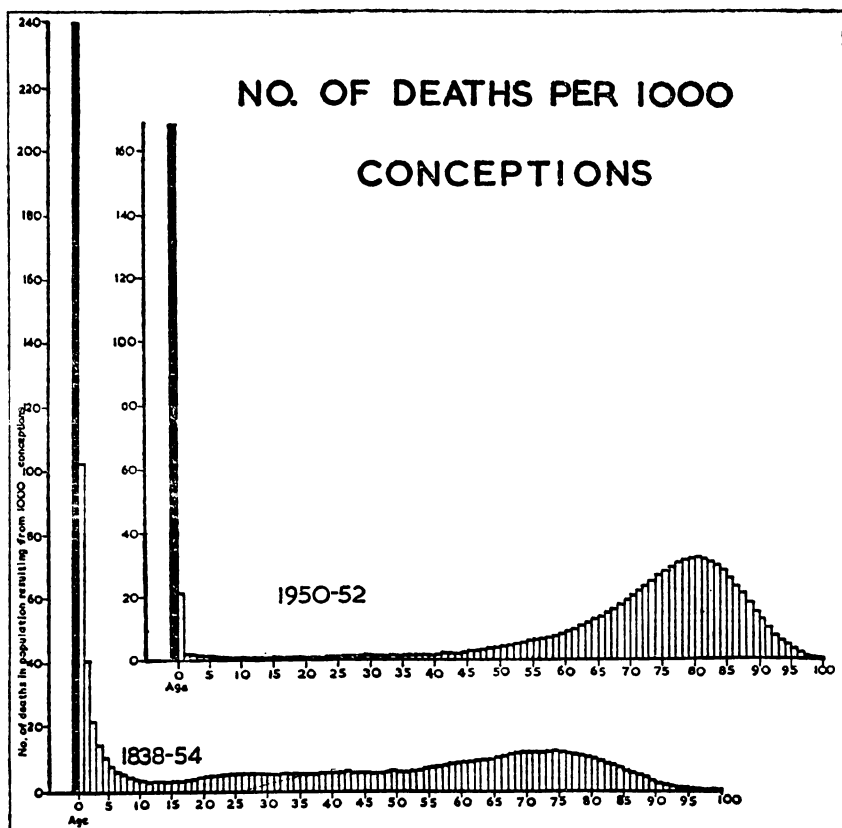


Fig. 1. Per 1000 conceptions (females only), the number dying before birth and at each year of life according to mortality data for 1838-1854 and for 1950-1952.

mortality. For the present purpose it is essential to begin at conception. The difficulty in doing so is that there are no accurate estimates of the frequency of abortion, particularly in the early months of pregnancy. Published estimates vary from 15 per cent to 45 per cent, and in Japan the incidence is even higher than this range at the present time.

Fig. 1 shows the relationship between mortality and age for females in 1838-54 and in 1950-52; it gives the number of deaths before birth, and in each year of life after birth, per 1000 individuals conceived at each of these two periods.³ (The

³ T. McKeown. The data given in this section are taken from "Priorities in Preventive Medicine." Harvard, The Cutter Lecture, 1960.

trend of mortality with age in males is similar; it was considered preferable to restrict the examination to one sex, and in relation to selection—discussed below—the data for females are of most interest.) For the earlier period the abortion rate has been assumed to be 200 per 1000 conceptions and the stillbirth rate, 50. (The earliest recorded national stillbirth rate was 40 in 1927–30.) Probably both are conservative estimates, but the error is unlikely to be large enough to alter substantially the distribution shown in Fig. 1. On the basis of these figures, 760 per 1000 individuals conceived would have been liveborn, and the number of deaths in each year of life was obtained by applying to this total the data provided in the English Life Table for 1838–54.

For 1950–52, we have taken the abortion rate suggested by the Royal Commission on Population (150 per 1000) and the actual stillbirth rate of these years (21). These rates suggest that approximately 832 per 1000 conceptions were liveborn, and subsequent mortality was again estimated by applying the information obtained from the life tables for 1950–52.

The figure shows the remarkable change in the age distribution of mortality which has taken place during the past century, of which the main features are the well-known reduction of mortality in early post-natal life, and the greater number of deaths in late life. (It is scarcely necessary to emphasize that the figures show the number of deaths per 1000 conceptions, and do not give mortality rates at stated ages.)

In order to examine the relationship between mortality and selection, numbers of deaths (per 1000 conceptions) have been estimated for four periods: pre-natal and neo-natal; pre-reproductive (from 1 month to age 14); reproductive (age 15–44; and post-reproductive (age 45 and over). In estimating pre-natal and neo-natal mortality for 1838–54 we have used the same abortion and stillbirth rates as in Fig. 1. Neo-natal mortality (deaths in the first month of life) which was not of course recorded at that time in national statistics, has been assumed to be 80 per cent of the stillbirth rate (which it has been

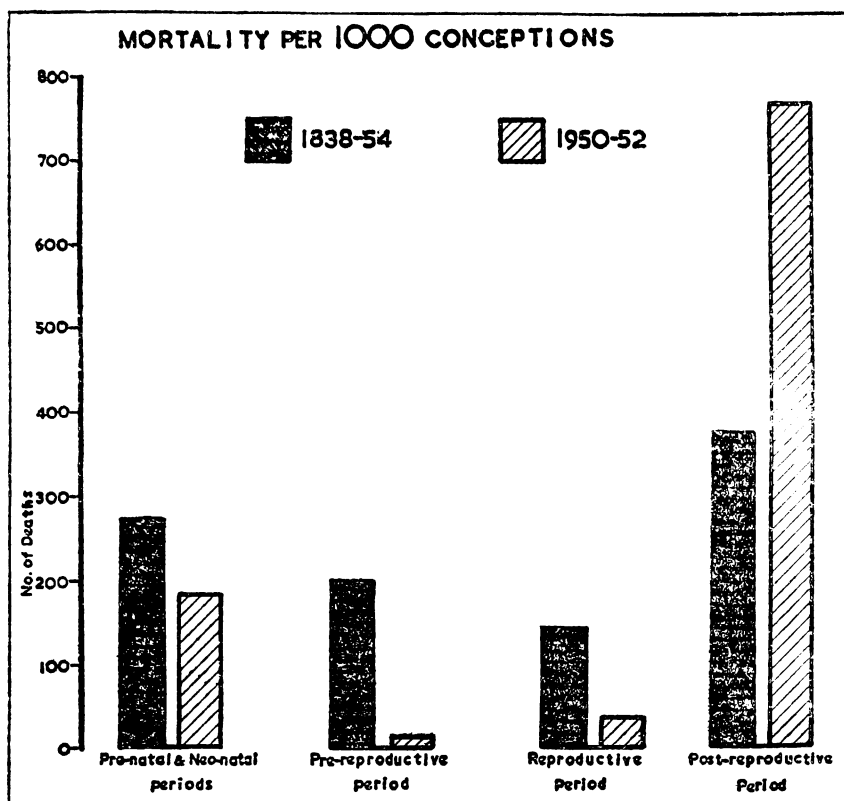


Fig. 2. Number of females dying in four broad periods of life per 1000 conceptions compared for the years 1838-1854 and 1950-1952.

—approximately—during the years for which it has been recorded). For 1950-52 we have used the same stillbirth rate as in Fig. 1, and the stillbirth and neo-natal mortality rates recorded in national statistics for those years.

The striking features of Fig. 2 are (a) the relatively small reduction of the number of deaths in the pre-natal and neo-natal periods; (b) the marked reduction of deaths in the pre-reproductive and reproductive periods; and (c) the increase in deaths in the post-reproductive period. Let us now consider these three age periods in turn, and, for reasons which will emerge from the discussion, in reverse order.

(a) *Deaths in the post-reproductive period.* Since we are considering numbers of deaths per 1000 conceptions, it is

evident that the striking increase in mortality after the end of reproductive life is attributable primarily to improved survival rates in the earlier periods. This evidence does not justify any conclusion about the trend of mortality rates within the post-reproductive period.

Haldane drew attention to the significance of the fact that whether a lethal condition is subject to selective pressure turns upon whether it is manifested before or after the end of reproduction. If it occurs before, affected individuals either do not reproduce, or have reduced fertility (because they do not survive to the end of the reproductive period). If it occurs after, reproduction is complete and unaffected unless the condition is also associated with a physiological reduction in fertility. Hence many diseases of late life, such as cancer and heart disease, occur when they do because they are not affected by selection. If this interpretation is correct, and it has not been seriously challenged, it follows that the influence of inheritance must be very much more significant in the aetiology of causes of death after the end of reproduction than in the incidence of those which occur before. It seems unlikely, therefore, that we can expect any profound change in the extent and causes of mortality in the post-reproductive period to result from modification of the environment. It could be affected seriously only by selective breeding. In the discussion of methods (below) reasons are given for thinking that this procedure is unlikely to be widely used in the foreseeable future. We are likely, therefore, to continue to be confronted with the problems associated with a high incidence of "degenerative diseases" in the post-reproductive period.

(b) *Deaths in the pre-reproductive and reproductive periods.* Perhaps the best support for Haldane's thesis is the behaviour during the past hundred years of mortality after birth and before the end of reproductive life. In the pre-reproductive period (to age 14) it has been reduced to a small proportion of the level in 1838-54, and in the reproductive period there has also been a substantial, though smaller, reduction. In

relation to selection the significant fact is that these changes have been brought about by manipulation of the post-natal environment, chiefly by specific measures such as environmental sanitation, and by the favourable trend in the standard of living. The reduction of mortality is almost wholly due to the effect of these changes on the incidence and virulence of infectious disease. In the light of this experience, and in accord with Haldane's interpretation, it seems justified to conclude that the high level of mortality during the nineteenth and earlier centuries in the pre-reproductive and reproductive periods was determined by an unfavourable environment, rather than by undesirable genes.

For the same reasons it seems justified to conclude that there is further scope for reduction of mortality in middle life (Fig. 2). There is now evidence of the influence of atmospheric pollution and smoking on chronic bronchitis, of smoking on cancer of the lung, of diet and exercise on coronary artery disease. It seems probable that these and other influences will be brought under control, and that in consequence death will be uncommon after birth and before the end of reproductive life.

(c) *Deaths in the pre-natal and neo-natal periods.* In considering together deaths in the pre-natal and neo-natal periods we are attempting to identify, so far as present knowledge permits, early deaths determined by causes operating before birth. All abortions and stillbirths are of this type, and when infant mortality is approximately 20 per 1000 livebirths (as in England and Wales today), so too are nearly all neo-natal deaths. There are, of course, many deaths in later life which are also influenced by events before birth (indeed to the extent that inheritance is involved this is true of all mortality). But with few exceptions it is only in respect to deaths before and immediately after birth that we can say confidently that the post-natal environment has had no effect.

With due regard for uncertainties about abortion rates, and in the nineteenth century about stillbirth and neo-natal mortality rates also, it seems permissible to conclude (a) that there

has been a considerable reduction, of pre-natal and neo-natal mortality and (b) that the level is still high (Fig. 2).

In assessing the possible future trend of this mortality our main task is to come to some conclusion about the relative contribution of inheritance and the pre-natal environment. It is now well recognized that neither intra-uterine nor early post-natal deaths can be assumed to be exclusively of genetic origin and that both inherited and environmental influences are usually concerned. Indeed, there are reasons for thinking that pre-natal mortality is largely attributable to the uterus which, far from being the haven suggested in the psychiatric literature, is the most dangerous environment to which the individual is exposed between conception and death.

The main grounds for this view are the considerations referred to above, namely that because the affected individuals do not reproduce, lethal conditions manifested before or during reproductive life are subject to the effects of selection. The trend of mortality in early post-natal life in response to environmental change is the best evidence for this effect, and there is no reason to suppose that it operates less powerfully before than after birth.

Let us now summarize our conclusions about future trends of mortality. It seems probable that we shall see the virtual disappearance of deaths between birth and the end of reproductive life and this will mean that most individuals conceived will die either before birth or after reproduction is complete. (This is more or less the present position.) In the pre-natal period the problem is largely environmental in character, which is to say not that genes are unimportant, but that if the environment could be controlled it would to a considerable extent be possible to prevent their lethal effect. (The circumstances are the same as formerly in respect to infectious disease: heredity undoubtedly had a profound effect on response to infection, and hence on mortality, yet control was established by environmental change.) Our success in preventing pre-natal mortality will turn both upon ability to discover

the nature of pre-natal environmental influences, and upon whether they prove amenable to control.

The problems associated with mortality after the reproductive period are entirely different. While there is unquestionably further scope for reduction in incidence (chronic bronchitis, coronary disease and cancer of the lung have been mentioned as examples of diseases susceptible to preventive measures), it seems unlikely that most deaths attributable to the so-called degenerative diseases can be prevented. If this is so we will continue to face the problems of care which these diseases impose.

MORBIDITY

Because adequate records of past trends are not available we can speak with even less confidence about morbidity. We shall consider three subjects: congenital malformations; morbidity during the pre-reproductive and reproductive periods; and morbidity in the post-reproductive period.

(a) *Congenital malformations.* Although they are also an important cause of death, congenital malformations can be discussed conveniently in relation to morbidity. Published estimates suggest that approximately 3 per cent of total births (livebirths and stillbirths) have a structural abnormality.

Many are, of course, of a relatively trivial character. About half survive to age 5, so that congenital malformations are evidently an important cause of morbidity and disability as well as of mortality.

There is no evidence that the incidence of malformations is declining, and in view of the reduction of other causes they are becoming relatively more important. We have little precise knowledge of their aetiology, and in predicting future trends must rely largely on the general considerations referred to in relation to pre-natal deaths. Although malformations are clearly attributable to the interaction of inheritance and environment, there is reason to believe that some of them could be prevented by modification of the environment. The grounds

for this view are, again, that lethal conditions manifested before the beginning of reproduction, whether before or after birth, are profoundly affected by selection. We also have more direct evidence in respect to one agent—rubella—as well as indirect evidence in the variation in incidence of many malformations in relation to maternal age, parity, season of birth, social class, geographical area and secular trend.

(b) *Morbidity in the pre-reproductive and reproductive periods.* In spite of the low level of mortality there is still a relatively high level of morbidity in these two age periods. In some cases, such as accidents, the causes are known but difficult to control. In others, such as the common cold, in spite of much research the causes are still obscure. Many infections of childhood are undiagnosed and, on existing knowledge, are probably undiagnosable. There is also a considerable amount of morbidity and disability in middle life, associated with diseases such as chronic bronchitis, rheumatoid arthritis and heart disease. It is not unduly optimistic, however, to believe that there will be a substantial reduction of morbidity from most of these causes: of accidents by precautions on the road, in the home and at the place of work; of infections, by further improvements in living conditions and, in some cases such as poliomyelitis, by specific protective therapy; of chronic bronchitis by prohibition of atmospheric pollution; and in several diseases by reduction in the frequency of smoking.

If these predictions are correct the predominant problem of morbidity which will confront us is mental disease. There is no evidence that the incidence of mental defect is decreasing. It is possible that improved obstetric services may make some contribution, and that in some forms, as in phenylketonuria, effective methods of treatment may be found. But present knowledge gives little grounds for the view that the problem of mental defect will become less formidable.

It is difficult to anticipate future trends of other forms of mental illness. We are handicapped by limited knowledge of past trends. Mental disease is not often a cause of death, and

hence we cannot, as in the case of physical disease, get much help from knowledge of mortality. We must therefore base our views largely on deductions from the behaviour of physical illness. It seems certain that there has been a sharp decline in mental disease due to infection, malnutrition, alcohol and toxic hazards in industry. For example, in the mental hospitals of England and Wales during the present century the proportion of male admissions due to syphilis declined from about one in five to one in fifty. We can be less confident about the trend of those forms of mental illness whose aetiology is still obscure: schizophrenia, manic depressive psychosis, and psychoneurosis. It is possible that there has been some reduction in the incidence of schizophrenia in response to improved social conditions (since hospital admission for schizophrenia is more common in poor than in favourable social circumstances). There is some evidence that manic depressive psychoses are more common, particularly in women.

But although this balance sheet is by no means wholly unfavorable, we cannot feel complacent about it. We are still very ignorant about methods of preventing or effectively treating mental illness, which is now, and is likely to remain for some time, the predominant problem of morbidity in early and middle life.

(c) *Morbidity in the post-reproductive period.* In order of frequency the common physical causes of morbidity in representative men aged 60 and over are as follows: chronic bronchitis, hypertension, coronary artery disease, peptic ulcer, hernia and osteoarthritis. With some changes in order of frequency the list for elderly females is similar.

At the present time in Great Britain (although not in many other countries such as the United States) chronic bronchitis is by far the commonest disease in this age period, and the one responsible for the highest level of disability. Enough is known of its aetiology to suggest that by control of the atmosphere, reduction of smoking and improvement in the standard of living the disease may become much less prominent. It also

seems probable that as a result of more exercise and changes in diet morbidity from coronary disease may be reduced. Knowledge of the other common diseases is less complete, and we cannot be confident about future trends.

In the field of mental illness it seems inevitable that with an ageing population we shall be concerned with increasing numbers of patients exhibiting changes associated with senility. Such patients are already common, and would be even more conspicuous in mental hospitals were it not that their expectation of life, from the time when they first exhibit symptoms, is much shorter than that for patients with some other forms of mental illness.

Finally, there is of course among the elderly a considerable amount of disability, such as defective vision and hearing, not associated with specific disease. Here again, in view of the age trend of the population we have no reason to believe that disability will become less common. What we can expect is that methods of relieving such conditions will become more effective, but in this section we are concerned only with an appraisal of the problems.

2. METHODS

CONTROL OF INHERITANCE

When they wish to improve their stocks, plant and animal breeders do not hesitate to control reproduction by selection of one or both parents. Racehorses which stay, delphiniums which do not bend in the wind, cattle with good milk and beef qualities, maize with a high protein content and roses which combine appearance and scent with disease resistance and perpetual flowering, are all attributable to selective breeding. But so far there has been no control of human reproduction, and perhaps the most important question related to methods which may be used in future to improve health is whether it is likely that the measures, hitherto restricted to the environment, will be extended to inheritance.

It is worth noting that the practice of selection to bring

about improvement in crops and farmyard animals long preceded the establishment of a science of genetics. To farmers who knew nothing of genes and chromosomes it was evidently worthwhile to select parents on the basis of their own characters or of the characters of their offspring. And in practice this procedure has not been greatly altered by the new knowledge of genetics. Breeders of racehorses still assess the value of a sire both according to his own record in competition, and according to the performance of his offspring. The fee for his service is greatly increased if a horse wins the Derby and St. Leger before being retired to stud; it is increased again if some of his offspring also win classic races. Evidently it is not only lack of knowledge which has prohibited application of similar methods to man.

The characters of human beings have of course been affected by selection. In order to reproduce, it is necessary to survive and to be fertile, and ability to do both has been influenced by the environment. Perhaps the most striking example is the selection attributable to infectious disease, which undoubtedly has had a profound effect on human evolution. There is, however, a fundamental difference between this "natural" selection, brought about by "nature red in tooth and claw," and the purposeful selection practiced by farmers. Conscious control of reproduction has had no effect on human evolution, and some people think it remarkable that men have not applied to their own kind the breeding methods which have had such conspicuous success with plants and animals. The reasons for this restraint are important in assessing future trends, and we shall consider them in relation to the three grounds of ethics, effectiveness and desirability.

Ethics. Let us first consider the question: Would it be right to control human breeding? This is an ethical question, and it is scarcely surprising that there is a wide divergence of opinions about the answer. Some people believe that in no circumstances would it be right to interfere with the pattern of reproduction imposed by instinct and the environment, a

viewpoint taken usually on religious grounds. Catholics, for example, believe that fertility should be controlled only by confining intercourse to a "safe period" or by abstention, and naturally take exception to eugenic policies which require more extensive interference with reproduction. There are others who consider that the genetic constitution of the human race is too important a matter to be determined by the irrelevant fact that two individuals happen to take a fancy to one another. They regard the association between the act of copulation and reproduction in much the same way as a breeder of dogs would regard the release of a mongrel among his prize bitches, and suggest that when knowledge and refrigeration permit, human beings should resign their reproductive functions to the laboratory.

These are extreme views. Most people who have thought about such matters take an intermediate position. They do not object in principle to some control of breeding; but they are much concerned about the purposes for which it is to be employed, and about the methods of achieving it. In particular they dislike the use of compulsory powers to prevent reproduction.

Effectiveness. The second question which we must consider is this: Would control of human breeding be effective? If it is to be answered the question must be made more precise. Let us enquire whether it would be possible either (a) to eliminate or reduce the frequency of undesirable genotypes or (b) to increase the frequency of desirable genotypes. In attempting to answer the first part of this question we shall refer separately to the few conditions which appear to be attributable to a single gene, and to the much larger number, including most of the important diseases, which cannot be so attributed.

In the case of conditions due to a single gene, subject to a reservation referred to below, it is evident that the effectiveness of suppressing reproduction depends upon the extent to which it is possible to identify individuals who carry the gene. By preventing reproduction of affected persons it would be possible

to eliminate a dominant genotype, if it is completely manifested before reproductive age in both the homozygous and heterozygous forms. These requirements are more or less met by only a few rare abnormalities, for example achondroplasia, and a certain type of juvenile cataract. In most dominant genotypes the requirements are not met, either because the abnormality is not completely manifested in all environments, or because it does not appear until after reproduction. Huntington's chorea is an example of a condition due to a dominant gene which cannot be eliminated in this manner because the affected individuals may have reproduced before they show signs of the disease.

In most cases the single genes responsible for abnormalities are recessive, and are manifested only in the homozygous state. The number of individuals who carry the gene but are not themselves affected (the heterozygotes) is much larger than the number of affected (the homozygotes). For example only 1 in 20,000 individuals exhibit the condition of albinism (i.e. are homozygous), whereas about 1 in 280 carry the gene but are not affected (are heterozygous). It follows that only a small proportion of affected individuals have affected parents, the suppression of whose reproduction would have relatively little effect on the frequency of the gene. It would be more practical to reduce the incidence of a sex-linked recessive condition, such as haemophilia, but this would require restriction of breeding of daughters and sisters, as well as of the affected males.

So far we have ignored the fact that genetically-determined abnormalities also result from mutation, the reservation referred to above. Mutation is a change in a gene, probably chemical in nature, which sometimes has very undesirable effects. The mutation rates so far estimated in man (for haemophilia, epiloia, achondroplasia, retinoblastoma and aniridia) are relatively low, but they are by no means insignificant. In haemophilia, for example, the frequency of mutation is apparently high enough to maintain the incidence of

the disorder at a fairly constant level, in spite of the fact that most affected males die before reproductive age. It is evident that control of reproduction cannot be expected to eliminate a condition which continues to reappear as a result of mutation.

In the majority of human diseases of greatest interest, however, the genetic background is obscure. What can be said with certainty is, first, that they are not attributable to a single gene, and second, that they are influenced in a greater or less degree by environment. These two considerations make predictions of the effects of control of reproduction extremely hazardous, but in most cases it would probably be small. For example, it has been shown that most mental defectives have parents who are not defective; prevention of reproduction of affected individuals would therefore have little influence on the incidence of mental defect in the general population. In Sweden, although the marriage of persons with so-called idiopathic epilepsy has been illegal for nearly two hundred years the incidence of adult epilepsy appears to be much the same as that in other Western countries.

It is even more difficult to speak with confidence about the possibility of increasing the frequency of desirable genotypes. It would probably be possible to list a number of human qualities which most people regard as desirable: integrity, intelligence, vitality, honesty etc. But even if we accept the possibility of agreement about which qualities are best and the advisability of an increase in their frequency, it is questionable whether it could be brought about. In the first place little is known about the relative significance of inheritance and environment in determining these qualities, and nothing is known about the related genes. If parents were selected with no other object than an increase in stature it could soon be achieved. It is by no means equally certain that the same is true of intelligence, or of the other unmeasured, and perhaps unmeasurable, qualities to which we have referred. Moreover, although cattle are bred with a single purpose such as increased milk yield, or improved quality of beef, no single objective would be ac-

ceptable in man. And it is quite conceivable that improvement of one desirable feature might be accompanied by deterioration of another. In *The Golden Fleece*, Robert Graves refers to an island on which there were many small boys whose shortness of temper and sturdiness of frame identified them as the offspring of Achilles. Confronted with a result of this kind the stockbreeder can mark it down as a failure and try again. The human breeder can scarcely do the same; he must therefore be doubly sure of what he is about before he begins "to finger the levers that control eternity."

We may sum up our conclusions about the possibility of control of human breeding by referring to a statement by a group of well-known geneticists. "At the present level of genetic knowledge we cannot improve the genes with which we are born, and there is little we can do to determine which genes we pass on to our children." Shaw's advice that one should "take care to get born well" is as difficult to follow in respect to genes as in respect to social circumstances.

Desirability. Finally we must ask whether, if it were permissible and effective, it would be desirable to control human breeding. Again the question must be phrased more precisely. No reasonable person is likely to quarrel with the view that if it could be brought about by acceptable methods, and without serious side-effects, the elimination of many genetically-determined diseases and abnormalities would be desirable. But it has also been suggested that it would be wise to increase the proportion of genetically well-endowed people. It is the latter claim which requires close scrutiny.

The belief that it would be desirable to increase the proportion of gifted people pre-supposes that improvement in human affairs is at present restricted by lack of them. It is difficult to accept this interpretation. The fact that human achievement has been remarkably high only in certain places and for short periods—in Italy during the Renaissance, and in England during the seventeenth century, to take two examples—suggests that at most times the environment is unfavourable

for great achievement. (The alternative explanation—that there have been some remarkable mutations at different times in history—is not acceptable.) T. S. Eliot has made the same point in another context, when he refers to periods when the first-class poet can do only second-class work, and the second-class poet cannot create at all. If we accept this interpretation we must believe that in human society there is an immense reserve of ability which is not exploited.

Moreover it is by no means certain that we would know how to use a larger number of gifted people if they become available, or that we should be able to reward them if they could be employed. A large part of the world's work requires little ability, and of a considerable part of the remainder it might be said, as Mr. Raymond Chandler has said of the Los Angeles police force, that it requires good men, but has little in it to attract good men. It is true, perhaps, that there are few jobs which could not be done better by intelligent than by less intelligent people. But if job placement ever becomes a serious international problem, it is more likely to be because many occupations demand ability but do not reward it, than because the general level of ability is too low. The time may come when man's control of the environment is so advanced that there will be little need of people with no more than ordinary capacity. But in the foreseeable future, even if it were possible, modification of the proportion of individuals with different levels of ability might create more problems than it would solve.

CONTROL OF ENVIRONMENT

In relation to health the word environment is frequently used in a restricted sense, to refer to such influences as water, air, food, housing and, sometimes, the social environment. In the light of our discussion of future trends in health problems these restrictions are quite unsatisfactory. We shall therefore use the term as the biologist uses it—in reference to all influences which are not inherited. These include matters as different as

the blood supply to the uterus, the nutrition and health of the mother in pregnancy, conditions during labour, and every kind of post-natal influence, from blood transfusion, vaccination or X-ray, to the density of the air and intensity of traffic on the roads. It will be convenient, however, to deal separately with the pre-natal, intra-natal and post-natal periods.

Pre-natal environment. At the outset it should be recognized that improvement in health hitherto has been due mainly to manipulation of the post-natal environment, and to a lesser extent, of the intra-natal environment. The reasons for this are by no means fortuitous. The uterus is a relatively inaccessible place, in which the foetus is effectively insulated from external influences to which the mother is exposed. The effects of this are two-fold. On the one hand the foetus is protected,—for example, against any but the most severe nutritional deficiencies. But on the other hand, because it is the internal environment of the mother which is important to the foetus, its effects are more difficult to investigate and to modify than those which operate during and after birth. (This is significant in relation to interpretation of the behaviour of the birth rate and death rate in the eighteenth century. When conditions were bad they resulted in an increase in the death rate rather than a reduction of the birth rate because the foetus is protected from the effects of the external environment. And when conditions improved after the industrial revolution, they were first and most sensitively reflected by a decline of the death rate.)

In the previous section the significance of the pre-natal environment was referred to in relation to three subjects: pre-natal mortality; congenital malformations; and morbidity and mortality in post-natal life. It is also possible that it may have an influence on post-natal growth and development, for there is evidence that the growth of the human foetus is frequently retarded in the late weeks of gestation. We do not know whether this retardation has any effect on later development.

At the present stage of knowledge it is difficult to speak confidently about the nature or effectiveness of the methods which

may be used in future to modify the pre-natal environment. To the extent that undesirable influences originate in the external environment (for example infectious diseases, one of which—rubella—has been shown to cause malformations) it should be possible to prevent them. But to the extent that they originate within the uterus (for example, deficient blood supply due to faulty attachment of the embryo) we can be less optimistic. In this context it is worth noting that a considerable number of pregnancies are terminated intentionally by induction of abortion.

The intra-natal environment. It has long been recognized that prolonged and difficult labour may affect the health of the foetus, and injuries inflicted during delivery are still an important cause of infant death. It is perhaps less obvious that conditions during birth may be associated with delayed manifestations of disease. For example, they may be responsible for some cases of mental deficiency, and there is evidence which suggests that foetal asphyxia may lead to persistent patency of the ductus arteriosus, which may remain unnoticed until months or years after birth.

That there is further scope for improvement of obstetric technique is evident from comparison of results obtained by different hospitals. For example peri-natal mortality is substantially lower in Aberdeen than in Scotland as a whole, and this difference is probably due to the excellence of the obstetric services in this city.

The post-natal environment. It is scarcely surprising that effective control of disease has so far depended almost entirely upon the control of the post-natal environment. This has been brought about either by direct interference with the body of the individual—protective inoculations, drug treatment, surgery, etc.—or by modification of the environment in which he lives. We must now try to come to some decision about the relative importance of these two methods in future.

There is little difficulty in evaluating them in the past. With the notable exception of vaccination against smallpox it is

doubtful whether specific therapy, protective or curative, had any measurable effect on morbidity or mortality before the beginning of the present century. There are now a considerable number of preventive procedures of varying effectiveness, against diseases such as diphtheria, tuberculosis, typhoid and poliomyelitis. And since the discovery of insulin in 1920 the range of useful curative measures has been considerably increased. Although these measures have had a profound impact on some individual diseases—tuberculosis, diphtheria, diabetes, pernicious anaemia, puerperal infection—it is doubtful whether collectively they have had much effect on national mortality trends. Nevertheless it seems probable that specific methods of prevention and treatment will become increasingly complex and effective. There are, however, many diseases, including some of the most common ones, on which such methods can have very little influence. Examples are chronic bronchitis, cancer of the lung and rheumatic heart disease. We must therefore continue to look to the possibilities of control of the external environment.

The marked improvement in health since the eighteenth century has been due almost entirely to the decline of mortality from infectious disease. This has been brought about partly by the favourable trend in the standard of living, and partly by the specific measures initiated in the sanitary revolution in the mid-nineteenth century. Is there further scope for improvement in health by the same methods?

Among the features of the external environment whose influence on health is most conspicuous in England and Wales today are the atmosphere, housing, diet, working conditions and road traffic. The effect of atmospheric pollution is evident in relation to mortality from almost all respiratory diseases, including chronic bronchitis, lung cancer and pneumonia. It is reflected in differences between different parts of the same town, between large and small towns, and between urban and rural areas. Indeed at the present time in Great Britain the advantage of rural over urban conditions of life, in so far as it

is reflected in mortality statistics, appears to be restricted to respiratory disease. It seems probable, therefore, that the prevention of atmospheric pollution is one of the most important measures now available to public health authorities.

The relation of housing to health, although less obvious in national mortality statistics, can scarcely be doubted. There is evidence of the effect of crowding on mental illness and on physical illness, particularly from infectious disease. Further improvements in housing can therefore be expected to make a significant contribution.

Although gross nutritional deficiency occurs rarely in Great Britain today, there are two sections of the population whose health may be jeopardized by lack of food. They are old people, and the late children of large families. It is among the elderly that need is most common, and in spite of the resources provided by National Insurance and National Assistance their diet sometimes falls below a reasonable minimum. The deficiencies to which children are exposed are attributable to the fact that the largest families are, in general, the poorest. The late children are exposed to infectious diseases conveyed by their brothers and sisters, at a time when family resources are at a minimum.

During the present century most of the crude toxic hazards associated with employment—mercury, lead, arsenic and phosphorous—have been eliminated or controlled. Nevertheless the standard mortality ratios indicate that there remain substantial risks associated with occupation. Some of the differences are attributable to variations in income, but others reflect the effects of the working environment. One of the most obvious adverse features is the industrial atmosphere, which is still responsible for much chronic bronchitis, and pneumoconiosis. It seems reasonable to believe that in time this type of risk will be eliminated. There will remain the possibility that some of the many new organic compounds which are constantly being introduced into industry will prove to be toxic, and constant vigilance will be necessary to control them.

The risks to health associated with road traffic are already formidable and are likely to increase. All that need be said about them here is that they will not be reduced without a more radical solution of the traffic problem than any which has so far been applied.

We have been considering those aspects of the external environment susceptible to control by public action. One of the most significant features of the measures adopted during the past hundred years was that because their effectiveness did not depend to any considerable extent upon the cooperation of the individual, they could be modified by Acts of Parliament. But during the past decade investigations of the aetiology of disease have revealed a number of environmental influences of a personal character which cannot be controlled so readily by public action. They include the effect of diet and exercise on coronary disease; of alcohol on hepatic function; and of smoking on a number of diseases of which lung cancer has been most discussed. If such influences are to be controlled it must evidently be mainly through educational methods.

3. SERVICES

Although the medical service in Great Britain has been accepted as a public responsibility, its form still reflects its origins in a period when it was largely under private auspices. The main task which now confronts us is to adjust the service, so that in form as well as in finance, it is geared to the changed circumstances. We shall consider the possible changes in relation to the three major divisions of the National Health Service.

HOSPITALS

In spite of improvements in design and tasteful furnishings, the modern hospital is still a forbidding place. It is largely responsible for the widespread impressions that health depends primarily on treatment of the sick, and that therapy is for the most part a highly technical business. For many people "having an operation" is the essence of medical care and surgery the summit of medical achievement.

An interpretation of the reasons for the decline of mortality since the eighteenth century leads to quite a different conclusion. The marked improvement in health is attributable primarily, not to what happens when we are ill, but to the fact that we do not become ill. And the main reason why we do not become ill is because we live in a healthier environment. It is to environmental services and the favourable trend in the standard of living that we are largely indebted for our better health. Medical history, like common sense, suggests that in designing services we should seek to promote prevention of disease rather than its cure, domiciliary rather than institutional care and, within the hospital, a wide range of activities of which complex investigation and treatment of established disease are only a part.

Against this background the hospital should find a more effective and a more modest place. A considerable part of its work should be directed through outpatient and day care towards making admission unnecessary, and by an intimate relationship to domiciliary practice towards making it possible to retain the personal character of the medical services which the predominance of the hospital now threatens. Services for in-patients should extend from highly technical procedures through a wide range of rehabilitation services to humane hotel keeping. Indeed, the only obligation which remains unchanged through all advances in medical knowledge and changes in the concept of public responsibility, is to care for the dying and to comfort the relatives of the dead.

Many of the problems which confront the hospital service are rooted in the traditional separation of acute, mental and chronic hospitals from one another. These three types are usually on different sites, and when they are on a common site are separately staffed and administered. This sub-division does not correspond to the medical, nursing and social needs of patients, and is wholly attributable to historical circumstances.

Origins of separation of hospitals. Each of the three major classes of patients was presented to society at different times

and as different problems. The object of the asylums was originally to protect the community from the supposed risks of the insane, and the methods adopted for this purpose were penal in character. The object of the Poor Law Authorities was to make admission to an institution a condition of public assistance, and the foundation of hospitals for the chronic sick was an unlooked-for complication of their decision to house the destitute. Until recently it was only in the general hospitals, which inherited the tradition of the voluntary hospitals, that investigation and treatment of disease were recognized as the primary object of institutional care. As a result the three systems were usually established on different sites and were financed, administered and staffed separately.

Disadvantages of separation of hospitals. (a) Mixing of patients with different needs. Since segregation was not based on medical assessment, patients in each of the three classes of hospital were heterogeneous in respect to need. Those in chronic sick hospitals—the mentally defective, the psychotic, the senile, the infirm, the venereally infected and the chronic sick of all ages—had in common only the fact that they were destitute. Those in mental hospitals exhibited the full range of mental and physical illness. And even in general hospitals, isolation from other facilities frequently forced retention of patients not in need of hospital care who were admitted or retained after investigation and treatment primarily for social reasons.

Since 1948, when all hospitals were placed under the same authority, there has been some improvement, particularly in hospitals for the chronic sick. But the mixing of patients with different needs continues, and is indeed unavoidable under the traditional partition which has been retained in the National Health Service.

Recently the needs of all patients hospitalized in Birmingham were assessed, and the table shows their distribution over four classes:

- (1) Those needing the full resources of a modern hospital—skilled nursing, laboratory investigation, surgery etc.

(2) Those needing limited hospital facilities, essentially simple nursing care without mental supervision, because of physical illness.

(3) Those needing limited hospital facilities, essentially supervision and training, because of mental illness.

(4) Those needing no hospital facilities, and retained chiefly for social reasons.

This classification is based upon an appraisal of the needs of each patient by the physician responsible for his care. The table shows that there are still substantial numbers of patients in chronic hospitals who need the facilities of acute or mental hospitals, and in mental hospitals who need the facilities of acute or chronic hospitals. Those in acute hospitals are more homogeneous in respect to need.

(b) Difficulties of staffing. Under present circumstances it is impossible to attract enough doctors and nurses to mental and chronic hospitals, where services are, in consequence, far below the standard expected in acute hospitals. So long as the hospitals are isolated they must depend on recruitment of staff prepared to devote themselves exclusively to these services and the difficulties will remain. They can be overcome only by placing the hospitals close enough to the acute hospitals to

Type of hospital facilities needed by all Birmingham hospital patients.

HOSPITAL GROUP	TOTAL	HOSPITAL FACILITIES NEEDED			
		Full	Limited, without Mental Supervision	Limited, with Mental Supervision	None
General and Special	100% (2936)	96.8 (2841)	1.6 (48)	0.5 (16)	1.1 (31)
Chronic Sick	100% (1338)	34.0 (455)	43.7 (585)	16.3 (218)	6.0 (80)
Mental	100% (3555)	12.9 (459)	1.7 (59)	73.0 (2596)	12.4 (441)
TOTAL	100% (7829)	48.0 (3755)	8.8 (692)	36.1 (2830)	7.1 (552)

make it possible for the same staff to serve both. This view rests on the belief that most doctors and nurses would be prepared to make a contribution to the care of the mentally ill and chronic sick, particularly if this obligation were acquired naturally in the course of training. They will not do so if it means cutting themselves off from their main interests.

(c) Artificial division of patients into acute and chronic classes. The present distribution of services gives the impression that patients fall naturally into two classes according to whether they need short term or long term care. This results from the fact that within a few weeks of admission patients in general hospitals are expected to die, to get better or to get out, whereas duration of stay in mental and chronic hospitals is often unnecessarily prolonged because of inadequate services. It is not possible to say what the distribution of patients would be in respect to duration of stay under adequate services, but it is certain that it would be much less conspicuously bimodal than it is today.

(d) Lack of flexibility. Another disadvantage of divided hospitals is that they cannot respond readily to changes in the size and character of the institutional population. For example the isolation of hospitals for tuberculosis and other infectious diseases has made it much more difficult to transfer staff and buildings to alternative use when they are no longer required for their original purpose.

(e) Reduplication of facilities. Independent hospitals must provide a full range of services. Hence it is not possible to economize by pooling resources or to vary the design and equipment of buildings to make them complementary to one another.

Future hospital organization. Let us now summarize the main features which should characterize the hospital if it is to avoid the disadvantages referred to above.

(1) All types of patients should be cared for on a common site in approximately the proportions in which they occur in the institutional population.

(2) The centre should consist of multiple buildings of varied

size, design, equipment and permanence of structure, each adapted to the needs of the class of patients to be admitted.

(3) Patients should be classified strictly according to their medical, nursing and other needs and placed in the unit most suitable for their care.

(4) Medical and nursing services should be provided by a common staff.

(5) The relationship of the hospital centre to the community around it should be much more intimate than hitherto.

The implementation of the first four proposals would result in elimination of two features of the hospital tradition: the segregation of patients according to criteria (acute, mental, chronic) which do not correspond to their medical needs; and the concept of the hospital as a single independent building providing a full range of services. The fifth proposal would lead to a new relationship between hospital and domiciliary medical services.

Fig. 3 illustrates the organization of medical services at the centre. All, or nearly all, inpatients would enter the unit which provides full hospital facilities, and after investigation and treatment most of them would return home. Some, however, although no longer in need of the full resources of the hospital, would require rehabilitation—using this term in the widest sense to include such activities as re-training and learning a new occupation as well as physiotherapy—after which they could return home. Another group of patients whose medical needs or social circumstances prohibited their discharge would need long-term care: washing, dressing, feeding, etc., in the case of the aged; an organized community life in the case of the mentally ill; simple hostel facilities in the case of some patients who could be discharged if they had a suitable home. They might also include patients working in the community while residing in hospital. Finally, there should be day-care of patients treated or cared for during the day while continuing to live at home. If this unit were not available, almost all such patients would have to be admitted as inpatients.

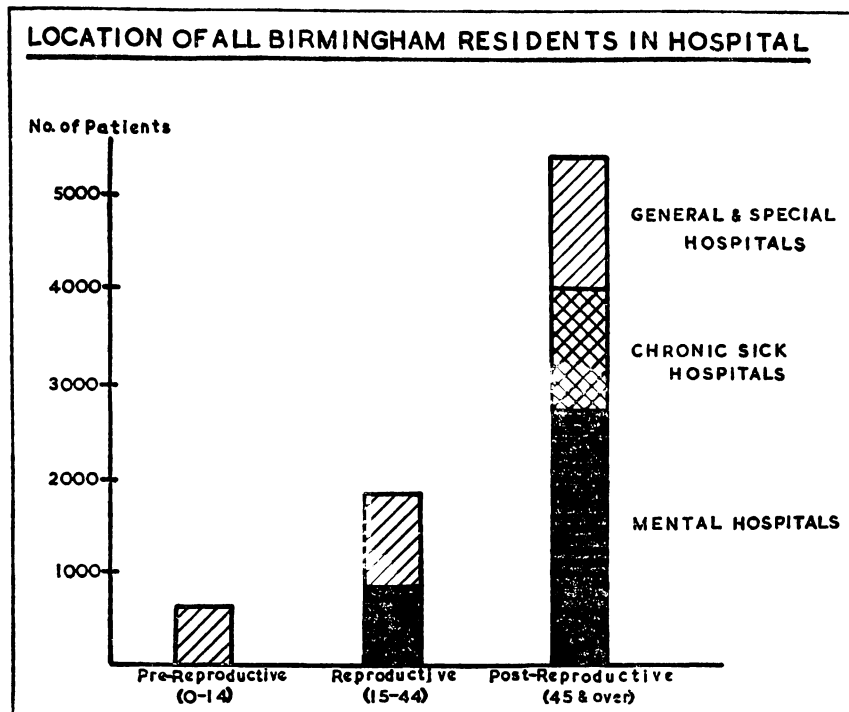


Fig. 3. Number of hospital patients in Birmingham classified as requiring a specified type of hospital service on the basis of a special assessment of need.

We should avoid misinterpretation of the figure by stressing that it is intended only as a diagrammatic representation of services each of which would require multiple units. For example, rehabilitation would require workshops and other facilities for training as well as physiotherapeutic services. Long term care would require wards with simple nursing services for bed-fast patients and hostels for those needing little more than residential accommodation. Moreover it is not suggested that in all units it would be desirable to separate the mentally ill from the physically ill. For example, patients of both types who require only residential accommodation might share the same hostel. The diagram is intended to illustrate the main groups of services, and mentally ill and physically ill patients are shown separately in order to stress that both are fully catered for and, in spite of differences, have common needs.

LOCAL AUTHORITY SERVICES

In Great Britain, as elsewhere, the local authority health services are concerned mainly, although not exclusively, with the prevention of disease. The environmental and personal health services are essentially preventive in character; the after-care and ambulance services deal with established disease. Broadly, however, it is true to say that preventive and curative medicine are under separate local administrations, and are practised by different doctors and nurses. The trend in countries as different as Great Britain, the United States and Russia is unquestionably to keep them apart. The tradition was established early in the century, when public responsibility was extended from environmental to personal health services, but was restricted to preventive procedures. This made prevention of disease a public charge, but left cure a private one. In Great Britain although all services are now publicly financed, the traditional division has been retained.

The disadvantages of this arrangement are self-evident. It is illogical to assign the preventive services for an individual—a pregnant woman, a pre-school or school age child—to one doctor, and the curative services to another. But perhaps the most serious feature of dual administration and staffing is that they make it very difficult to establish a farsighted system of priorities. There are many diseases—chronic bronchitis is an excellent example—for which only preventive measures can provide a satisfactory solution. Yet in the choice between that which is urgent but relatively ineffective and that which is effective but less urgent preference is inevitably given to the immediate problem. If this awkward decision is forced on a common administration, preventive medicine may receive the priority which it merits.

If the future development of health services is rational, it seems reasonable to expect that all medical services concerned with the individual will be brought under a common administration and staff at local as well as at central level. This would mean that obstetricians responsible for deliveries would provide

the related ante-natal services, and that doctors concerned with the sick child would undertake the preventive services, both of a specific and of an advisory character. The work of local authority doctors concerned with ante-natal, child-welfare and school services would be done by general practitioners and consultants.

Such an arrangement would place the division between the personal medical services (of all types) and the environmental services, rather than between preventive and curative services, as at present. It should not mean the end of medical interest in the environmental services. But in many countries of the West these services have now reached a level at which they can be entrusted safely to the supervision of non-medical staff, advised when necessary by medical consultants. Indeed this procedure is already in existence in a few county boroughs in Great Britain.

Any attempt to unify the preventive and curative personal medical services would inevitably raise the awkward issue of the nature of the local administration. In Great Britain it seems very unlikely that hospital, consultant and general practitioner services would be assigned to local authorities. Not the least, but certainly not the only objection, would be the unsuitability of local authority boundaries. The more acceptable arrangement would be to transfer the preventive personal services to the regional authorities concerned with hospital and general practitioner services. This would leave the environmental and welfare services with local authorities.

GENERAL PRACTITIONER SERVICES

The central question concerning the future of general practice is not the personal character of the service or the family basis of practice, but whether a substantial proportion of medical services will continue to be provided outside institutions.

At the present time there are two conspicuous trends in the relationship between domiciliary and institutional services. They are towards isolation of the one from the other, and pro-

vision of all curative services from hospitals or from clinics based on hospitals.

In countries such as Great Britain and Norway doctors are engaged almost exclusively in either hospital or domiciliary work. This arrangement has many disadvantages, of which the most serious is perhaps that it restricts a logical development of services. In obstetrics, for example, there are good grounds for believing that the proportion of institutional deliveries should increase and mean duration of stay in hospital should decrease. With separate administration and staffing of domiciliary and institutional midwifery these developments are impeded. Similarly in the case of the mentally ill and aged sick, patients cannot be divided simply into institutional and domiciliary classes; they require a complex pattern of care which would cut across the traditional boundaries. Yet another disadvantage of separation is that doctors outside hospital tend to lose touch with the technical advances of medicine, whereas those inside, seeing only highly selected patients, may lose touch with reality.

The second significant trend, as yet more evident in countries such as Russia and the United States than in Great Britain, is towards provision of all curative services from hospitals or clinics based on hospitals. Where there is no link between domiciliary and institutional work, and where the means of investigation and treatment are located in hospitals, this trend is almost irresistible, and unless it is arrested general practice as we now know it may become extinct. If health depended mainly on a battery of technical procedures there might be little to regret in this change. Since it does not, there is a strong case for preservation of a personal medical service.

Hence there are two grounds for retention of domiciliary practice. In the first place it is needed for effective mobilization of a wide range of services in which home and outpatient care are at least as significant as inpatient investigation and treatment. And secondly, it is essential for the preservation of the personal character of the medical services.

If domiciliary practice is to survive and take a more prominent part in an integrated medical service it will be necessary to have both a common administration of institutional and extra-institutional services and an important role for the general practitioner in hospital and for the consultant outside hospital.

A common administration. Reasons have already been given for a common local administration of hospitals and of the personal medical services now provided by local authorities. The grounds for bringing the general practitioner services within the same administrative framework are self-evident.

General practitioners and the hospital service. Paradoxically, the most effective means of insuring the continuation of domiciliary practice is to bring the general practitioner into the hospital. His role there must, however, be something more than the coat-hanging, coffee-drinking relationship to the consultant sometimes suggested. In many fields—mental illness, obstetrics, geriatrics, paediatrics and general medicine—there is no reason why he should not take over some of the duties now assigned to full-time or part-time staff. Indeed in some areas arrangements of this kind are already in existence.

If a continuous system of care is to be operated between home and hospital, in which inpatient care is only one, and not the dominant, feature, it is almost equally important that the role of the consultant should be extended outside the hospital. Examples are already available in a few towns where a psychiatrist, in association with general practitioners and the medical officer of health, retains his interests in the mentally sick after their discharge from hospital until they are ready to dispense with psychiatric supervision. Arrangements of this kind should be extended to other subjects and to all areas.

These changes would raise other questions, of which the most important, perhaps, concerns the relationship between a consultant working outside the hospital and a general practitioner working within it. This problem is already evident in obstetrics, where the decision to introduce general practitioner beds threatens to create a second level of consultant work (if the

beds are separated from those which now exist), or will require reappraisal of the relationship of the two classes of medical worker concerned with institutional obstetrics (if the general practitioner beds are under the supervision of the consultant). On the whole the second seems to us to be the less difficult of the two alternatives. But it might modify the relationship between the general practitioner and the consultant and lead to some merging of the two. Such a trend might result in two classes of doctors, one working mainly but not exclusively in hospitals and the other working mainly but not exclusively outside hospitals, each less sharply differentiated by training and conditions of employment than are the consultant and general practitioner of today.