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PUBLIC ILL HEALTH

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by

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**Honorary Treasurer, Committee Against
Malnutrition**

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PREFACE

THIS BOOK is not a detailed survey of the state of health or ill health in this country to-day. There are already books giving sectional surveys, and there are the many annual reports, official and unofficial, local and national. It aims rather at giving a more general and fundamental picture than many of these by taking a wider viewpoint, social as well as strictly medical. It is especially concerned with the practical application of the results of medical and scientific discoveries which during the present century have completely changed our conception of public health. In these terms it would appear that much of the complacency of the Annual Report of the Chief Medical Officer of Health is unjustified. The tone of this review is so much one of gratification that health has not been impaired owing to the prolonged industrial depression as much as had been expected, rather than a constructive attitude towards the problems of health. This tone seems to arise from a belief that the medical service has been able, by the provision of milk and school food and expert medical care, to prevent any more serious state of affairs. In view of the evidence hereafter presented,

I cannot subscribe to that view. Although I have used the name of Sir George Newman in referring to his Annual Report, this does not imply an attack on him personally, but rather a convenient method of referring to the official report for which, as Chief Medical Officer, he is responsible.

Of necessity my account is largely occupied with quotations. I have often preferred a quotation to express my opinion, rather than my own words. Great care has been taken to ensure that the meaning of quotations is not distorted from that of their context.

My official position with the Committee Against Malnutrition must not be taken to mean that the views expressed in this book are those of that Committee. For any opinions given here I alone am responsible. Nevertheless, the records of the Committee have been completely at my disposal, and those who are conversant with these will realise how much I have profited from them. I have incorporated material from the bulletins published by the Committee without further acknowledgment. My thanks are due to Mr. F. Le Gros Clark, not only for permission to do this, but also for his assistance and encouragement throughout. I have also to thank Dr. E. Stolkind for figures used in the chapter on Tuberculosis.

London, *April 1935.*

CHAPTER I

THE BACKGROUND OF PUBLIC HEALTH

SINCE 1919, when the Ministry of Health Act gave birth to a Chief Officer of the Medical Department, it has been the custom to submit an Annual Statement on the State of the Public Health to the responsible Minister. In this report is a *résumé* of the work of the Department, of the present position, and of improvement effected in public health. While there is due recognition of the work done and improvements made, there is at the same time a growing body of opinion that all is not quite well—that events during the past sixteen years or so have rendered obsolete some of the conceptions behind the Act, and that these changes have not been satisfactorily reflected in the attitude of the authorities to the problems that confront them; in short, that there is a certain narrowness of execution by the Ministry of Health, and that the health of the nation is thereby suffering, or at least not improving as fast as might be possible, expected, or desired.

The Ministry of Health Act, 1919, appointed a

Minister of Health "for the purpose of promoting the health of the people throughout England and Wales." The second clause defines the general powers and duties of the Minister as follows: "To take all such steps as may be desirable to secure the preparation, effective carrying out and co-ordination of measures conducive to the health of the people, including measures for the prevention and cure of diseases, the avoidance of fraud in connection with alleged remedies therefor, the treatment of physical and mental defects, the treatment and care of the blind, the initiation and direction of research, the collection, preparation, publication and dissemination of information and statistics relating thereto and the training of persons for health services." These terms of reference seem to be sufficiently wide to cover the whole ground of public health, but in practice the application is very much narrower. On the conception of a modern attitude to public health, we cannot do better than to quote from Sir George Newman, on health problems of the modern period, from his book, *Health and Social Evolution*, 1930: "Hence the fundamentals of national or social health are not now in the first instance concerned with particular diseases, but with the conditions of life which affect the two governing factors—namely, *the nature of man* and *the kind of environment* in which he lives." It will be our endeavour in later sections of this book to examine the health services in more detail, to see if in practice

they utilise this essential conception of Sir George, and to examine his own report, as Chief Medical Officer of Health, in the light of his own statement of fundamentals. In the meantime, we shall deal with certain aspects of the growing public interest and concern in health.

Medicine and Social Conditions. It cannot be denied that there is still too much attention paid to particular diseases by the State medical service. The statistics of incidence of disease, and mortality from disease, are easily compiled, and are so often taken as an indication of the state of public health. Dr. F. G. Collins, the Medical Officer of Health in West Ham, in his Annual Report for 1932, states : " I am more and more inclined to think that in dealing with the health of the community the outlook is often directed towards the wrong aspect, and instead of concentrating upon those social evils which definitely tend to illness and disease, attempts are made to correct or minimise the disabilities arising therefrom." Health is not so much a question of absence of disease ; it is only when the balance of the body is disturbed so far, and symptoms of this upset are so pronounced as to be readily diagnosed, that there is reached a state called by the name of a particular disease. Often the job assumed by medicine is in restoring some degree of equilibrium, after this has, for some reason or other, been badly upset. We suggest that

it would be more effective to endeavour to remove those factors which tend to upset the balance, and that this positive line of action is the fundamental one that an enlightened medical service should adopt. These factors are mainly social : overcrowding, lack of food, wrong food, nature of occupation, and many more. The relationship between these factors and *diseases* is to-day apparent ; that between them and *health* is just as important. We see in those social factors barriers to the healthy life of the community—barriers which medicine, as such, is unable to overcome.

Food and Health. The factor that, in our opinion, is perhaps the most influential in preventing public health is food—lack of food in quantity, lack of food of the right quality, and lack of correct balance. The struggle to obtain sufficient food has been one which has dominated the whole of civilised history. To-day, we can say that the struggle is at an end—solved by scientific discovery on the one hand, and the discoveries of dietetics and physiology on the other. We can, for the first time in history, say that we have the power to give every member of our population sufficient food, and this without being at the expense of other nations or peoples. This fundamental change in the position is reflected by a greatly increased interest in food. Wide publicity has been given to the relation of health and food.

While Mr. J. H. Thomas repudiated his statement, made at the annual dinner of the London Provision Exchange, that there was to be an election in two years' time, by saying it was a joke, the second part of his remark—that when the General Election came the most important factor in the fight would be the food of the people—remains seriously true. It is no unconnected factor that just over a year ago there was formed the Food and Wine Society—a society which sets out to spread the knowledge of good food and wine, and to arrange expensive examples of gastronomic art. Their aim is to effect an all round improvement in cooking, and to widen the appreciation of good cooking. We have the various condemnations of the working-class housewife's bad cooking, no less than the gourmet's complaints that his dinners are as unsatisfactory from his point of view as the working-class diet is from the point of view of supplying health.

The Quest for Health. An important light on the modern interest in food and health is supplied by the use made of it in advertising. Foods and drinks which were previously advertised as being good as such are now proclaimed to be good for health. The goodness and the health-bringing qualities are given a predominant emphasis. Unfortunately, from this type of advertisement it is but a short step to the discovery of a new disease unknown to medicine and the sale of a product to prevent this. This motive

of fear for health is used a good deal in the advertisement and sale of certain drugs and foods. It is true that many of them contain healthy ingredients, but, generally, these may be obtained, as non-branded goods, more cheaply, yet as effectively. Yet how easy it is for a busy working-class housewife, especially in homes where there is unemployment, to be misled into thinking that she can make up for an inadequate supply of food by using one of these so-called patent food-stuffs. From the best will in the world, money is spent on next to worthless extracts, etc., which can so ill be spared from buying food. In this connection the practice of obtaining doctors' testimonials to the effect that such-and-such a preparation is all that is needed to keep well and fit is strongly to be condemned. We understand that these are often obtained, not by direct payment, but by a firm buying out a doctor's debts. In any case the practice is reprehensible, both medically and socially. Of the difficulties in dealing fairly with the problem of advertising foods, we are well aware. In America, there is a National Bureau of Standards, and other institutions, attempting to protect the consumer.

Regarding the situation in this country, we will quote from Professor Haldane's lecture to the National Union of Students this year: "He said that the law of libel interfered greatly with the freedom of speech, and added that there was one proprietary food on the market at the moment which

they always used in the laboratory if they wanted to cause rapid rickets in rats. He could not tell them its name, and no newspaper would publish it if he did" (*Manchester Guardian*, April 4th, 1935).

It is an ironical situation in which we find ourselves subjected to such improper advertising just at the period when we have obtained the laboratory knowledge and experience to tell us the truth about food-stuffs and health.

Difference in Standards. Lastly, we have found evidence of different standards of health for rich and poor. We see this in mortality rates : bronchitis and pneumonia in this country accounted for 50,000 deaths in 1933. These respiratory diseases accounted for one-fifth of the deaths in children under two years of age. In 1931 the mortality per thousand was 1.46 in Bethnal Green, 1.40 in Shoreditch, 1.37 in Bermondsey, compared with .68 in Hampstead and .64 in Lewisham. The implication of such differences we have discussed at length in later chapters. We have only to look around us to see the significance of the division between rich and poor. (In examining reports and surveys, we are constantly finding that healthiness depends on economic position.) We find, too, how "health and physique may be improved by a diet as liberal and varied as that now enjoyed by the well-to-do. Our aim must be to achieve these improvements. To acquiesce in any lower standard

is to accept some level of stunted growth, some level of needless suffering and premature death, as permissible in a world which could provide abundance for all " (*C.A.M. Bulletin*, No. 1).

CHAPTER II

STANDARDS OF HEALTH

PERHAPS the most important question when the health and nutrition of a community are under review is that of the standard or normal taken to which actual conditions are referred. Certain figures and comparisons will make their own frames of reference : mortality rates, infantile mortality rates, incidence of various diseases—all statistics such as these require no extraneous measuring-rods. They depend, of course, on the classification adopted, and a change in this will alter the significance of the figures. But it is when we come to the subjective matters that difficulties arise. If we say that a child or adult is unhealthy or under-nourished, do we mean in relation to some calculated standard of those in the same general grouping, or to that of other groups, or to some calculable ideal or optimal standard ? In dealing with the health (including nutrition) of the general public, it would be necessary to take into account all three factors. To get a scientifically true picture of the health of an individual or group, there should be made a comparison with past history (a, so to speak, horizontal comparison), one with

other persons or groups in different social positions or with different incomes (a vertical comparison), and finally with what we may call a perfectly healthy group or individual which can be determined by a series of controlled experiments. An investigation which only considered the horizontal data would be at once incomplete and untrue.

Optimal Standards. Over the past few years nutritional and medical research workers have done a good deal to determine the upper limits of health. Carefully chosen experiments have been made to show that the human creature reacts in certain ways to various stimuli such as better food, more food, some special ration of food, or sunlight. Health is very largely dependent on food. As Sir George Newman says : " Since its foundation in 1919, the Ministry of Health has always insisted upon the importance of nutrition as a fundamental factor in public health." The science of nutrition is relatively a new one, but it has advanced so rapidly during the present century that we are in possession of a sufficient number of experimental results to have an objective standard of nutrition. We shall deal later with the more intimate relations of diet and health. Here we will quote some of the classical work which has been done, and which gives some indication of an optimal standard.

For instance, in 1926 Dr. Corry Mann conducted an experiment into the diets for boys during the

school age, to show "that the nutritive value of a dietary which was originally chosen with every regard for the welfare of the children to be reared upon it could be strikingly improved by additions which in a quantitative sense were small." The experiment was conducted in a village colony for boys aged seven to twelve years, and seven groups were formed. One group was kept on the basic diet generally considered adequate, as stated above, and the other six groups were given the basic diet plus the following daily supplementary ration :

1st group	$\frac{1}{2}$ to $\frac{3}{4}$ oz.	watercress
2nd	„ 3 oz.	sugar
3rd	„ 1 pt.	milk
4th	„ $\frac{3}{4}$ oz.	casein
5th	„ $1\frac{1}{8}$ oz.	butter
6th	„ $1\frac{1}{8}$ oz.	vegetable margarine

The supplementary rations of sugar, milk, butter, and margarine are approximately of the same caloric value. The sugar and margarine add only extra calories, the casein adds extra animal protein, watercress extra vitamin A, butter extra vitamins A and D, and milk vitamins A, D, and B, animal protein and calcium.

The experiment was concerned to find out the increase of weight and height of the various groups. These are given in the table below :

INCREASE OF HEIGHT AND WEIGHT

Group	One Year		Two Years		Three Years	
	Pounds	Inches	Pounds	Inches	Pounds	Inches
Basic control	3.85	1.84	8.12	3.63		
Watercress	5.42	1.70				
Sugar	4.93	1.94				
Milk	6.98	2.63	13.17	5.21	17.74	7.16
Casein	4.01	1.76				
Butter	6.30	2.22	12.43	3.91		
Margarine	5.21	1.84				

It is clear from this table that the milk group out-paced all the others in growth. The additional ration caused an increase in weight in all cases, but only milk and butter gave appreciable increase in height, so that by both criteria milk gave the best results. It is important to note that the extra growth in the milk group was not the only result—the improvement extended to the general physical conditions. Dr. Corry Mann states that, after eighteen months, “a casual visitor entering the dining-hall would never fail to recognise the table of that house which was alone receiving the extra ration of milk, the boys of that house being obviously more fit than those of any other house.” Both the butter and milk groups became less liable to chilblains, which were customarily universal during the winter months, and the skins of these groups became softer and less liable to diseases.

A similar experiment was conducted by Sir John Orr, under actual home conditions. He selected four groups of forty to fifty children in each of seven towns in Scotland and North Ireland. The control group

remained on the ordinary home diet. To the other three groups the following additional rations were given :

Group I. Whole milk $\frac{3}{4}$ pt. to children 5-6 years
1 pt. „ 8-9 „
 $1\frac{1}{4}$ pt. „ 13-14 „

Group II. Separated milk, amounts as above

Group III. An amount of biscuit of the same caloric value as the separated milk

Roughly the results were that the rate of growth both in height and weight of the milk groups I. and II. was 25 per cent greater than that of the non-milk groups. The difference between groups I. and II. was not so much mensurational as of general appearance—glossier hair, clearer complexion and better carriage being observed in group I.

These two experiments—both carefully controlled, but in one case in a limited colony, and in the other under ordinary living conditions—are extremely important as showing what can be done by giving an additional ration to what is usually thought to be a satisfactory diet.

Another experiment of great significance was that carried out at the Pasteur Institute in Coonoor by Dr. McCarrison (reported in *Nutritional Abstracts and Reviews*, July 1932). He wanted to know the causes of the differences between the various races in India. Each race has a characteristic diet, and the investigation was conducted to see how far the physical

condition and health were conditioned by the national diets. Of these various diets, Dr. McCarrison says : "The 'Sikh diet'—the most nutritious of those examined—was made up of freshly ground whole wheat made into cakes of unleavened bread (*chapattis*), milk, and the products of milk—butter, ghee, curds, butter-milk ; *dhal* (legume), vegetables (fresh carrots and cabbage), tomatoes, root vegetables, fresh meat, with bone and fat, once a week, and water. The 'Madrassi diet'—the least nutritious of those examined—was made up of washed polished rice, *dhal* (legume), fresh vegetables, condiments, vegetable oil, coffee, with sugar and a little milk, a little butter, milk, ghee (sparingly), coco-nut, betel-nut, and water. The respects in which these two diets differ are obvious."

The experiment was conducted by taking six groups of twenty young rats and feeding them on national diets, the greatest care being taken "to simulate in every detail the culinary practices of the races concerned." All the animals were specially selected from one unusually healthy stock, and the experiment "was so conducted that factors such as climate, atmospheric temperature, rainfall, age, body-weight, sex-distribution, caging, housing, and hygiene were the same in all groups." The relative weights of the rats at the end of the experiment were taken to indicate the nutritive value of the diets.

These are now given :

National Diet	Average Body-weight of group at conclusion of experiment
Sikh	235 grammes
Pathan	230 ,,
Maharatta	225 ,,
Kanarese	185 ,,
Bengali	180 ,,
Madrassi	155 ,,

These striking figures remind one of Sir Gowland Hopkins' famous experiments with rats, which we describe in a later chapter.

The arrangement of these diets corresponds with what any observer can judge of the relative health and physique of the various nationalities. The warrior pastoral tribes of Sikhs and Pathans are so obviously healthier than the Bengali and Madrassi, who live in a poor and overcrowded area.

Dr. McCarrison continues : " Further evidence of the health-giving properties of the Sikh diet is afforded by the following experience. My stock rats are fed on this diet. The average daily strength of this stock is round about 1,000, sometimes more, sometimes less. The animals live under conditions of perfect hygiene, and are exposed daily to the sun's rays. During the past three years there has been no case of illness among them, no death from natural causes (the older animals are killed off when no longer of use for breeding purposes), and no infantile mortality other than an occasional accidental death. Large numbers of them (1,189), at all ages up to

two years, have been killed and subjected to post-mortem examination without revealing any microscopical evidence of disease except an occasional cyst (tapeworm) in the liver. Disease has been almost completely excluded by attention to three things : cleanliness, comfort, and food."

Optimal health in rats ! It reads almost like a Utopian conception : a world—for rats—in which there is practically no disease ; where rats grow old in peace and live in perfect health. Can we visualise a world—for humans—without disease ; with health for all, and the price only cleanliness, comfort, and food ? Such a condition of society could open up vistas of undreamed progress, pave the way for a development of civilisation such as has never yet been known. Apart from such visions, returning sadly to the human race as it is, we do know enough to indicate something of the attainable optimal health. We can say that if for some reason or other a person is not as well nourished or as physically fit as he is potentially capable of being, then he is below optimal health, his state of well- or ill-being is unsatisfactory. We agree that this is a difficult standard to attain—that there are many barriers to the optimum—but here and now we do insist that any body of responsible officers whose concern it is to care for the public health should recognise such optimum standards in practical application as well as in theory, and that it should be their foremost duty to endeavour to promote the optimum.

The Vertical Comparison. Here again there is a mass of evidence that can tell us the relative healthiness of different groups. Perhaps the best known experiment is that given in the *Health of the School Child*, 1927. The physical development of boys of fifteen years of age in four well-known public schools was compared with that of boys in a South London riverside district. The public-school boys were getting about half as much food again, and in a more nutritious form, than those in the South London district. The result of the comparison was to show that the latter were on an average 15 to 20 lbs. lighter than the former. A more recent experiment was made by the Medical Inspection Department of the Monmouthshire County Council in 1933. The following table, which is taken from the Annual Report, is a comparison of the average heights and weights of boys and girls attending elementary and secondary schools in the district.

HEIGHT IN INCHES

Age	Boys		Girls	
	Elementary	Secondary	Elementary	Secondary
11	53·6	56·2	54·6	55·3
12	54·7	57·4	56·9	58·3
13	55·8	60·6	57·6	60·4
14	58·3	61·3	58·9	61·6

WEIGHT IN POUNDS

Age	Boys		Girls	
	Elementary	Secondary	Elementary	Secondary
11	68·5	77·6	68·5	77·9
12	72·6	78·6	74·6	79·9
13	80·8	89·5	82·4	88·9
14	87·1	93·5	87·2	91·2

Now height and weight are not the only criteria of health, but it is found in both the examples quoted that with the heavier and taller group go other signs of an altogether higher standard of health. Much further evidence is referred to later in this book, for the moment we shall merely state our conclusion that the standard of health both of children and of adults is conditioned by economic position. This applies also to the incidence of disease ; measles is no longer a fatal disease to the children of well-to-do parents, yet it is responsible for many infant deaths in working-class families. That is, apart from all questions of optimum standards, there is immediate work to be done by the Ministry of Health in determining those factors which prevent the lowly paid working class, the unemployed, and the children in elementary schools from being as healthy and well developed as those enjoying larger incomes ; and, having done that, to push for the higher standard in the lower economic group. There are obviously many factors at work—heredity and overcrowding being some—but it is our strong conviction, supported by any amount of evidence, that the most important single factor is that of food.

Sir George Newman's Report. Let us now turn to the Report submitted by Sir George Newman on the State of the Public Health, and examine this in the light of the above considerations.

We agree that “starvation is no doubt extremely

rare in England, yet, although the population is, as a whole, obviously much better nourished than in former days, there can be no doubt that many people suffer by starving the body of certain constituents of a wholesome and sufficient dietary. The evidence of this is indisputable, and can be witnessed by all men who see cases of undernourishment, of anæmia, of rickets, or of dental decay. The availability and cheapness of certain articles of food is of course partly responsible for their wide consumption as compared with proteins, animal fat, and fresh fruit and vegetables." According to Sir George, "malnutrition is not a condition with well-defined signs and symptoms, and this makes its recognition difficult when the degree of malnutrition is not great. There are at present no satisfactory objective or physical tests or criteria by which the state of nutrition can be determined."

That is perfectly true in general, but, as we have suggested, there are those vertical standards of comparison. We agree that it is difficult to say of a group of children that it is at a certain time in its own history malnourished, and at another time adequately nourished. But it is possible to say that in comparison with a group which gets more and better or less and worse food that it is malnourished or adequately nourished. The food given can easily be ascertained, a comparison between the children made, and results arrived at accordingly. What Sir George fails to do is to apply any other than the

horizontal method comparing the health of a person with that of the average of his group and treating only of the history of that group.

The Unreliability of Average Standards. In an article on "Underfeeding—Does it Exist?" in the *Medical Officer* of July 14th of this year, Dr. Dunstan, School Medical Officer for Lewes, says: "Having regard to the mass of evidence now collected, the figure of 10 per 1,000 as the incidence of malnutrition occurring in our schools appears to be a serious understatement. Various explanations have been put forward, as thus: (1) that the effects of underfeeding do not become evident at once; (2) that nutrition may be improved in non-depressed areas and so have cancelled out the rise in the depressed areas, thus leaving the average unaltered; and (3) that much of the underfeeding has been remedied. To these, I suggest, should be added a fourth reason—namely, failure in diagnosis. I believe that the 10 per 1,000 quoted by Ramsbotham represents the *severe* cases in which the evidence of malnutrition is so marked as to arrest attention in the course of medical inspection. Even if we include the 15 per 1,000 'under observation,' we have no reason to believe that the remaining 975 are the fortunate possessors of an optimal vitality."

We return later to Sir George's reports on various districts. In the meantime, we state our conclusions that the investigation of the Ministry of Health is

of very limited value, for the reason that the standards used are almost invariably of that subjective nature and within the narrowest framework of restorative medicine. There is the well-known example of the medical officer of health who moved from a country district in Bedfordshire to a South Wales district, and attempted to apply his country standards of health in examining the children of his new district. His figures of malnourishment for his South Wales district were so high that an enquiry was made, and it was shown that, instead of taking an average standard of the new district and making returns in relation to this, he was using the normal figures worked out from his country experience and so reporting a general level of health below that of his Bedfordshire area.

The Limitations of the Public Health Service. Although Sir George Newman has admitted that the condition of the health and nutrition of the public is nowhere near the optimum, yet we can find no evidence of any real attempt to set about improving the health of groups which are admittedly less well nourished than others. Even the distribution of milk under the Milk Marketing Board received its impetus in the necessity to find a market for surplus milk rather than a demand from the health authorities.

Our conclusion is inevitably that there exists in this country a mass of people who are nowhere near

the health and nutrition standard of those more fortunately situated, and still less approaching an optimum, and that experiment has shown that the barrier to better health is largely the fact of inadequate feeding. If that were all, perhaps Sir George would have some justification for his picture of an England where health was generally improving and unemployment had not caused distress. But if we examine the condition of the lowly paid and unemployed working class by some more adequate test, we cannot fail to see that they are living on a standard that is frankly inadequate. We discuss later both the question of scales and the unemployed. Here we must point out that both the diets drawn up by the British Medical Association and the Ministry of Health are minimum diets designed as a standard below which no one of the population should fall to be kept in a reasonable state of health. They were not designed to afford more than the barest necessities, nor to help to increase general health ; rather they were drawn up with the negative viewpoint of managing to *maintain* health, not to improve it. Now it is interesting that Sir George Newman, beyond giving the history of the establishment of these standards, nowhere mentions any application of them. Were these figures obtained for purely academic purposes ? Logically it would seem one of the first duties of the Ministry, since they recognise the scale, to cause an investigation to see if any section of the population is in fact living at a

standard below that scale. Here, at last, is an objective standard, rough and ready even though it is, yet there is no evidence in the report that it has been, or is intended to be, used by the Ministry in surveying public health.

To sum up, an adequate picture of the health of the nation can only be obtained by keeping in mind an optimum scale ; all other scales are notoriously unsatisfactory. Nevertheless, by a vertical comparison between groups in different economic positions, we can discover the barriers to health and the remedies. Finally, there are certain accepted minimum standards, and yet there is evidence that many people are living below these standards by reason of their economic position.

CHAPTER III

DIET AND HEALTH

THE STORY of the scientific discoveries of diet is typical of the development of a social subject. As usual the impetus came from non-scientific circles, owing to the necessities of social problems. To illustrate this, we cannot do better than quote from that official report, in March 1919, of the Food (War) Committee of the Royal Society on "The Food Requirements of Man and their Variations according to Age, Sex, Size and Occupation." By the end of the war the shortage of food-stuffs had created conditions which were unfortunately ideal for examining the results of deficiency in diet. In dealing with the effects of the diminution of the food supply (p. 16) the report says : " The experience of Germany during the past three years has shown that it is possible for large masses of men to live and to carry out their normal employment on a diet very much less than that to which they were accustomed. The effect of semi-starvation such as that which has been endured for so long in Germany has been lately investigated with great care by Benedict on a number of young healthy adults. The first effect of

diminution of food is a diminution in the weight of the body. The individual, if he remains at his work puts out at first the same amount of energy as before, the energy lacking from the food being supplied in the first place by the fat and in the second place by the muscular tissue of the body. But when, under this régime, the weight has fallen 10 per cent to 12 per cent, it is found that the basal requirements of the individual are largely reduced. Thus in one case where a man, 5 ft. 2 in., on semi-starvation, diminished in weight from 115 lb. to 84 lb., his basal metabolism was diminished from 40·5 to 33 calories per square metre of body surface. In another case of a man, 6 ft. 2 in., where the loss of weight was still larger—viz. 163 lb. to 101 lb.—there was a diminution of basal metabolism from 40 to 25·4 calories per square metre body surface. Under these conditions all the processes of the body are carried out more economically. There is no diminution in the actual expenditure of energy required for doing a certain amount of work, but the basal metabolism is diminished, and the individual is more economical in effort and economises his muscular activity to the utmost possible effect. Thus in a squad of men investigated by Benedict, the normal demand of the men for food ranged from 3,200 to 3,600 net calories. After a loss of 12 per cent in the body-weight had been reached, they were able to maintain this weight and to carry out their normal work with a diet of 2,300 calories, i.e. a diminution of $\frac{1}{3}$ in their previous

food requirements. . . . This state of economical nutrition seems to be without danger to health even when extended over some months. When extended over years, as in Germany, the general effect appears to be a diminution in the resistance to tubercular infection—the incidence of T.B., and the deaths from this disorder, having largely increased in all parts of Germany.”

Incidentally the report concludes : “ The above report shows how very inadequate is our present knowledge of the science of nutrition, and demonstrates the necessity of renewed investigations of almost every point discussed in it.” A more recent excursion of science into the realm of public affairs has been that of establishing a minimum monetary scale of diet. Again, the social position is such that there are large numbers of families living on a lowered standard, and public concern brings scientific interest to work on those problems. In the first place there was Circular 1243 of March 21st, 1932, which drew attention to two reports made by the Minister’s Advisory Committee on Nutrition. One of these was a “ Report on Diets in Poor Law Children’s Homes,” the other a “ Memorandum on the Criticism and Improvement of Diets.” Then in 1933 the British Medical Association appointed a Committee—“ To determine the minimum weekly expenditure on food-stuffs which must be incurred by families of varying size if health and working capacity are to be maintained, and to construct

specimen diets." This report was published as a supplement to the *British Medical Journal* of November 25th, and it was immediately seen that there were important differences in the principles which had been established by the Ministry of Health. Circular 1370 next appeared, and gave the new conclusions of the Minister's Advisory Committee: "In their Memorandum to the Minister on 'The Criticism and Improvement of Diets' the Advisory Committee adopted 3,000 calories and 37 grammes of first-class protein as adequate values for the calculation of sufficient diets. The Committee appointed by the British Medical Association have based their calculations on 3,400 calories and 50 grammes of first-class protein.

"In fixing the values in their Memorandum, the Advisory Committee had not specifically in view the care of unemployed persons and their families—they were contemplating generally persons not engaged in more than moderate physical labour, and in their view the amounts provided are consistent with the results of direct experiment and with observation of the dietaries of families where the work done was manual. . . .

"The British Medical Association Committee were specifically required, by their terms of reference, to lay down a minimum standard, and, in the view of the Advisory Committee, no evidence known to the Advisory Committee and no argument stated in the British Medical Association Committee's Report

justify the increase of 3,000 calories to 3,400 calories, or of 37 grammes of first-class protein to 50 grammes. The Advisory Committee accordingly do not desire to modify in any way the advice tendered to the Minister in their previous Memorandum. They believe that the advice there given may safely be adopted as the basis of any scales for sufficient diets."

A dispute between two such eminent groups of experts obviously could not be left at that point. A joint conference between the two groups was called, and reported in May 1934. It was soon seen that there was no real difference of opinion. According to the May report—"It can be seen that, whereas the British Medical Association's Committee confined their attention to single active families, the Ministry's Committee had in view communities of people many of whom lead comparatively inactive lives." Again—"It appears, therefore, that a working solution of the problem of physiologically desirable dietary standards for individuals can only be found in a sliding scale of caloric needs based on age, individual physique, occupation, and habit." The sliding scale revealed that the caloric requirement varied from 2,600 to 4,000 at the lowest and highest limits in accordance with whether the work was light, moderate, or heavy. Since the terms of reference of the B.M.A. Committee were of a more immediately practical nature, and also were able to be expressed in approximate money terms, it is more

usual to-day to take their scale in calculations involving minimum needs. Although the B.M.A. considered their scales the minimum requirements, those of the Ministry's Committee were generally thought to be satisfactory scales of adequate diet. The danger of the entry of the B.M.A. is that their scales will tend to become regarded as sufficient to satisfy instead of just enough to prevent damage.

Now the position has not so far changed since the Food (War) Report was published in 1919 that it is any safer to lay down diets in such detail. It is true that we have learnt much in the past few years, but our knowledge is still limited. Then, again, there is a vast difference between a minimum and an as yet unknown optimum. We propose, therefore, to examine the body of knowledge which has been so far accumulated by dietitians.

As far as is at present known, the essential requirements of a diet are :

- (1) Fuels
- (2) Body building
- (3) Minerals
- (4) Vitamins

Fuel. The energy which a human body dissipates in a state of complete rest is proportional to its surface area. Unless this energy is supplied by food the tissues of the body will be broken down to supply it—as we have seen earlier, in the report on Benedict's work. Over a long period this will lead to

starvation and death. This dissipation of energy of a human organism at rest is usually called the basal metabolism. Normally, of course, the human is not at rest, and therefore requires much more fuel-food than this basal quantity, in order to supply the energy he uses in work or any other movement of the body. It has been worked out fairly accurately what any given occupation will require in addition to the basal quantity. As examples of this, we quote the following two tables from Ackroyd, *Vitamins and Other Dietary Essentials* (pp. 14 and 16).

DAILY CALORIC NEEDS OF A CARPENTER
11 STONE IN WEIGHT

8 hours' sleep at 65 calories per hour	520 calories
2 „ light exercise at 170 „	340 „
8 „ carpenter work at 240 „	1,920 „
6 „ sitting at rest at 100 „	600 „
Total food requirements for the day	3,380 „

CALORIC CONSUMPTION OF VARIOUS
NATIONALITIES

Japanese students	2,343 calories a day
Italian brickmakers	4,641 „ „
English tailors	3,053 „ „
Swedish workmen	4,126 „ „
U.S. sailors	4,998 „ „
Unemployed man (Germany 1927),	2,200 „ „

As Dr. Ackroyd remarks, these figures concern what is, not what should be. These fuel requirements are most easily supplied by carbohydrates (starch and sugar), and these are usually such foods

as flour, rice, oatmeal, cereals, potatoes, sugar, etc. If these are lacking, fats and proteins in excess of what is needed for tissue repair can be utilised. (The Esquimaux use protein as fuel, obtained from a very large meat consumption.)

Body building. Those nitrogenous substances called proteins of which the body is largely built are peculiar in that they cannot be formed in the body from any substance other than protein in the food. They are highly complex in chemical structure, and each tissue or organ of the human body containing protein has a need for protein of specific structure. If the particular protein is not present in the food, some part of the body is protein starved.

Beads (protein structures fitted for certain tissues or organs) which are in excess of requirements, or do not fit, can be used as fuel. A "complete" protein contains all the different kinds of beads. In analysing a diet, proteins may be divided into first class (complete) or second class. Animal proteins (meat, fish, eggs, cheese, milk) are first class, i.e. eggs contain complete protein—the rarer as well as the more common beads—while vegetable proteins (dried peas, beans, lentils) are second class. Often the amount of protein taken may be sufficient in bulk, but, owing to the peculiar nature of proteins, the absence of first-class protein may result in dietetic deficiency.

Fats. Fat works in much the same way as the carbohydrate; all edible oils and fats—butter,

margarine, olive-oil, lard, dripping, meat fat—can be used by the body to supply fuel and to assist in growth. As with carbohydrates, and in contradistinction to proteins, any fat, animal or vegetable, will supply the need for fat of the body.

Mineral Salts. The most common mineral elements which are known to be necessary for the human body are iron, calcium, phosphorus, copper, sodium, magnesium, potassium, chlorine, and iodine. These mineral salts make the ash which is left after the combustion of food for the purposes of fuel and growth. Animal foods supply acid ash, sulphates, phosphates, and chlorides; vegetable foods and fruits, alkaline ash, carbonates.

These mineral salts are dissolved in the various fluids in the body, and are absolutely essential to satisfactory functioning. Lime and phosphates are especially needed for the teeth; chloride to form the hydrochloric acid in the gastric juice; iron and salt for the blood, and iodine for the thyroid. Milling of grain to make white flour and white rice removes mineral salts. An adequate diet must contain all these salts. The most liable to be deficient are iron, calcium and phosphorus.

Water. An obvious necessity, contained both in our food and our drink. Four to six pints daily are necessary.

Vitamins. Vitamins are perhaps the crowning glory of modern dietetic research, on which work

and the production of papers continue to flourish. The revolutionary conception that it was not something that was present in the food which was causing a disease, but something which was absent, is the result of two main lines of development—the practical experience of men in charge of the food of various bodies, and the laboratory experiments of the last thirty years.

Of the first, we may mention the elimination of beriberi from the Japanese Navy in 1884. Previously 32 per cent of the men in the Japanese Navy suffered from beriberi. Medical Inspector General Takaki made a special investigation, and concluded that the freedom of European Navies from beriberi was due to the larger amount of protein in their diet. Three years after the introduction of the new diet there were no further cases of beriberi in the Navy. During the Russo-Japanese War there were 200,000 cases in the Army, none in the Navy. The difference in diet was as under :

Per Day.

Navy: 1 lb. meat ; 20 oz. rice ; 10 oz. whole barley.

Army: 5 oz. meat ; 30 oz. rice.

Now General Takaki gave a wrong reason for his success, but it produced results, and established the connection between beriberi and deficient diet. Earlier, the change over to machine mills to make white rice had led to an increase in beriberi, but the connection had not been recognised. A few years

later (1897) Dr. Eijkman, a Dutch doctor at a prison hospital in Java, observed that prisoners and the hens developed beriberi. These lived on similar food, and he was led to experiment on the diets of the fowls. Some of these were fed on whole-grain rice ; some on rice that had been half peeled ; while others were given white rice. Polyneuritis developed only among those fowls that had been given white, and this was cured by giving them the half-peeled or whole-grained rice. Eijkman and his assistant, Vorderman, were able to test this conclusion—that beriberi was due to a deficiency in white rice—by an experiment among the prisons of Java. Some prisons continued to give white rice, while others gave half-peeled rice. The experiment covered some quarter of a million prisoners. The results were that, in those prisons where white rice was eaten, one in 39 of the prisoners developed beriberi ; while in those where half-peeled rice was eaten, only one in 10,000 of the prisoners developed the disease.

Scurvy had long been known as a disease which, if not caused by food deficiency, at any rate could be cured by administering certain foods. Vasco da Gama is known to have lost 100 out of 160 men from scurvy during his voyage, in 1498, round the Cape of Good Hope. Yet Captain Cook, in 1772, was able to make his long voyage to Australia without scurvy developing among his crew because of his provision of germinated barley and cabbage preserved in vinegar. Between these two voyages, in 1752, Lind had

published his treatise on scurvy. Lind was a practical British naval surgeon who conducted various experiments on the usual lines of giving an extra ration of various foods to sufferers and seeing what happened. He discovered that oranges and lemons had the best results in curing scurvy. Lind's work was a fine example of careful observation and the desire to spread enlightenment. It may be a comfort to those who find it so hard to obtain public acceptance of accurate knowledge of dietary causes of disease, such as rickets and dental caries, to know that Lind wrote of scurvy, in the middle of the eighteenth century : "Some persons cannot be brought to believe that a disease so fatal and dreadful can be prevented or cured by such easy means. They would have more faith in some elaborate composition, dignified by the title of an anti-scorbutic golden elixir or the like. . . . Facts are sufficient to convince the unprejudiced. . . . It is no easy matter to root out old prejudices or to overturn opinions which have acquired an establishment by time, customs, and great authorities." This holds true to-day, with the possible exception that advertising could be added at the end of the last paragraph. It may be noted that, in 1916, 7,500 British soldiers were invalided in Mesopotamia as a result of scurvy, and that the Indian troops suffered even more severely.

Another widespread disease—pellagra—has been largely associated with maize growing and eating communities, being found especially in the U.S.A.

from 1907 onwards. In 1913, Dr. Goldberger was appointed by the U.S. Bureau of Public Health to investigate the causes of the outbreak in the southern States of America. As usual it was to institutions that he looked, and found that in an asylum in Milledgeville, Georgia, the patients contracted pellagra, while the staff remained immune, in spite of their constant contact with the disease. Goldberger drew two main conclusions from his observations: pellagra was not an infectious disease, and was found among the poor who, therefore, had a scanty supply of food. The next step was to an orphanage, where the children were given during a winter a glass of milk a day, and a more varied and better diet. The result was that no pellagra was recorded, although the usual recurrence rate in the spring was 40 per cent. Two years later, Goldberger reversed the experiment, to make one of the few controlled tests of giving inadequate diets. Twelve convicts, by the offer of a free pardon, were persuaded to restrict their diet to a maize meal, white wheat flour, potatoes, salt pork, and golden syrup. In six months seven out of the twelve had contracted pellagra.

These and other similar observations, with humans as the object studied, were in their way conclusive, and yet left over many problems which seemed incapable of solution. It was then that the laboratory worker came on to the scene and cleared up so many doubts and uncertainties. In the laboratory it is possible to use, for instance, rats or guinea-pigs,

both of which animals react sufficiently quickly, and breed fast enough, to obtain a large number of results in a short period of time. The type experiment of most recent research was that performed by Sir F. Gowland Hopkins in 1912, published in the *Journal of Physiology*, the results of "Feeding experiments illustrating the importance of accessory factors in normal dietaries." The experiment was made with rats. First of all rats were fed on a mixture of milk-protein, starch, sugar, and lard in adequate quantities, and with the proportions of protein, fat, and carbohydrate correct. The animals lived and grew slightly.

The next stage was to feed the rats on a similar, but purified, régime, whereupon the animals died. Two or three c.c. of milk were then added to the purified diet—an amount insufficient to add appreciable quantities of protein and fat. Nevertheless, the rats not only lived, but thrived. Variations in the experiments on the same groups were plotted in growth curves. From these it was clearly seen how the milk supply conditioned the well-being of the animals: the curve of the milk-fed group ascending steadily until the supply of milk was withheld, when there was an abrupt decline. Against this was plotted the non-milk group on a uniformly poor graph until given milk, when the curve sprang upward and crossed that of the other group, now no longer fed on milk. From that date to this, innumerable experiments of a similar nature have determined the other

accessory food factors. and established their extreme importance for life and adequate nutrition. It is now known that the old diseases of scurvy, beriberi, and pellagra are in fact due to the deficiency in the diet of particular vitamins. Worse, perhaps, than the actual amount of definite illness is the sub-normal health caused not by the absence, but by the shortage, of the vitamins. This shortage is probably the cause of much ill health and unhappiness.

We summarise below the main points about the vitamins as known to-day, with some comments on the effects of their absence.

Vitamin A. Sources : animal fats (except lard), green stuffs, root vegetables containing carotin. The first symptom of vitamin A deficiency, even in an apparently healthy person, is a very much lowered resistance to infection. If the shortage is continued, xerophthalmia, an inflamed condition of the cornea of the eye, may develop, and, if unchecked, this can lead to blindness. A less serious form of this disease is night-blindness—an inability to see in any but a good light. The retina, owing to a lack of vitamin A, is starved of visual purple, a substance which sensitises it to the action of light. An experiment has been performed, with a Birch-Herschfeld photometer on 213 patients in a children's hospital : 168 children gave a normal response, while 45 showed an abnormally slow recovery of light adaptation after ten minutes in the dark. These

children were treated with three teaspoonfuls of cod-liver oil daily. In four days many of the children recovered, while after six weeks all were cured. Other results of vitamin A deficiency are loss of weight, stone in the bladder and kidneys, and impairment of fertility.

Vitamin D. Present, as in the case of vitamin A, in animal fats, especially cod- and halibut-liver oils, butter, egg yolk, beef suet. Absence is the cause of rickets ; partial absence gives rise to " minor rickets," a full discussion of which is to be found in a later chapter.

Vitamin C. Found in fresh fruit and vegetables, especially oranges, lemons, tomatoes, spinach, watercress, cabbage, and, in a smaller quantity, in potatoes. A severe shortage of vitamin C will lead to scurvy ; less pronounced shortage will give rise to vague ill health, sallow complexion, fatigue, and a lowered resistance to infection. One of the difficulties about vitamin C is that vegetables are usually cooked, and heating may destroy the value of the vitamin. Thus the " dosage " of raw cabbage to prevent scurvy in man is one ounce per day. The quantity necessary if the cabbage is cooked for twenty minutes, four ounces ; if for an hour, ten ounces ; and if cooked with soda all the vitamin C content is destroyed. Boiling for a short period is less harmful than slow cooking at a low temperature ; twice cooking destroys vitamin C. Contrary to much

popular superstition, modern canning need not always destroy vitamin C.

Vitamins B and B₁. Found most abundantly in rice-bran, liver, whole barley and whole cereals, pulses. Absence leads to beriberi ; shortage to loss of appetite, indigestion, headaches, poor general conditions, abnormality of heart and endocrine gland.

Vitamins B₂ or G. Found best in dried yeast, or yeast extract, lean beef, pig's liver ; also in whole wheat, milk, egg yolk, and tomatoes. Deficiency is a factor leading to pellagra ; black tongue in dogs.

The Balance of a Diet. An adequate daily diet should contain $3\frac{1}{2}$ to $4\frac{1}{2}$ oz. of protein, $2\frac{1}{2}$ to 4 oz. of fat, 14 to 18 oz. of carbohydrate (all dry weight). Proportions of this diet are : $\frac{1}{6}—\frac{1}{6}—\frac{2}{3}$ (as a matter of interest, milk contains these food constituents in the ratio of $\frac{1}{4}—\frac{1}{4}—\frac{1}{2}$, and is the most perfectly balanced natural food-stuff). The following average diet is taken from *Food, Health, and Vitamins*, by R. H. A. and V. G. Plimmer :

An Average Diet	Oz. Dry Weight Protein	Fat	Carbohydrate
$\frac{1}{2}$ pint milk (10 oz.)	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{3}$
1 egg (2 oz.)	$\frac{1}{4}$	$\frac{1}{3}$	—
Meat, fish (4 oz.)	$\frac{1}{3}$	$\frac{1}{3}$	—
Meat fat, butter (2 oz.)	—	$1\frac{1}{2}$	—
Cheese (2 oz.)	$\frac{1}{2}$	$\frac{1}{2}$	—
Total from animal foods	$1\frac{3}{4}$	3	$\frac{1}{2}$

An Average Diet	Oz. Dry Weight Protein	Fat	Carbohydrate
Bread (8 oz.)	$\frac{1}{2}$	—	4
Potatoes (10 oz.)	$\frac{1}{4}$	—	2
Cereals (8 oz.)	$\frac{1}{4}$	—	4
Sugar (2 oz.)	—	—	2
Vegetables, fruit, jam	$\frac{1}{2}$	—	$1\frac{1}{2}$
Total from vegetable foods	$1\frac{1}{4}$	—	$13\frac{1}{2}$
Grand total	3	3	14

This diet, although on a moderate scale, will satisfy both requirements of quantity and quality—that is, will provide enough energy and body-building factors for an average person, and at the same time supply the vitamins essential for health.

Knowledge of Food Values. It has been necessary to give this account of our knowledge of food at some length, because there is an absence of accurate thinking even among medical practitioners. There is often very little conception of what food requirements are outside the most obvious requirements for energy. The worst fault is to go short of food containing vitamins. This is only partly a fault of lack of knowledge, the other lack is of money. For it is, unfortunately, these foods which are on the whole more expensive, and are very often beyond the means of working-class families. We shall discuss this economic factor later, but as an example of the lack of knowledge of both a country working-class housewife and the local general practitioner, the

following experience of the author is worth quoting. When lecturing to a country women's meeting he asked for specimens of actual diets which had been eaten during that day. One was so bad—consisting mainly of white bread, tea, meat gravy, a little vegetable, and cocoa—that he spoke to the housewife concerned. She complained that she was almost always “doctoring,” but didn't know why. The local doctor gave her the usual bottle of medicine, and made absolutely no enquiry into the food she ate. The woman herself had no idea that her faulty diet had any connection with her wretched state of health. This incident is, we believe, typical of thousands of cases.

In most middle- and upper-class families, the food eaten is sufficient in quantity and quality to supply all the needs for energy, growth, and health. It is in the working class that the smallness of income allows only of a less plentiful and varied diet. Lack of knowledge of food values is widespread. It is surely unfair to blame a working-class housewife for not possessing the knowledge which more fortunately placed women have not got, but yet without which she cannot feed her family adequately.

. We know now that many illnesses, that slowness to recover from illness, that subnormal health, are often the result of dietary deficiency. Perhaps the best summary on the effects of vitamin shortage in impairing public health is given in the quotation below, from the report, “Vitamins, a Survey of

Recent Knowledge," published by the Medical Research Council. "So far as Western civilisation is concerned, it is no doubt true that the rareness of the occurrence of frank deficiency diseases, such as scurvy, xerophthalmia, and beriberi, indicates that an absolute deficiency of vitamins scarcely ever exists in an individual diet. On the other hand, it is now becoming generally recognised that much subnormal health and development, and even incidence of disease, are associated with a partial deficiency of one or more of these accessory substances. The influences of such partial deficiencies, even when relatively slight, may be extremely serious when they occur in very early life, and, if we may judge from the results of experiments on animals, an adequate supply of these indispensable dietary components later in life may fail to make good the damage caused by a deficiency in youth. There is also danger that the effect of such a partial or latent deficiency may persist as a chronic condition throughout adult life. It is difficult to provide convincing evidence of this, since the well-known symptoms which characterise the disease may not be present, and the only method of clinching the diagnosis would be to make widespread therapeutic trials with the vitamin or vitamins suspected to be deficient, and to observe whether general improvement of health took place. Green and Mellanby have pointed out how wide is the margin between the dose of vitamin A which will just maintain a rat in life, if it is not attacked by

infection, and the dose which will wholly prevent those infections. The latter dose is about four times as great as the former. Animals receiving doses between these maximum and minimum amounts, while showing no overt symptoms of vitamin A deficiency, yet suffer from a partial or latent deficiency, and are proportionately liable to infection in consequence. This example seems to show that a latent deficiency disease is a real thing and not an imaginary concept."

So we see that although our knowledge of dietetics is by no means complete, we know enough about *optimum* diets to say that the conception of *minimum* diets is unsound scientifically and socially. The only standard which is legitimate is one which ensures that there shall be no shortage of any essential constituent. So, to safeguard our health and development, we shall need to take more—often considerably more—food than has been prescribed in any minimum so far established.

CHAPTER IV

THE FOOD SUPPLY

Agriculture and Science. Sir Daniel Hall, Chief Scientific Adviser to the Ministry of Agriculture, in the Rede Lecture, at Cambridge last year, on "The Pace of Progress," stated that the pace of material progress based upon science had become so rapid that the social structure of the nation could not adjust itself quickly enough to assimilate the advances. According to the *Manchester Guardian* report (March 5th, 1935), he said: "Agriculture at the present time affords an example of an industry brought to a world-wide economic standstill because of our inability to handle the enhanced powers of production due to science. On the one hand we have European countries 'freezing' their peasant social structure by tariffs and other fiscal expedients—on the other we have the exporting countries adopting fantastic measures to decrease production—Brazil burning coffee and the United States ploughing up cotton and paying bounties for 'not raising' hogs."

Two points are brought out here: (1) the increased potential production, and (2) the enforced limitation. Taking these in order:

The Advance of Scientific Agricultural Production. The application to agriculture of science in general, and of machine power in particular, has made it possible to-day to produce more than enough food for everyone. The production of food has changed since those early days when man was able to obtain food only by the most primitive and strenuous methods, dependent largely on the luck of chase or fortunate discovery of roots, until there is an assured supply by highly skilled industrialised food-producing communities. As Professor J. A. S. Watson, President of the Agricultural Section of the British Association, stated in his Presidential Address last year, on "The Survey of Scientific Progress and Economic Planning in Relation to Agriculture and Rural Life," "the main result of the most recent agricultural progress in the more advanced countries has been to set free for activities other than food production an increasing proportion of the population, with, as a secondary consequence, the possibility of an unprecedented rise in standards of life. . . . Through the application of the sciences of genetics and nutrition, the average output of eggs per bird increased by 20 per cent in six years. The use of the tractor and the harvester enabled a reduction of 50 per cent to be made in the labour cost on corn production. The output of meat per acre of grass land increased at Cockle Park, and on much similar land elsewhere, by more than 100 per cent, through the use of what was once a

worthless by-product of our steel industry. A simple and cheap remedy had been found for the 'rot' in sheep, which often in the past killed a million sheep and more in a single year. All these things led to cheaper, easier, and more abundant production."

Sir John Orr, in his Chadwick Lecture, on "The National Food Supply—its Influence on Public Health," informs us that "in Australia much of the land under wheat could yield 100 per cent more if it were intensively fertilised, and nitrogenous fertilisers can now be obtained from the air in unlimited amounts. Stock farming, apart from wool production, is only beginning to be developed. There are millions of acres of pasture land awaiting development." Of the present position, he concludes, "the most striking feature is the abundance of our food supply and the ease with which it can be produced."

Between 1913 and 1928 the total increase of world grain production was greater than that of population. Malthus' theory of a diminishing food supply with a growth of population has been refuted again and again by scientific production. By selective cultivation it is possible to grow wheat in areas where before the climate was unsuitable. Rust-resisting varieties are cultivated which will result in still larger yield. Insect pests are overcome by transfer of natural enemies to give a new balance of nature over wide areas. Refrigeration and modern transport enable food to be stored and carried on a scale undreamed of earlier. According to the *U.S.*

Year-Book of Agriculture, 1930, the number of tractors used in the United States increased from 246,000 in 1920 to 843,000 in 1929. This tractor, almost man's greatest aid in winning food, has long been a central feature of Russian propaganda for increased food production—propaganda reflected in films such as *The General Line*.

Such is the position. Scientific and agricultural experts tell us we could have all the food we wanted or required. Yet in practice we know that the consumption of food has not increased at the same rate as production ; that in fact we are not so much better off in relation to food as we believe we ought to be ; that the solution to the age-long problem of sufficient food has been solved and yet abandoned. What, then, has happened to the economic supply of our food-stuffs ? There has been a hold-up somewhere—a hold-up with three main features : the restriction in distribution of food-stuffs, the limitation of their production, and, finally, the actual destruction of stocks already accumulated.

The Restriction and Limitation of Supplies.

We do not propose to deal in any detail with the various restrictions in trade over the last few years. Exchange control, tariff regulations, import and export boards, producing and distributing schemes, have all played their part in restricting the exchange and consumption of food-stuffs as well as the other commodities.

Wheat. We will, however, quote from the Food Research Institute of Stanford University, California, on the salient features of the season ended July 31st, 1934 : " To observers concerned with the improvements in the world wheat situation the crop year 1933-34 was one of disappointed hopes and expectations. Early indications pointed towards a world wheat crop ex-Russia small enough to assure a substantial reduction of the world wheat surplus, and to foreshadow a rise in wheat prices, with an accompanying measure of relief to wheat producers and to Governments deeply engaged in assisting producers.

" Week by week as the season progressed, however, the crop forecasts and estimates made larger and larger world totals ; and appraisals standing in December 1934 were some 300 million bushels—nearly 10 per cent—above forecasts current in August and September 1933. World wheat prices, low when the crop year opened, tended to fall rather than to rise in the early months. Even with an advance in the spring and early summer of 1934, associated with unfavourable development of the 1934 crop, the average crop-year price of wheat (gold basis) on free import markets fell to a new level—an occurrence avoided, however, in several countries where national currencies were sufficiently depreciated, or where protective devices provided sufficient shelter.

" Government price fixing, direct and indirect

subsidisation of wheat exports, and barriers to wheat imports were more widely in evidence than ever before. Year-end stocks were brought to a new high level when the year closed. The first attempt at governmental co-operation in international wheat control was unsuccessful in its major objectives. Wheat adjustment in the United States, domestically a qualified success, had little or no favourable influence on the current international position. The volume of international trade in wheat flour plumbed new post-war depths (though this was early anticipated), and ruled at the level characteristic in the first decade of the twentieth century. According to the International Institute of Agriculture, the world's exportable surplus since 1927 to 1934 has been, in millions of bushels: 1,078—1,128—1,444—1,129—1,390—1,395—1,325—1,200; 1935, estimated, 1,010."

Fish. Turning to a domestic industry, we find that the British landings and trade in wet fish has fallen from 13,756,000 cwts. in 1932 to 13,663,000 cwts. in 1933, and to 13,575,000 cwts. in 1934. The *Economist Annual Commercial History and Review* of 1934 states: "The effects of the Sea Fishing Industry Act of 1933, which provided for the closing of certain northern fisheries during the summer months and for the determination of minimum sizes for net meshes, can now be partially assessed as the Act has been in operation during a full

season. It is no doubt partly responsible for the increase in the average price of fish from 16s. 4½d. per cwt. in 1933 to 16s. 7¾d. in 1934 in England and Wales, and from 13s. 6d. to 14s. 3¼d. per cwt. in Scotland. But the Act has led to a definite shortage of rough fish in some districts. The Fish Merchants' Association in Hull, for example, is quoted in the *Fish Trades Gazette* as saying that "the prohibition of these landings during the months of June, July, August, and September has been greatly to the disadvantage of those merchants who supply fish friers, and these are the members of the trade who absorb the greater part of the supplies."

This shortage of fish in country districts has become so acute that the National Federation of Women's Institutes include co-operative buying of herrings and other fish in their "Suggestions for Work on Right Feeding in County Federations." They point out that in some districts it is impossible to obtain fish, and have arranged with fish wholesalers in Lowestoft and Hull and in Scotland to supply local Women's Institutes who wish to buy fish co-operatively. It is too early yet to see what results this arrangement is going to produce, cutting as it does right across the recent restrictive policy of the industry.

We give the following quotations and figures of the extent of the limitation of production and destruction of food by way of contrast to the figures given of possible productivity.

The *Economist*, on December 30th, 1933, published the following figures of expenditure allocated under the American Agricultural Adjustment Administration for restrictive schemes : i.e. money to be spent in reducing supplies of foods.

33 million dollars to be spent on emergency pig sow slaughter and restriction.

350 million dollars on corn and hay production control.

120 million dollars on wheat acreage reduction.

In Denmark, in November 1933, the Government established a special destruction fund to slaughter, and burn in incinerators, 5,000 cattle per week.

The *News Chronicle*, October 17th, 1933, reports : " It is a tragic irony that men and women in New York should be suffering the tortures of hunger while tens of thousands of pigs in farrow are being slaughtered in Iowa by the command of the Government, and farmers in Kansas and Nebraska are burning their grain."

" Brussels sprouts, according to a Warwickshire grower, are being left to rot in the fields because the wholesale prices are too low to pay the cost of packing and carriage to market." *Daily Herald*, December 6th, 1933.

" Sheep breeders in the San Juan area have slaughtered and burned the carcasses of 60,000 sheep because they can find no market for them." *Sunday Express*, February 19th, 1933 .

"The Chilean authorities are to slaughter 500,000 sheep simply for the tallow, the remainder of the carcasses will be burned. This step results partly from the effects of the Ottawa restrictions on the Chilean cattle and sheep trade." *News Chronicle*, April 23rd, 1934.

"Thousands of cases of Spanish oranges are being dumped in the sea because of the crushing tariff duties which have been imposed, making it impossible for brokers to handle the fruit. In Liverpool alone, during the past three weeks, many hundreds of tons, representing thousands of cases and enough fruit to keep a township supplied for weeks, have been dumped in the Mersey. Onions and other produce are also being destroyed and abandoned through the high duties." *Daily Herald*, June 27th, 1933.

Here is a commentary, on the supply of medicines, in the *Daily Herald*, January 1st, 1933—"While 2,000,000 people are dying every year from malaria, supplies of quinine, the most valuable medicine for the prevention and cure of the disease, are being deliberately and drastically curtailed to keep up the price. 'The world needs at least 1,400 tons of quinine a year, but gets 600 tons,' says a special report issued by the Health Organisation of the League of Nations. . . . The growers have greatly improved on the old methods of obtaining the bark of the cinchona tree, from which quinine is extracted, and the trees have been improved by careful cultivation. If the

growers liked, all the world's needs could be supplied in a few years and the death roll from malaria at least halved."

Food and the Ministry of Health. Such is the picture : a world in which food and medicine abound, but in which the supply is restricted to the detriment of health. We have seen that the Chief Scientific Adviser to the Ministry of Agriculture recognises the implications of scientific progress, and, in view of the paramount importance of diet and food for health, would suppose that the Chief Medical Officer would have something to say about the supply of food. We recall the Chadwick Lecture by Sir John Orr, to which we have already referred. Sir John, in his introduction, says : " This [the national food supply] is in some respects the most important political and social question of the present day." Truly, he says, " Food-stuffs cannot in all respects be classed in the same category as other commodities. A regular daily supply of food is necessary for the continued life of the community. . . . The maintenance of the food supply is one of the most important duties of a Government. . . . The public health aspect of our food supply is one of the most important duties of a Government. . . . The public health aspect of our food supply is as important as the economic aspect." Let us now turn to the chapter in the 1934 Report on the " Relation of Food to Health and Disease."

Speaking of the "insistence" by the Ministry of Health on the "fundamental factor [of food] in personal and public health," Sir George Newman considered "two principal means are available; first, the education of the community in the choice of suitable food, and, second, the safeguarding of foods from deficiency in composition, from adulteration, and from contamination." We are concerned for the moment with this second means, about which alone the Ministry shows any concern in this section.

The Principle of Safeguarding. There is no doubt that precautions are being taken by the Health Service to ensure a pure milk supply free from tubercle. Yet, according to Dr. Harris, in his lecture to the Royal Institution, in February 1934, "something like 7 per cent of the raw milk sold at market in Great Britain at present is infected with tubercle. Over 2,000 cases of tuberculosis in human beings occur each year, caused by such infected milk. The only final remedy would be to kill all infected cows and keep the herd free from infection in the future. But this would involve great expense and organisation, and political difficulties intervene. . . . Those who can afford it should buy certified or Grade A milk, which has little or no risk of carrying infection, as it is definitely tested against tuberculosis. But the cost is the obstacle. Prices in London, February 1934, were :

Certified milk	. 7d. per pint.
Grade A milk	. 4½d. per pint.
Ordinary milk	. 3½d. per pint."

Here we have a criticism of the milk supply deeper than any with which Sir George Newman deals. From his discussion of the Milk Orders, it would appear that the problem of pure milk was solely one of testing and granting licences. There is more in it than that. There is the whole economic structure of the milk market, with the incentive of profit and not purity as a primary consideration.

The Report also mentions "Dubious Food Practices." As examples of these, Sir George gives the dying of canned peas. "It would seem that the dying of canned peas in this country is now universally practised, so that it is difficult, if not impracticable, for a consumer to obtain undyed English canned peas. . . . It could reasonably be maintained that the consumer in this country is entitled to know whether or not the canned peas which he purchases are dyed, and that this information should be conveyed by means of a declaration on the container." This certainly seems reasonable; perhaps it would be even more reasonable if the Ministry could take steps to enforce producers to discontinue the practice of dying, but perhaps this, again, is one of the things that would be expensive and involve political difficulties.

Again, not only are peas dyed, but they are also

“processed.” “These are prepared not from fresh peas, but from dried peas, which are soaked for several hours, to soften them, and are then dyed green and canned in the same way as fresh green peas, which they come to simulate. There is little doubt that many persons who buy these ‘processed’ dried peas think that they are getting canned fresh peas, and an adequate declaration of their nature seems called for in the interests of the consumer.”

In this criticism the Ministry is only touching the fringe of a vast problem—that of the commercialisation of the buying and selling of food-stuffs. Many years ago the British Medical Association did produce in this country a pamphlet on so-called patent drugs, and in the United States a good deal of work on the purity of food and the claims made by packet-producing companies is being done to-day. If the Ministry of Health is really concerned with the safeguarding of our food, have they nothing to say on the giving away of gifts or other inducements to buy certain foods? The coupon business extends to food-stuffs as well as other commodities, and it is undoubted that the cost of such propaganda must enter into the price of the product to its detriment. There is another aspect which we have not seen dealt with by the Ministry. We noticed, earlier, that research into wheat growing enables the producer to obtain heavier crops, and crops in areas which had previously been closed. But are we sure that this yield of wheat is as nourishing? We do

know that the nutritive value of products of cattle and poultry fed upon artificial food rather than grass and more natural food is less. Then, again, the fields are given artificial manure, and even the grass itself may be less nutritious. Dr. McCarrison, in India, has shown that land receiving "natural" rather than "artificial" manures yields corn of higher nutritive value and contains more vitamin B.

Agricultural shows, in this country and elsewhere, stress size rather than food value. Large Brussels sprouts and cabbages, fruit of enormous size, densely packed leaves of lettuces, are all favoured at the expense of smaller varieties, which contain an equal amount of vitamins and minerals in less bulk.

For many years gooseberry growing was practised almost to fanaticism in parts of Lancashire and Yorkshire. Every village inn had its annual show, and always the criterion was size. So far has this desire for largeness gone that in reaction a well-known seed grower now publishes a special catalogue for epicures, saying, in his introduction, "Too long have vegetables been chosen for such majestic contours as would assure a prize at the vegetable show. These, like the racehorse, are a class apart, admirable for their purpose." We question the purpose, but the fact remains that in intensive market gardening there are dangers of which a safeguarding Ministry ought to take notice. Dairy farming is subject to the same disadvantages. By selective breeding, hens are made to produce a much larger

quantity of eggs, and cows and pigs and sheep to produce a bulk of fat unknown before. Unless this is borne in mind, we may see a gradual deterioration in the quality of our food-stuffs, and, in consequence, of our health.

The Bulk Supply. We see, therefore, that the aim of the Report and the Health Service, to ensure that the food available is good and wholesome, in practice leads to very little. We feel that such are the limitations that they are unable to deal with anything more than a certain amount of patchwork regulation. This to-day is hopelessly inadequate. Not only is there almost complete failure to tackle the problem in their own conception of it, but there is no recognition that there is a duty to see that there is an adequate supply of food. Has the Medical Service no comment to make on the restriction of imports of food, the raising of the prices of staple food-stuffs, the actual destruction of supplies? These factors are part of the fundamental background of the public health of this country, and the Ministry responsible for the state of public health has yet, in dealing with nutrition, to give an indication of its concern with the essential problems of the bulk supply of food.

CHAPTER V

THE EVIDENCE OF ILL HEALTH AND MALNUTRITION

SO FAR IN THIS BOOK we have been concerned with the more theoretical aspects of public health. We have examined the questions of standards of health, have enumerated the knowledge which we possess of the intimate relation of food and health, and discussed the position of the supply of our food. With the conclusions of these sections in mind, we will, in the ensuing chapters, attempt to give a picture of the state of health prevalent in this country to-day. We shall analyse conditions, to discover remedies, and, if the remedies are not availed of, we shall enquire the reason. We shall not be content to take general statistics, but shall look into the way these have been compiled, to see if there are any factors masked in the general figures.

At the outset we wish to make it clear that we are not concerned solely with the results of the present industrial depression. This has accentuated many features of working-class health that were present even before 1926. If we lose sight of this, it

would appear that if and when the industrial depression is relieved so will the health improve. This is to some extent true, but it is only partially true. The unemployed are in a position which is shared by many low-paid workers. The problems of health will not be solved by a boom in trade alone.

Before we continue we shall give a few short extracts of the kind that are found in reports which expose the condition of ill health prevalent in the country.

Of the children, the *Bermondsey Review of Time and Talents Settlement*, September 1934, states :

“ In June we were faced with a very serious report on the children in one of our Care Committee schools. As a result of a special inspection by County Hall, the doctor stated : ‘ I have received a most painful impression of the high percentage of anæmic types. . . . The type of defect seen at the school suggests a lack of vitamin provision. . . . Anæmia and rheumatism and general debility are increasingly prevalent. The fact is that, although employment is slowly improving, the results of these last five or six years are becoming increasingly apparent. A general low level of nutrition and living conditions are helping to produce a generation of poor physique, and with insufficient stamina to meet extra strain or demand of any kind. ”

Of the mothers, the County Medical Officer in Middlesex says, in his Report for 1933 : “ With regard to the sharp rise in maternal mortality from

3·85 per 1,000 in 1932 to 4·77 in 1933, affecting both the county of Middlesex and the country at large, two additional factors may have contributed. . . . Widespread poverty, in consequence of national industrial depression, may prejudicially have affected the nutritional level of the female population, but in this connection it must be pointed out that Middlesex is in a more favourable position than the rest of the country.”

Of the unemployed, the Chester Medical Officer of Health's Report for 1933 says : “ The principal results of poverty, which are particularly concerned in leading to tuberculosis, are overcrowding and under-nourishment. The standard adopted was to regard a family as poor if it had an income of less than 10s. 6d. a head. . . . It is considered that the evidence warrants the statement that under-nourishment is a predisposing cause of tuberculosis. In certain large industrial areas of the country a considerable percentage (often 30 per cent) of the insured population is unemployed. A knowledge of Public Assistance scales of relief indicates that practically all households dependent on unemployment pay, transitional benefit, and Public Assistance fall below the standard used in the investigation quoted (10s. 6d. per head)—only too often lamentably so.”

Of the nutrition of children, the Cambridge S.M.O. Report for 1933 says : “ It is important to remember, in considering the question of malnutrition, that the problem is not entirely or even largely

a medical one ; it is mainly a social one. . . . Malnutrition does not show definite signs, even to the expert, until it has been exerting its influence for some time. It is most undesirable that children should remain untreated until they show signs of malnutrition, for by that time serious damage may have been done."

These reports give an indication of what we may expect. For purposes of convenience we have divided the field of enquiry into various groups of the population and special types of ill health. Of necessity such sections overlap, and must not be regarded as watertight compartments.

CHAPTER VI

THE CHILDREN

IN MANY WAYS school children are the best looked after section of the community. There are to-day school routine examinations, schemes for providing milk and food at low rates for all, and free in cases of proved necessity. If we compared photos of groups of school children of to-day with those of even twenty years ago, there is no doubt that there has been a marked improvement in health as reflected by the look of the children. After all, the care devoted to school children is care during one of the most critical periods of life. During school life, growth is most rapid, and bad nutrition does most lasting damage. This damage would not necessarily be directly reflected in statistical information. As Sir George Newman says, regarding unemployment, and under-nourishment in young children : " We must ascertain whether or not there is physical impairment or under-nourishment short of that which would affect the mortality rate and yet which might cause ill health and incapacity and undermine the stamina of the people. And first there are the children." Sir George then gives a number of reports from selected

districts, making it clear from the start that these are almost entirely based on the routine examinations of school children.

Routine Examination. The arrangements for the routine examination are quite simple. A child is examined three times during its school career : on entrance, at ages eight to nine, and on leaving (in the London County Council area, four times). The School Medical Officer visits a school some three times a year, and in addition is available for special examinations at any time. The mother of the child is notified of the impending examination, and usually accompanies the child. The examination is made by the S.M.O. at the school. Few schools have special rooms for the examination, in which case an ordinary school-room is prepared and curtained off (in Leyton only two schools out of nineteen have special rooms). In some districts a nurse takes the height and weight, before the doctor commences his examination, and records these on the medical card. On an average a doctor will see some twenty-five children between nine-thirty and twelve in the morning, and another twenty-five in the afternoon from two to four-thirty—that is, an average of six minutes per child. A report card is written of the examination : the usual tests being made of chest and heart, throat, eyes, nose, and general appearance. The eyesight and cleanliness are often tested by a nurse several days before the examination. Malnutrition is assessed by

general appearances, muscular tone, anæmia, etc. Many doctors say that they can often pick out the children of unemployed families by their less healthy appearance, the texture of the skin, and the difference in the appearance of veins. A child can be given a special examination, at the request of either a teacher or a parent, at any time during the school career, and these special examinations are made at the end of the routine examinations. All children who have been certified on their routine report card as requiring attention are given a special examination on the next visit of the doctor. If a child is sent to a clinic for examination, this is not written up on the report card.

At the moment we are concerned with malnutrition as the most serious causal factor of illness in children, and one for which the Ministry of Health gives figures in different districts. Malnutrition is both a causal and a resultant disease. It is not necessarily the result of too little food—more often, indeed, of a wrong balance, certain essential constituents being absent from the diet, and, in rarer cases, factors outside the food proper which affect assimilation and digestion. First of all we quote from the Report of the School Medical Officer for the City and County of the City of Chester, 1933. We refer to paragraph 5, on the findings of Medical Inspection for 1933 : “ (a) Malnutrition—the number of children treated was 17 compared with 3 in 1932. The number requiring to be kept under observation was

58 compared with 25 in 1932. This increase was in part due to a vigorous campaign to ascertain fully the extent of malnutrition amongst the school population. The teachers co-operated with the School Medical Officer, and at his request reported to him all children whom they suspected of being under-nourished. These were examined at the School Clinic, and 15 were considered to be suffering from malnutrition and 24 were noted for continued observation. The remainder were found in routine inspection. The figures for 1933 are therefore not truly comparable with previous years, for they constitute all cases of malnutrition in the schools, and not merely those found during the year's routine inspection or those brought on the parents' initiative."

Now Chester is not a city especially hit by unemployment ; conditions were in no way worsened. Yet, by the routine examination, two only were picked out as malnourished ; by the special drive, fifteen others were found. These figures would suggest that the routine inspection in which the Ministry of Health takes so much pride is completely inadequate as a method for finding out if children are suffering from malnutrition.

Again, the Gloucestershire S.M.O.'s Report, in 1933 (p. 8) : " In view of the suggestion that there were considerable numbers of children with defective nutrition owing to lack of sufficient food, a general survey was made of children in attendance at 188 schools. From the general observation of the school

medical inspectors during the past few years, about one quarter of the children examined were regarded as above the average, and about one in ten as being below the average. In the course of the special survey, all children came under review, the original selection being made by the head teachers in advance of the visit of the medical inspector, who then made his own selection ; 188 schools, with 20,942 children on the registers—about half of the total in the county—were visited. . . . It was reported that 546 children were unable, by reason of lack of food, to take full advantage of the education provided for them. The 546 children represent 2·6 per cent of those seen.”

According to tables on p. 25, at routine examinations no children were certified as requiring treatment for malnutrition ; 1,422 were required to be kept under observation. At the special examination, 64 required treatment, 122 to be kept under observation. We note that the malnutrition figure at this special examination of 26 per 1,000 compares with a figure of 11 per 1,000 for the whole country in Sir George Newman's Report.

Let us examine Sir George's local reports.

County of London. “ With regard to routine inspections, the number reported to be below average nutrition was 4·7 per cent, the lowest ever recorded in London ; but, as evidence of the great care lest any child should suffer, it may be mentioned that a larger proportion than in the previous year, namely,

1 per cent of the total inspected compared with 0.91 per cent, were marked for treatment." What does "average nutrition" mean? In the absence of definition such a term is valueless, especially when coupled with the evidence we have as to the inadequacy of the routine examination. Malnutrition itself is a term which it is difficult to define, not only in social enquiries, but also by the experts. We remember that at the meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine itself, the discussion on methods of assessment of nutrition showed how little the experts agreed among themselves, except in so far as they all recognised the difficulty of definition. Yet on the definition of "malnutrition" and "average nutrition" may depend the health, and, indeed, lives, of millions. The only contribution that to us seemed to help the matter forward was that of Dr. J. C. Spence. As reported in the *British Medical Journal*, February 2nd, 1935: "He would suggest that anyone faced with such problems required a threefold equipment. In the first place he should have some standards of the desirable and attainable level of health and physique for the age and sex of the person under examination. Were there standards of normal health available in England? There were certainly averages, but he was inclined to call them debased averages—debased because they never knew whether they could not, by taking thought, add a cubit to the stature.

Some better standards of anatomical development as revealed by X-ray examination were badly wanted. The second piece of equipment was a knowledge of clinical medicine which would enable the examiner to say that the fault, if he had discovered it to be there, was nutritional in origin, or due to some other pathological process, such as latent disease. The third item was a knowledge of dietetics—not a difficult subject, nor a subject which deserved a special diploma from any college, but nevertheless a subject the knowledge of which was not widely diffused.”

We cannot believe that this wide conception is used up and down the country when a routine examination is carried out. We will give comparative figures of nutrition and health later ; in the meantime we must point out the danger that in a uniformly poor area the *average* nutrition of children will gradually come to be used as the normal, and cases of malnourishment failing to show severe symptoms may be treated or not in reference to a standard itself subnormal.

When Dr. Magee, of the Ministry of Health, complained, at that same meeting, that a knowledge of the meaning of the word malnutrition appeared to be in inverse ratio to its occurrence, we would reply that it is the unsatisfactory use in official reports, and the conclusions drawn therefrom, that gives rise to so much misuse.

Sir George Newman concludes that “poor

nutrition appears on the whole to be an idiosyncrasy of certain children, the cause of which is at present uncertain." As a general conclusion this is nonsense, however true it may be in isolated cases. Our knowledge of nutrition and malnutrition is not so bad as that.

Height and Weight and Nutrition. Now the clinical syndrome, or picture of malnutrition, which is largely used in routine examination is not well defined. Marked cases can be readily picked out, but detection of the lesser degrees, so important from the preventative aspect, are liable to be overlooked during the short routine examination, as we have seen in the cases of Chester and Gloucester. Then, again, the personal factor plays a large part in clinical assessment. Different standards must be used by different observers. Inexplicable differences in rates in similar economic areas are probably due to this personal factor—as, for example, Bootle returning a malnutrition rate twelve times as high as Liverpool. It is almost impossible to follow a child's progress by using clinical methods alone. The children are only seen at infrequent intervals, and often different doctors will see a child at different routine examinations.

Nutritional indices. To get over all these difficulties much work has been devoted towards the possibility of "nutrition index" for measuring

normal development. Weight for age is an obvious first choice, and this has been combined with one or several factors to obtain indices to the same state of nutrition under different conditions and at different ages. Height or height cubed, chest circumference, and other measurements have been used, but nowadays the more complicated indices have been largely abandoned because of their difficulty in use. It has been found, however, that some simple index can greatly assist a doctor in supplementing a clinical test. There are four main uses of such a simple index :

(1) As a preliminary test. Children who are underweight could then be given a more detailed examination, and all serious cases could be kept under constant review.

(2) As a method for comparing conditions in different areas, and children living under different conditions in the same area.

(3) As a check of the varying standards of individual medical officers.

(4) As an indication of the progress of a particular child.

Zones of Weight. Dr. W. R. P. Emerson, in *The Diagnosis of Health*, gives the results of his investigation in America. First of all he has drawn up tables of optimum weights for different heights, and then worked out, on a clinical basis, four zones of weight.

- (1) Over 20 per cent above the average weight for height.
- (2) Optimal : Average weight to 20 per cent above.
- (3) Border-line : Average to 7 per cent below.
- (4) Danger : Weight more than 7 per cent under average.

His conclusions are : " The underweight suffer from lowered resistance with increased tendency to respiratory affections and tuberculosis. . . . In general the greater number of defects found, the greater percentage of underweight, the greater number of physical defects, the less gain in weight, and, conversely, the fewer defects the greater the gain."

Beckenham, Kent. Dr. Philips Cole has used these scales in a special investigation into the nutrition of elementary school children in Beckenham for 1932 and 1933. As a result of his figures, we can conclude that :

(a) The percentage of children in the danger zone shows a steady increase from the time of entrance to the time of leaving school.

(b) The percentage of defects is much greater in the underweight zone.

(c) There is a remarkable difference in the degree of serious underweight in the different schools.

(d) There was a steep rise in the numbers in the danger zone among the eight-year-olds in one school (Churchfields) during 1933.

The following table gives the percentages in 1933 in the danger zone :

	Infants		Intermediate		Leavers	
	Boys	Girls	Boys	Girls	Boys	Girls
Alexandra	5.9	12.0	3.4	18.8	21.5	—
Balgoun	7.7	11.4	—	—	28.2	50.0
Bromley Road	6.2	4.2	11.1	11.6	46.1	66.6
Churchfields	7.5	4.2	24.1	32.5	—	53.7
Marian Vian	25.0	27.0	47.9	72.0	56.0	64.0

The figures for Churchfields in 1932 were :

6.6 9.1 8.1 7.3 — 35.6

We quote Cole's conclusions from these figures :

“ The large proportion of children found to be definitely underweight in the infants and junior mixed departments of the Marian Vian schools was unexpected and rather surprising. The school is the newest school building in the district, and the area from which the children are drawn is open and comparatively free from overcrowding. . . . Most of these children come from the council's housing estate and the newly developed areas in Elmers End and Eden Park. This district has grown chiefly by immigration from the more densely populated parts of the Metropolitan area, and most of these families are purchasing their houses by the

system of deferred payments ; the sum they have to find each week to meet these payments is a disproportionately large part of their income, and it appears likely that the rent is found at the expense of nutrition. Even on the council's housing estate there are comparatively few houses available, for families with children, at a rent less than 15s. per week, which is frequently 25 per cent of the total income."

Dr. Cole's explanation of the increase in underweightage in intermediates at Churchfields schools was that it appeared that this increase could be associated with unemployment.

" Information from the Public Assistance Officer and the Unemployment Bureau shows that the area in Beckenham where there was most unemployment and outdoor relief during the last year was precisely the area in which this increase of malnutrition was evident. . . . These figures, and their correlation with the incidence of unemployment, are of special interest because this increase of malnutrition is not very clearly evident in the course of routine physical inspection in the schools ; in fact the number of children noted by clinical examination alone as being definitely under-nourished is no larger than the number in the previous year."

Dunstan's Scales. Dr. W. R. Dunstan has found that in his experience Emerson's scales of weight

for heights over fifty inches are high for elementary school children in this country. He takes a nutritional quotient by dividing the actual weight of the child by the difference between the actual weight and scale weights for height : " Values of Q from - 13 to - 10 represent an underweightage of 7-9 per cent below scale. These are the cases that in my view need periodic weighing. Children yielding a Q of 9 - or less in magnitude have a weightage that is 10 per cent or worse below scale, and should receive special investigation " (*Medical Officer*, March 3rd, 1934).

Dr. Dunstan gives the results of his scale from various districts where they have been used. The percentage of numbers of elementary school children who are classed into the subnormal range are: Lewes, 41 per cent ; Breconshire, 43 per cent ; a London suburb, 35 per cent ; two administrative counties, 48 per cent and 17 per cent.

When he examined various special schools, etc., he found that " out of 35 children in a Public-Assistance institution, in which there can hardly be any question of inherited robusticity, *not a single child* shows a scale-weight deficiency of as much as 7 per cent. These children, I know, are well cared for, and are given an ample diet."

At Larkhills Special School, where the diet is also ample, he found that 61 out of 65 children were above the scale average.

Dr. Dunstan's investigation into Lewes children is

especially interesting because of the result of improving the diet. In 1932 he found 97 children 10 per cent or more below his scale weight for height. As a result of improving the diets, and with added vitamins, in March 1934, 86 had come within the safety zone of less than 7 per cent deficiency, while 9 had a positive quotient. There can be no doubt of the relation between weightage and diet.

Breconshire. Dr. Betenson has used Dunstan's scale when investigating the nutrition of children in Breconshire (reported in his Annual Reports, S.M.O., 1932 and 1933). In 1933 Dr. Betenson made a comparison of "the children of the two district areas of Ystradgynlais, where unemployment has not been a very serious factor in regard to family income and its capacity to provide food of the right type, and of Brynmawr, where the very opposite condition of affairs has been in existence for many years. . . . In neither area were the children specially selected—they were in all cases those who came before me at medical inspection." The general results are given below :

	Brynmawr	Ystradgynlais
Children above normal weight for height	48·8	64·8
Children at normal weight for height	11·7	8·3
Children below normal weight for height	39·9	26·9

Of children in the danger zone (10 per cent or more deficiency), Brynmawr gives nearly twice as many as Ystradgynlais, and, for those in 7-10 per cent below scale weight for height, exactly twice as many.

London. In Poplar, in January 1933, local social workers reported an uneasiness about the nutrition of local children. The London County Council Medical Officer made a special examination of 25 school children belonging to 9 families. He reported that only 7 out of the 25 showed nutrition below average, and in no case greatly so. Nevertheless, Mr. Somerville Hastings made a comparison of the weights of 24 of these children which were given in the report, and, using the average weight for age among London elementary school children, he found 19 out of the 24 to be below that average. In conjunction with Dr. Ritchie, at about the same time, Mr. Hastings made an investigation into the nutrition of 53 children of school age of 21 unemployed families in Hammersmith (*Lancet*, March 20th, 1933). They found that of the 20 who showed no clinical signs of under-nourishment 13 were of average weight or over—7 below the average weight of London elementary school children. Of the 33 who showed clinical signs of under-nourishment 24 were below—9 of average weight or over.

Dr. Freeman, in Heston and Isleworth Borough (*Medical Officer*, August 18th, 1934, and August 25th, 1934), reports on the analysis of data obtained from

medical record cards of elementary school children. He used Quetelet's height-weight nutrition quotient (N.Q.) of $\frac{\text{height} \times 100}{\text{weight}}$. "It was found that the proportion of children with defects rose as the weight for height ratio decreased. The smallest percentage of defective children was found in the zone with a weight for height ratio of 5 per cent or more above normal, and the largest percentage of defective children in the zone with a weight for height ratio of 5 per cent or more below normal. The incidence of clinical subnormal nutrition and respiratory defects was found to diminish regularly as the value of the nutrition quotient rose. . . . In the case of the eight-year-olds, more than 50 per cent of the children with an N.Q. greater than 10 per cent below normal were of subnormal nutrition, the percentage gradually falling as the N.Q. rises until there is only one subnormal child out of 51 with an N.Q. more than 10 per cent above normal."

Standard of Height. In 1926, Dr. J. Kerr (*Fundamentals of School Health*) gave the following as average heights of groups of school boys aged thirteen years :

Dukes English public-school boys	151·4 cm.
Tuxford and Glegg (elementary schools)	142·5 "
London elementary schools	143·1 "
London secondary schools	148·7 "
Glasgow elementary schools (poorest)	138·5 "
Glasgow elementary schools (best class)	144·5 "

Whatever the disadvantage of scales, it must be clear that some scales, such as those used in the examples above, can be of great assistance in assessing nutrition. In some cases it would appear that a height-weight scale is better than clinical tests, but it must be remembered that it is not correct to call underweightage malnutrition. That there is a definite connection is obvious, but it is not proposed that a height-weight index should supersede the clinical test, but rather supplement it. Used in intelligent hands, it could do much to counteract those inconsistencies and defects of clinical methods *per se*. All investigators of this method insist that care must be taken not to take a depressed average as an optimum standard.

West Suffolk. As an example of an investigation combining clinical and height-weight tests, we give the results of that carried out by Dr. A. Michael Critchley, at the request of a sub-committee of the West Suffolk County Council, 1932. He used two criteria to assess a child as suffering from malnutrition.

. (1) There was clinical evidence of under-nourishment. Manifestations of faulty nutrition were : absence of fat ; under-development or flabbiness of the muscles ; faulty posture ; easy fatigability ; anæmia ; drawn haggard faces ; headaches ; lassitude, and general malaise.

(2) The nutritional index was at least 10 per cent below normal for age and sex ; the nutritional index being taken as 100 $\frac{\text{weight}}{\text{height}}$.

8,979 children were examined—30 per cent of the total number investigated came outside the second criterion, and were classed as not suffering from malnutrition ; 447, or 49·7 per thousand, were found to be ill nourished. Dr. Critchley classifies the causes as follows :

Cause	Alone	In Combination	Total
Heredity	1	8	9
Past illness	37	28	65
Present ill health	96	85	181
Faulty hygiene	41	106	147
Poverty	63	127	190
Faulty assimilation	35	—	35

On these figures, Dr. Critchley comments : “ Lack of means is unfortunately found to be the factor most commonly present in this enquiry. . . . The economic difficulties of the present day are no doubt reacting unfavourably on the rising generation. . . . Unemployment, especially among the agricultural labourers, who are not entitled to draw the dole, causes much distress. . . . If he is unemployed, there is no dole, only parish relief. Owing to the low rateable value of the rural area, there is but little money to spend on relief, so that the unfortunate labourer does not receive a generous allowance.” The birth rate in the area was high. Dr. Critchley found that

of those cases of malnourished children in which poverty was an important cause 47·4 per cent came from families in which there were seven or more children. In many such cases the income was under 3s. per head per week for all requirements—food, clothing, rent, etc. Mismanagement was given as a second cause of under-nourishment, and was frequently combined with poverty. Dr. Critchley says : “ It was found that the common dietary faults were lack of milk, animal protein, uncooked vegetables, and fruit, hence there was a vitamin, iron, and protein deficiency. To the town-dweller it may seem paradoxical that there should be a shortage of milk in the country, but it is so. Most of the milk is sent to the towns, so that in many cottages it was discovered that the only milk employed was obtained from a tin and used for colouring tea. . . . Meat was usually only a Sunday treat.” There is, in conclusion, a strong recommendation for the extension of school feeding, of which Dr. Critchley says : “ Valuable information is supplied by one of the head teachers, who, finding a large number of poorly nourished children in his school, started a scheme for the provision of a hot midday meal. This meal consists of meat, vegetables, and pudding, and is cooked on school-room fires by two girls, who are changed each day. When there is roast meat, the village baker cooks it free of charge. Some of the vegetables are grown in the school garden, and in future all will be. Thirty-four children have five

meals each week, for which they pay sixpence, and the loss on the whole school works out at about 1s. 8½d. per week. If one teacher on his own, without official encouragement, can organise an almost self-supporting scheme for feeding his children, it is not too much to suggest that, with the organised help of the county authorities, a widespread adoption of school meals would not incur any large expenditure."

We feel that such must be the experience of many county schools. The country children are no better fed than town children, and often, owing to the depressed nature of agriculture to-day, there is more widespread poverty, even if not so severe. Feeding on the lines recommended by Dr. Critchley would be invaluable in such conditions.

The Pre-School Child. As a result of the statement in the Annual Report of the Newcastle Dispensary for 1931—that "the Committee was gravely concerned about the great increase in poverty, sickness and malnutrition amongst the poorest classes in the city"—the Newcastle City Council caused an enquiry to be instigated into the physical condition of children between the ages of one and five years in relation to their environment and social circumstances.

Dr. J. C. Spence was asked by the Medical Officer of Health, Dr. J. A. Charles, and the Health

Committee to undertake this enquiry. The reason for selecting the child of pre-school age was given by Dr. Charles : " Malnutrition or its facsimile is still present in varying degree amongst the womenfolk and certain of the younger children of the unemployed—but tends to leave untouched the children of school age and the infants in arms . . . evidently, when a search is to be made for the signs and physical indication of malnutrition, such an investigation should be particularly directed to that section of the city's population which, being susceptible by reason of the tenderness of its years, is, nevertheless, under ordinary circumstances less liable to be subject to the routine of medical supervision."

Dr. Spence took three groups of poorer-class children : 51 from maternity and child welfare clinics, 54 from a Salvation Army Sunday-school, and 20 from a dispensary. In 103 cases out of the 125, the main bread-winner was unemployed. A control group was taken of 125 children from well-to-do commercial classes. Dr. Spence considered that, although the number of children was small, they could be regarded as a fair sample of the classes using clinics and similar institutions, and that an investigation by him alone as examiner would be more valuable than an analysis of records made by various independent observers.

Dr. Spence took as his points of examination the following :

- (1) General condition, judged from the appearance, the activity, subcutaneous covering, the amount and tone of muscle, the stance of the child.
- (2) Height and weight measurements.
- (3) The presence of anæmia.
- (4) The presence of rickets from both clinical and X-ray examinations.
- (5) The development of the teeth.
- (6) The presence of active diseases, enlarged glands, enlarged spleen, ear or lung infection.

Height and Weight measurements. Dr. Spence drew up zones of heights and weights for each age. He considers these zones to be of a normal, if very modest, standard. From the charts given, it can be seen that of the control group 25 per cent of the commercial-class children are above and only 5 per cent below the normal zones of height, while the rest fall within the standards. Of the poorer-class children, 2 per cent are above and 47 per cent below. The figures for weights are : the commercial class 48 per cent above, 11 per cent below ; of the poorer class, 11 per cent above, 55 per cent below.

Rickets. Dr. Spence found no cases of active rickets among the better-class children. In the 103 poorer-class children examined, 5 had active rickets, while others showed signs of minor rickets.

Anæmia. The standard used for satisfactory blood level was hæmoglobin 75 per cent, while anæmia was considered to be present when the hæmoglobin was below 65 per cent. Judged on these low standards, 19·8 per cent of the poorer-class children had satisfactory blood level, 23·1 per cent were anæmic, while the other 42·9 per cent were normal ; while the better-class children showed much more satisfactory readings.

Dr. Spence's general conclusions were :

“ (1) That at least 36 per cent of the children from the poor districts of the city which I have examined were unhealthy or physically unfit, and, as a result of this, they appeared malnourished.

“ (2) That since this high incidence of apparent malnutrition is not found in children of better-class families, it is due to preventable causes.

“ (3) In my opinion the main immediate cause of the apparent malnutrition of the city children is the physical damage done by infective diseases occurring in young children at susceptible ages, and under conditions which prevent satisfactory recovery.

“ (4) The main factors which promote and perpetuate this physical damage are probably :

“ (a) The housing conditions, which permit infections of young children at susceptible ages.

“ (b) Improper and inadequate diet, which prevent satisfactory recovery from their illnesses.”

The illnesses suffered by the two groups revealed a significant difference. In the poor class, 49 of the 125 children had suffered from pneumonia or pleurisy or chronic cough, while only 5 out of the 125 of the professional class had suffered from these diseases. Six of the better-class children had had measles, 46 of the poorer class. Dr. Spence remarks : “ It will be seen how high is the incidence of infective diseases amongst the city children in their earliest years. . . . The damage that is done by these illnesses occurring at susceptible ages, and under conditions which prevent satisfactory recovery, accounts for much of the poor physique and ill health in later years.” Out of the 45 children who were unhealthy or unfit, Dr. Spence considered that in 20 cases this was due to preceding illness, while in the other 25 cases the cause was improper or inadequate diet.

In giving the results of this investigation in his Annual Report, Sir George Newman makes great play with the fact that some of the children were in fact sick children. He says : “ While the children examined by Dr. Spence were of the poorest group in a severely depressed area . . . we have here a collection of sick, as well as malnourished, children.” Now Newcastle is no more depressed than a number of other areas, and the fact that the children were

sick in no way narrows the significance of the enquiry. The children were sick largely because of their poor condition, not in poor condition because of their sickness. It is true that the after effect of infectious disease plays an important part in causing malnutrition, but it is equally true that underlying malnutrition accounts to a large degree for the high incidence of infectious disease among poor children. In the section on infant mortality we see that the respiratory diseases occur much more often in anæmic babies.

Dr. Charles supplemented the conclusion with the results of an enquiry into the expenditure in fifteen houses where the income came for the most part from Unemployment or Public Assistance sources. It was established that the average amount of money spent weekly on food was 4*s.* 8*d.* per man. This compares with the B.M.A. scale, which, corrected for Newcastle prices, would have been 5*s.* 7½*d.*

Dr. Charles says : " Even if we allow for the all too frequent self-sacrifice of the mother of the family, and take into consideration the auxiliary sources of food available for the children—the welfare centres, and the school kitchens of the Education Committee—it is still certain that, in many of our poorer homes, child and adult alike have an inadequate dietary."

The conclusions are of great importance in showing what a careful enquiry will reveal. We can only agree with Dr. Charles that there is " an urgent need for more frequent surveys of this type." Such surveys

would give, in our opinion, equally startling results, and the evidence collected would call for some immediate administrative action to give attention to the relatively neglected section of our children—those of pre-school age.

CHAPTER VII

THE CHILDREN (*continued*)

RICKETS A DEFICIENCY DISEASE

SOME YEARS AGO it had become fashionable to regard rickets as a disease which was no longer a menace to the health of the population—at least in the south of England. It was recognised that rickets still was present in the industrial north, due, presumably, to lack of sunshine, but, in the absence of severe deformities, it was regarded without grave concern. Two factors have now contributed to disturb that satisfaction. Firstly, the greater knowledge of vitamins, and the deficiency diseases due to a lack of them, has shown that a defective diet is at least as important a cause of rickets as absence of sunlight, and that the evil effects of the latter may be largely obviated by giving certain foods. Secondly, and in part due to the increased knowledge of rickets as a clinical entity, modern radiographic examination has shown the extensive prevalence of a minor degree of rickets, or, as it is sometimes called, the “Newer” rickets, to distinguish it from the “Older” rickets, which was always accompanied by severe deformity.

Rickets is a disease of nutrition. Its occurrence is

chiefly in early childhood, beginning, usually, between the sixth and ninth month. Owing to the absence of sufficient vitamin D, deposition of lime salts fails and the bones do not develop properly. As a result of severe deficiency, the bones become soft, and are easily bent under the weight of the body, so giving rise to obvious deformity. Although rickets mainly affects the growth and structure of the bone, it also affects the general health of the subject, who often develops a tendency to nasal, bronchial, and intestinal catarrh.

Calcium and phosphorus require for their absorption into the blood the presence of a catalytic agent which has been given the name vitamin D. Without vitamin D the blood is unable to perform its normal function, and is unable to absorb sufficient calcium and phosphorus to ensure that the bones get enough of these materials for their proper growth and development. There may be enough calcium and phosphorus in the diet, but the body cannot use them without vitamin D, which is absolutely necessary to enable the blood to use these substances in the proper way.

Vitamin D is found in liver and kidney, in eggs, milk, and butter (to a degree varying with the season of the year), and particularly in cod-liver oil and halibut-liver oil. Artificially it can be made by treating a substance called ergosterol with ultra-violet light.

Ultra-violet light, whether that of the sun's rays

or from a special lamp, will prevent or cure rickets. It is certain that the anti-rachitic value of eggs, milk, and butter is greater when these are produced during a sunny season. Vitamin D appears to be a substance which, in a way, stores up the beneficial effects of ultra-violet light.

The Prevalence of Rickets. The Report on the Health of the School Child, 1928, points out that "radiographic examination, however, shows slight deviations from normal in respect of calcification of the epiphyses in a much larger proportion of infants than shows recognisable signs of the disease, this proportion having been put as high as 90 per cent of infants who are otherwise apparently in normal health."

In an examination, recently carried out, of the youngest group of children attending elementary schools under the London County Council, 1,635 unselected five-year-old children revealed the presence of one or more of various abnormalities (parietal and frontal bossing, enlarged radial epiphyses, knock-knee, bow legs, bowing of tibia, beaded ribs, spinal curvature, and misshapen chest walls) in 1,433 (87 per cent). The most prevalent signs were knock-knee, occurring in 1,035 (63 per cent), and parietal bossing in 952 (58 per cent).

Dr. Spence, in his Newcastle investigation, found 44 children with some degree of rickets, without any difficulty. In the same series of investigations, he

found five cases of active rickets out of 103 poor-class children examined, but none among a better-class group with whom he was making a comparative test.

In a statistical survey of the occurrence of rickets in Sydney, New South Wales, Dr. Maddox found that 52 per cent of the 218 children examined had active or healed rickets, and that the diet was deficient in vitamin D. A. F. Hess, from whose investigations much of our present knowledge is derived, considers that rickets is a very prevalent condition in America and in Europe (*Rickets including Osteomalacia and Tetany*, 1930). Dr. Carstens has shown that in northern climates, and especially in industrialised countries like our own, rickets is bound to be widespread by reason of lack of sunlight, unless this deficiency is made good by an adequate supply of vitamin D in the food.

Let us state clearly that it is not a case of mortality statistics. The rôle of rickets is more insidious because less obvious than that. The indirect results of the presence of minor rickets can be traced in many deaths in infancy from convulsions and pneumonia, which, but for the aggravating influence of rickets, would not have proved fatal. We mention here, and have dealt with more fully elsewhere, maternal mortality as a legacy from deformity due to rickets as a child. Respiratory infection results in many infant deaths, and rickets is a predisposing factor.

The Causes of Rickets. Rickets has been recognised and described ever since the first century A.D. It was realised that it was associated mainly with the development of the big industrial towns in northern climates, but only recently the work of Mellanby, Huldschinsky, and Hess has shown that the real connection is not with sunlight, as such, but rather with ultra-violet rays. In general, it is true to say that a map of the occurrence of rickets will coincide with a map of sunlight deficiency determined, not by the number of hours, but by the quality and intensity. Thus the daily sunshine period in New York during the winter when rickets is active is about the same as in London during summer when rickets is either being healed or has healed.

The puzzle of why rickets developed in industrial towns is now solved by the recognition that it is the ultra-violet rays which matter where rickets is concerned. Dust and smoke in the air absorb ultra-violet radiation, and reduce the quantity received by a living creature on the ground. High walls and sky-scrapers reduce sky- and sunshine. It is therefore apparent that the rapid urbanisation of a country by its housing congestion and smoke pall has facilitated the development of rickets by the great reduction in ultra-violet radiation reaching the inhabitants.

Vitamin D can, however, be supplied in the food. Unfortunately the amount contained in the dietaries of children is not sufficient to compensate for the deficiency of ultra-violet rays likely to be experienced

in industrial areas. Cow's milk contains too little vitamin D, and even butter, in the amounts customarily used, is unsatisfactory. Vegetable oils, except possibly coco-nut oil and animal tissue fats, contain little or no vitamin D. Egg yolk possesses value against rickets, but, as we have previously said, this is variable, depending upon the feeding and condition of the hen. Even breast milk, which is undoubtedly one of the best preventatives of rickets, may be deficient. It is absolutely essential that a mother, in addition to having sufficient food in general, should also have adequate supplies of vitamin D herself. Even a good diet containing what would appear to be sufficient food may be deficient in vitamin D, and thus its value in preventing rickets be annulled. A diet to avoid rickets and build up the bones must contain sufficient calcium, phosphorus, and vitamin D. During infancy, milk is sufficiently rich in these substances to supply nearly all that is required, so that a lack of minerals is not likely to be a factor in the production of infantile rickets. If, however, during childhood, milk is not given in sufficient quantity, as this is often practically the only source of lime, the calcium deficiency may be of considerable importance in causing rickets. Milk must be given freely to children, as it is the best source of calcium and phosphorus, and of vitamin D itself.

The Rickety Child. The child who has suffered from rickets is at a disadvantage all its life compared

with one which has been free from the disease. Dr. Mackay has compared 46 children, of six to ten years of age, who had had rickets in infancy or early childhood, with 40 non-rickety children of the same age. She found that the rickety group had an average height and weight of 2·5 inches and over half a pound less than the other group, while one in four still had deformities of the long bones, and one in five chest deformities. The bones most affected by deformities are the pelvis and lower limbs, since these are the limbs which are continually subjected to the strain of bearing the weight of the body. Minor deformities in other parts of the body may tend to disappear, but the chances of disappearance are less the longer the rickets remain active.

The Treatment and Prevention of Rickets. It should be clear by now that the toll of suffering taken by rickets is far larger than is popularly supposed. Even many public health services seem to ignore the danger to health which can result from minor rickets, and Sir George Newman's Annual Report scarcely mentions rickets. Rickets would never arise if the diet was plentiful and rich in anti-rachitic foods, i.e. those containing vitamin D. That is not to say that there are no problems remaining to be solved, but that sufficient is known to enable us to eradicate rickets. Measures to prevent rickets should be applied to all children—there is a danger for every child born in a climate such as ours

where there is a small amount of sunshine during a large part of the year.

Again, expectant and nursing mothers should be given vitamin D in sufficient quantities to ensure that they shall not be in danger of contracting rickets. Food alone may be insufficient. In our climate, food contains insufficient vitamin D to be sure that rickets will not develop. Irradiated yeast, used in making bread, would be an anti-rachitic agent, but the danger could be that the increase in the price of such bread might lead to a lessening of consumption of other food-stuffs valuable in other ways. Irradiated milk would be better as a preventative of rickets, but probably not as a cure for already active rickets. In any case, at the very best, a pint of irradiated milk contains only as much vitamin D as 12 grams of cod-liver oil. The ease of giving milk is a point in its favour, and, provided that its preparation and standardisation were carefully controlled, irradiated milk might prove to be of great value in the public control of rickets, since an ample milk supply would also provide first-class proteins and minerals. The difficulty would be that milk, to be irradiated successfully, has to be done in the absence of air, and in thin layers. This difficulty could be overcome by feeding cows with irradiated dry yeast. However, the best method of supplying vitamin D is probably the dosing with cod-liver oil or halibut-liver oil—the latter having an anti-rachitic potency ten times

as great as the former ; the salient advantages are that it is cheap, is very easy to give, and is unlikely to lead to overdosage. It also contains vitamin A and iodine, the latter being of value, since there is often a shortage in an average diet. A dose of cod-liver oil of three teaspoonfuls daily will start to cure rickets within a few days. Sunlight as an anti-rachitic factor depends on two factors—the ultra-violet ray content of sunlight, and the amount of previously inert ergosterol in the body. Ergosterol is contained in the fat under the skin, and must be obtained from food. Skyshine as well as sunshine contains ultra-violet rays, although not in such quantity. To be efficient, a child should spend a large portion of the hours of daylight in the open. Open-air nurseries or schools will help in this direction. Artificial sun-ray treatment can be used, but this is only a palliative, and often detracts attention from the fundamental anti-rachitic factors—fresh air, sunshine, and good food. It must be pointed out that “ Vita ” glass, a special glass which is made to allow ultra-violet rays to pass, is only of limited value. Ultra-violet rays are absorbed by dust and smoke, so that the use of “ Vita ” glass in such an atmosphere has scarcely any beneficial action.

To sum up. Rickets is a disease due to faulty diets. Professor and Mrs. Plimmer, in their book, *Food, Health, Vitamins*, give the following figures : “ In an examination of L.C.C. schools Lawson Dick

found that 80 per cent of the children were rickety. In the London area the proportion of men rejected for the Army as physically unfit has been as high as 82 per cent since the war." They conclude : "The percentage of rejected corresponds with Lawson Dick's earlier estimate of the percentage of rickety children in London schools. General Sir Wilfred Beveridge stated that the chief cause of the men's rejection was malnutrition during childhood." We hold no brief for Army recruitment, but it seems to us an unnecessary tragedy that we should be producing C₃ individuals when the cause and cure of rickets are sufficiently well known to make prevention possible here and now.

DENTAL CARIES AND DIETARY DEFICIENCY

When a group of Iowa Indians visited England at the beginning of the nineteenth century their fine teeth were the object of universal admiration. If they were asked why they had such good teeth, they would reply that good teeth were the lot of all men, but that those of white men were destroyed by the passing over them of so many lies. This is to-day a funny story, and illustrates that a theory of causation of one age becomes the object of mirth to a more enlightened succeeding generation. To-day there is a popular theory of the cause of dental decay which will probably seem just as fantastic within quite a short while. We refer to the

notion that bad teeth and caries are due to food decomposition, and can be prevented by keeping teeth scrupulously clean and well brushed. To illustrate the use of this, we quote from a short article in the *Manchester Guardian*, March 30th, 1935, headed "School Health." It concerns about four thousand school children in a small Lancashire town. "Nearly half of the children required dental treatment, and many of their mothers and fathers, it was discovered, had had false teeth before they were twenty-one. 'Soft-diet' and excessive sweet eating are put down as the two main causes of bad teeth."

The story of the discovery of the true cause of dental decay is the usual one of careful laboratory work followed by experiment with various groups of children given extra rations. This was carried out by Mrs. May Mellanby in three stages. In the first stage it became clear, as a result of Professor Mellanby's work on rickets in dogs, that the structure of the teeth was similar to that of the bones, and that the same materials were necessary for both. When rickets was induced in a puppy by feeding it on a diet defective in vitamin D and calcium, not only did rickets appear, but the teeth suffered as well. They erupted later, were irregular, and were badly formed. The diets which prevented rickets (as, for instance, those containing cod-liver oil) also resulted in strong, well-formed teeth with a good enamel covering. A difficulty was encountered at

this stage. Although the teeth of puppies short of vitamin D are defective in calcification, yet they do not decay in the same way as human teeth. Dental caries had never been able to be induced in laboratory animals. Mrs. Mellanby suggested that vitamin deficiency would cause badly calcified and irregular teeth in man as in dog, but, in the absence of caries in the latter, to make the assertion that vitamin deficiency caused caries in man, it was necessary to link dental caries and bad calcification. The next stage was to show that dental caries in men occurs most often in teeth that are badly calcified. This was done by Mrs. Mellanby, by examining a very large number of human teeth of the first dentition. As anticipated, it was found that it was precisely those teeth with defective enamel in which cavities and caries were most often to be found.

It was then established that caries occurs most often in teeth without the protection of a good coat of enamel (bad calcification), and this, in its turn, is the result of a diet in which calcium and vitamin D are poor.

The third and final stage is the test on a large scale. This was conducted in an inverse way, not showing that shortage of vitamin D causes bad teeth, but that diets especially chosen for their rich content of vitamin D and calcium would prevent decay. As usual, charitable institutions were selected, three in Birmingham being amenable to the experiment.

Four groups of eighty children, each of varying ages, were all given what was considered an entirely satisfactory diet. Each group had in addition an extra daily dose of a certain food. The first group received treacle, the second olive oil, the third cod-liver oil, the fourth "radiostol" (commercial irradiated ergosterol, or vitamin D). In 1928, when the experiment began, all the groups had about 18 per cent of teeth which were defective. In 1930 it was found that the percentage of carious teeth had increased in all the children, but that in the groups given treacle and olive oil it had increased far more rapidly than in the groups given cod-liver oil and "radiostol." Even if vitamin D did not prevent caries, it retarded the usual rapid development. An interesting result of Professor Mellanby's other experiments on diets and caries has been the discovery that oatmeal contains phosphorus in a form which is unusable which partly nullifies the value of vitamin D. It is not, then, the external softness of oatmeal which causes decay, but the absence of phosphorus preventing vitamin D from its work in assisting calcification. It is fairly certain that a diet which contained adequate milk and vitamins would produce good teeth; at the lowest estimate, we know that, by giving cod-liver oil or some other vitamin D food, decay could be checked even if not prevented. We cannot say yet that we know completely the causation of dental caries, but we know enough to check it, and, what

is more important, we know that the theory of carbohydrate decomposition is no longer tenable. A prominent cause of caries is a food deficiency, and the measurement of dental decay will be a measurement of deficient diets. When we are told that there is little or no malnutrition in school children, in the same report that gives something like 50 per cent of the children suffering from dental decay, we know that there is a lack of appreciation of the causation of teeth troubles. We do not suggest that the figures of treatment for bad teeth should be taken as the figures for malnutrition, but we do want it to be realised that there is no warrant for satisfaction that children are adequately nourished when there is such direct evidence that they are suffering from a dietary deficiency.

We quote from various reports on the condition of teeth in school children and others :

“ The results of routine medical inspection of entrants for the last three years show a continued increase of dental defects—a strong indication of faulty diet in the toddler and pre-school years.” Cardiff S.M.O.’s Report, 1933.

“ The condition of the teeth of the children newly admitted to the school does not improve in any way, but tends rather in the other direction. . . . It is generally acknowledged that the dietary plays a very large part in the condition of the teeth.” Bedfordshire S.M.O., 1932.

The following table contains figures relating to

dental defects found in routine examination. They are not especially selected but taken almost at random from a large number of Reports of School Medical Officers of 1933.

DENTAL DEFECTS

Area	No. of children inspected	Requiring treatment	Actually treated
City of Leicester	27,447	15,160	8,719
Port Talbot	4,635	2,335	844
Newcastle under Lyme	5,638	3,388	2,343
Berkshire	18,534	14,049	6,109
Norfolk	31,093	19,849	9,986
Devon County	40,302	20,032	16,842
Norwich	9,206	7,528	5,181
South Shields	15,775	10,624	3,777
Essex	36,718	24,963	17,112
Durham	27,352	16,517	11,836

Durham S.M.O. states : " The subject of dental treatment has been dealt with at length for several years. There has been no addition to the service during the year. The numerical inadequacy of the staff and clinics requires no reiteration."

The seriousness of bad teeth is that it leads to such an amount of other trouble and illness. Decayed teeth are a very malignant " septic focus," and may lead to the poisoning of the whole of the body, and certainly to bad health. An immense sum of money is spent every year on remedying dental defects—money that can often ill be spared. It is our opinion that it would be worth while to make some attempt

to prevent bad teeth, and that this could be done on a very large scale by ensuring adequate diet during those years when the teeth are being formed.

INFANTILE MORTALITY

Sir George Newman tells us that "in 1933 the number of deaths of infants under one year of age was 36,960, or approximately 3,000 less than in 1932 and the smallest number ever recorded. This yields an infantile mortality rate of 64 per 1,000 live births."

Although this is satisfactory enough in its way, it is perhaps disturbing to know that the rate of decrease has lessened considerably over the last few years. The fall from well over a hundred in pre-war days to the present figure is due in a large measure to the decrease of epidemic diarrhoea. It is not perhaps popularly realised that this decrease, in its turn, is due to a great extent to the fact that there are fewer flies in the large cities with the reduction of horse traffic. A further result of this being that there is less dust in the air owing to the change to tarred roads for motor traffic. The report concludes: "It will be realised that with an infantile mortality rate at 64 per 1,000 no spectacular improvement can be expected," and then goes on to examine the quarterly incidence since 1870. More instructive, perhaps, would have been a survey of the figures for different districts. Sixty-four is the death rate for the whole country, including 12 county boroughs and districts

where the infantile mortality rate is 90 or more (four at 100 or more), as well as 12 with rates under 50. The following table gives the rates for various towns from 1928 to 1933 :

	1928	1929	1930	1931	1932	1933
Wigan	93	129	107	103	91	110
Liverpool	94	97	82	94	91	98
St. Helens	98	114	80	88	89	116
Bath	47	48	48	39	40	52
Brighton	50	54	51	54	41	47
Oxford	38	64	41	44	61	32

We fail to see why the Ministry of Health is satisfied with infantile mortality rates of over 100 in towns like St. Helens and Wigan. Cannot the influences which send up the figures be discovered and overcome? Or do we and the Ministry condemn 100 or more infants out of every thousand born to die annually in, let us say, Wigan, while only 50 die annually in Brighton? Differences also occur in different areas of the same town. In Middlesbrough, in the poorest wards, the infantile mortality rate in 1932 and 1933 was 101—that of the borough as a whole, 84 and 91. Even more striking are the figures published by the Medical Officer of Health for Birmingham for 1933. He divided Birmingham into three rings—the central wards, the middle ring, and the outer ring. These divisions roughly correspond with the social strata—the central wards comprise the poorest population living either in slum or in near-slum houses, the middle ring are somewhat

better off, and the outer definitely in a higher economic position. Here are the figures :

	Total infantile mortality rate	Under 4 weeks	4 weeks to 1 year
Central wards	81	29·7	50·3
Middle ring	66	32·8	33·2
Outer ring	59	31·4	27·6

From these figures it will be seen that a baby, during the first four weeks of its life, runs little or no more risk of death if living in the central wards than if living in the outer ring. The Medical Officer of Health states : " The higher rate in the central wards is not operative during the first month of life, and is probably associated with environmental factors, including overcrowding and with less efficient ' mothering,' as well as with nutritional difficulties associated with poverty." The infant mortality rate from bronchitis and pneumonia is : central wards, 23·2 ; middle ring, 11·2 ; outer ring, 12·8. Deaths from these causes occur mainly after the first month : i.e. 29 deaths up to 4 weeks ; 192 deaths from 4 weeks up to 1 year.

The fact that bronchitis and pneumonia are the diseases to which infants under one year old are most susceptible is well known. In St. Helens, in 1933, the infantile mortality rate from these diseases alone was 33, actually higher than the total infantile mortality rate of that year for Oxford. Why should infants in a poor area contract these diseases more readily than those in a better-class area ? The answer is probably

that the poor-class infants develop anæmia, and are thereby more liable to fall victims of the respiratory diseases. In the chapter on Maternal Mortality, we shall see the importance of diet in the case of expectant mothers. Now we see the result of the anæmia of the mother in the death of her infant. For the food of an infant, which is mainly milk, contains practically no iron, which is nevertheless essential as a blood-making material. After the child is weaned and put on a mixed diet, iron can be supplied in the food. But for the first six months of life the child has to live on the iron that is stored in its liver before birth, and this iron has to be obtained from the mother. Strauss and Castle (1933) discovered that an infant might be born with a normal amount of hæmoglobin even if the mother were anæmic. "It shortly became apparent, however, that after several months these infants born of anæmic mothers developed pallor. The results indicate that this anæmia of infancy is the result of maternal iron deficiency." So that if the mother is not getting a good supply of nourishing food the child is unable to store up sufficient in its liver to last it until the time comes when it can get iron from food. Anæmia in infants is much more common and serious than is generally realised. Dr. Mackay, in 1931, found anæmia in about 50 per cent of children in a poor district in London. In many cases it is sufficient, apparently, to double the mortality rate. Diarrhœa, vomiting, and bronchitis are all much more common

in children who are anæmic than in those who are not. We can now trace the connection between the high infantile mortality rate and the poverty of the mother. If only working-class expectant mothers were able to afford adequate diets, rich in iron and other blood-building substances, the incidence of anæmia could be greatly reduced. With this decrease, the incidence of diarrhœa, vomiting, and bronchitis would automatically fall. These are the diseases which are responsible for the high infantile mortality rate in certain areas. It is not true, as Sir George Newman stated, that a spectacular improvement is impossible. The rate is below 50 in many districts, and there is no medical reason why the high rates should not be reduced to this figure. Such a reduction could still lead to a spectacular drop in the general infantile mortality rate.

CHAPTER VIII

MATERNAL MORTALITY AND MORBIDITY

IN 1933, the maternal mortality rate was 4·51 per 1,000, the highest rate since 1911, when the present classification was introduced—that is, there were 2,618 deaths directly due to pregnancy and childbearing.

But the maternal mortality figure in no way covers the disablements due to pregnancy. It is a commonplace for women to expect either temporary or even permanent disability as the price of bearing a child. Yet surely the process of giving birth to a child, a supreme act on the part of a woman, is, or should be, a perfectly natural and healthy act, which should give rise to no disablement or impaired health other than the actual labour and recovery therefrom.

Much public attention has been concentrated on the maternal mortality ; the morbidity figures, where the health of the mother has suffered permanently as a result of pregnancy and confinement, are less easily available, but no less serious. According to the Final Report of the Departmental Committee on Maternal Mortality and Morbidity, the following

are typical examples of morbidity rates : Professor Blair Bell found, at the Royal Infirmary, Liverpool, that, during the six years 1925-31, of 2,275 consecutive women who had borne children, seen in the gynæcological department, 775 (34 per cent) were suffering from disablement due to pregnancy and labour. He pointed out that these represent only the more serious conditions for which women had come to the department for advice. In 1928-30, 7,734 women were treated at the Royal Samaritan Hospital for Women, Glasgow. Infection associated with childbirth was found to be a causal factor in the condition of 2,178 (28·1 per cent), and injury associated with childbirth in 2,730 (35·3 per cent). Dr. Miller, working at the Edinburgh Post-natal Clinic, found that 30 per cent of 2,000 women suffered from some disablement. The most common disabilities as a result of injury or infection during labour are discharge, prolapse, backache, chronic infection. Pregnancy often aggravates diseases already present—such as kidney and heart disease, and tuberculosis.

Now the problems of maternal mortality and morbidity fall roughly into two classes. In the first class there are the general fitness of the expectant mother—her physique, her health, and her nutrition. In the second, are her preparation for the actual pregnancy and confinement, and the skill with which she is attended during labour and delivered of her child. We suggest that those in the

first category are the more fundamental ; it is only when there is failing here that it is necessary to stress attention on the second.

Physique. First of all is the physique of the expectant mother first class ? As we have seen in the chapter on rickets, the answer in many cases will be "No." A woman who has suffered from rickets during childhood has thereby probably deformed the structure of the bones most important during pregnancy, such as the pelvis, adequate formation of which is essential to healthy childbirth. To illustrate this point, we quote again from the Final Report of the Departmental Committee, comparing English conditions with those in Scandinavia : "Diet, the importance of which as a factor in the prevention of septic infection has been recently emphasised by competent authorities, appears to be better balanced than in England and Wales, and includes a larger consumption of milk, especially during puberty and adolescence. Probably in consequence of these hygienic conditions there is a more natural pelvic development, less rickets, and a smaller incidence of contracted pelvis, circumstances which cannot but have a large influence upon the safety of child-bearing and childbirth " (p. 50).

Nutrition. The health and nutrition of an expectant mother are almost synonymous. We have already seen, in the chapter on Diet and Health, the

importance of nutrition on health in general, and during pregnancy adequate nutrition is exceptionally important. Not only has a pregnant woman to have enough food to stand the wear and tear of her own body, but she has also to provide all the material to build the body of her baby. If the mother is not taking enough building material in her food for both herself and the baby, then either both of them go short and suffer in health, or the baby may get enough and the mother go short. In both cases the dangers to baby and mother are increased, and health must suffer.

Anæmia. Dr. Davidson has seen that, among the unemployed families in Aberdeen, "anæmia is prevalent among nearly half the women of the poorest classes in Aberdeen, but is not common among men or school children." Diet appears to play an essential part in producing such anæmia. "That the anæmia is due to iron deficiency, and, further, that the diet cannot adequately supply the deficiency, is abundantly clear from the dramatic effects which are produced by the treatment of those individuals with large doses of iron without any alteration to the diet" (Davidson *et al.*, 1933). It is pertinent to ask why this iron deficiency should occur only among women and not among men, and a moment's thought brings one to the conclusion that one of the causes is the demand by the as yet unborn baby during pregnancy, and by the mother

during lactation. It has been established by experiment that the average daily intake of iron among these women was 11 mg. with a range as low as 6 mg. Although this may be adequate in normal times, during growth and pregnancy, times of extra demands, it is inadequate. Dr. Davidson concluded that at least 15 mg. per day is required at such times. The evidence is that not only in Aberdeen, but in many other areas as well, diets of working-class women are deficient in this quantity of iron. A similar story may be told of calcium and phosphorus. A new-born baby, on an average, will contain about 30 gr. of calcium and 19 gr. of phosphorus. Between the 28th and the 40th week of pregnancy, the foetus will require 25 gr. of calcium, and 15·16 gr. of phosphorus—that is, in these 12 weeks the mother must supply this quantity from her body. The normal adult intake is 0·7 gr. of calcium and 1 gr. of phosphorus daily. When a woman is breast-feeding her baby, she has to supply 1·3 gr. of calcium per pint of milk. Unless the food of the mother is adequate, the drain on these substances is more than she can manage. K. U. and C. Townsend tested 16 women at the end of pregnancy, and found all of them had a negative calcium balance, and 11 had a negative phosphorus balance. The balance was restored by feeding the women 1·6 gr. calcium and 1·8 gr. phosphorus daily, or by giving them vitamin D in egg yolk or cod-liver oil. Dr. Davidson concluded, from his work in Aberdeen,

that "if the percentage of anæmic women found in Aberdeen is present in the industrial areas of the south (and we believe that anæmia may be even more serious there, since economic conditions are worse and the cost of living higher), then the loss of economic efficiency of the working-class mothers in this country must be enormous. It is true that most of the women investigated complained of few, if any, symptoms of ill health, but this was due to the fact that they had become accustomed to living sub-normal lives for years, and had really forgotten the joy of good health. They invariably admitted that this was so, when, after efficient treatment, their blood had been restored to normal. . . . On the grounds of economic efficiency and of health, the prevention of anæmia in working-class women and infants has become a major problem, and one which demands immediate attention."

Beside these body- and blood-building factors, we know that an adequate supply of vitamins is essential for a pregnant woman. It is thought that certain neuritic pains and wasting of the muscles, which occur particularly in association with pregnancy, may be due to shortage of vitamin B. Again, it has been observed that obscure aches and pains and weakness in certain muscles, which are so often complained of by pregnant women who attend outpatient departments, occur mainly when the diet is poor in vitamin B. As we have seen earlier, vitamin B is found in yeast and yeast extract, egg yolk,

kidney, and whole wheat—all of which foods tend to be omitted from a working-class diet. Vitamin A deficiency is thought to impair resistance to infection. Sores and rashes are often found in mothers and babies who have been short of vitamin A in their diet.

Altogether we see that pregnancy imposes much extra strain and stress. We already know how important the vitamins and foods like milk are, and have seen that an inadequate consumption leads to a lowering of health. It is doubly important to see that a pregnant woman gets plenty of food to provide body- and blood-building materials for herself and her baby, and to be healthy enough to resist infection during her confinement, and to suffer no disability therefrom.

Maternity Services. Local authorities are empowered to assist maternity services by various Acts of Parliament, among which the chief are : Midwives Acts (1902, 1918, 1926), the Public Health Acts (1875–1925), the Notification of Births Acts (1907–1915), and, in many respects the most important of all, the Maternity and Child Welfare Acts (1918). We summarise the services they may provide under these and other relevant Acts :

(1) *Midwifery.*

Provision of midwives by salary or subsidy.

Provision of transport, telephone, and equipment.

Payment of midwives' fee in necessitous cases.

*Payment of doctors called to the assistance of midwives.

*Compensation of a midwife when suspended from practice on account of infection, not being herself in default.

Compensation of midwives for loss in cases sent to a maternity hospital from an antenatal clinic.

Provision of refresher courses of instruction.

Provision of midwives to act as maternity nurses.

Provision of home nursing for puerperal fever and discharging eyes.

Provision of home helps.

(2) *Institutional Provision.*

Provision of beds for cases of abnormal midwifery and abnormal antenatal conditions, and for patients where the domestic circumstances are unsuitable for delivery at home ; beds for unmarried mothers, for convalescent treatment, for cases of puerperal fever and discharging eyes ; beds, in association with clinics, for the restoration of breast-feeding.

(3) *Antenatal.*

Provision of antenatal clinics, antenatal examination, a general medical practitioner, health visiting, dental treatment, extra nourishment.

(4) *Post-natal.*

Provision of clinics for medical examination ; clinics for treatment of gynæcological conditions (where contraceptive advice may be given in certain cases) ; clinics for the promotion of breast-feeding, extra nourishment.

(5) *Consultant Services.*

Provision of consultants for abnormal antenatal conditions, for difficult labour, and for puerperal fever.

(6) *Other Services.*

Bacteriological examination ; X-ray examination.
Provision for midwifery outfits, clean linen, and of anti-streptococcic serum.

(7) *Health Instruction.*

Literature, exhibitions, lectures, films, etc.

It should be especially noted that only the two items marked with an asterisk are *statutory obligations* under the Midwives' Act, 1918, and the Maternity Homes Act, 1926, respectively ; all the other services are *permissive or adoptive* only—that is to say, that the only duties which a local authority is compelled by law to assume in connection with maternity service are those of paying the doctor and compensating the midwife.

How far do local authorities, in practice, make use of these powers ? The Maternal Mortality Committee made an analysis of the position in England and Wales from a study of the Reports of Medical Officers of Health for 1932. From this survey they found about 29 county councils out of 62, 44 county boroughs out of 185, and 22 metropolitan boroughs out of 29 were assisting the maternity services in their areas by availing themselves of half or more of the permissive services. Payment was being made for some services ; clinics, both antenatal and post-natal, health and educational visitors, and instructions were mostly free. For other services a charge was made according to the means of the patient. The scales of charges vary in different districts,

assessment being made by the relevant local authority, who has legal power to recover the money.

It is interesting to compare these services with the summary of the Departmental Committee on Maternal Mortality and Morbidity of what they consider to be the essential services :

(1) The provision in every case of the services of a qualified midwife to act either as midwife or maternity nurse.

(2) The provision of a doctor to carry out antenatal and post-natal examination in every case, and to attend during pregnancy, labour, and the puerperium, as may prove necessary, all cases showing any abnormalities.

(3) The provision of a consultant when desired by the doctor in attendance during pregnancy, labour, and the puerperium.

(4) The provision of hospital beds for such cases as need institutional care.

(5) The provision of certain ancillary services, transport, sterilised equipment, laboratory facilities, dental treatment, etc.

The Committee commented : " Such facilities cannot prove effective unless they are both used and correlated." We will examine the services provided in terms of these proposals and comments.

The Present Services. The Departmental Committee considered that the training of medical students in midwifery and diseases of women is insufficient. One of the difficulties is that there is a

shortage of cases for each student to conduct twenty cases of midwifery before graduating—due mainly to the lack of co-ordination between hospitals and the large number of nurses who take the C.M.B. certificate. In 1918 the Maternity and Child Welfare Act expressly excluded the provision of general domiciliary service by medical practitioners. As a result the general medical practitioner is almost excluded from the maternity services provided by local authorities. Again, the liaison between doctors and hospitals is inadequate, and this lack of co-ordination leads to a good deal of unnecessary duplication of records, and also to the absence of adequate reports when cases have been transferred to hospital.

Nursing is not always adequate. University College Hospital conducted an investigation into the effects of skilled or unskilled nursing, covering 1,696 cases. Out of 679 deliveries by medical students where skilled nursing was not provided as a routine service 5·2 per cent of the women developed notifiable puerperal pyrexia ; while in the case of 730 where skilled nursing was provided the figure was only 2·19. Similar figures were found for pupil midwives. Observation of 118 cases delivered before the institution of a sister to supervise their nursing showed 4·23 per cent of notifiable pyrexia ; while after the introduction of supervision there was 1·18 per cent out of 169 cases. Women, during a confinement, are so very liable to infection that skilled nursing is essential to avoid it. It is unfortunately

the practice of many women to be attended by a doctor and a "handy woman," and no midwife, on grounds of less expense. These "handy women" are untrained, and are a source of danger when they go beyond their duties of domestic work to do the nursing of mother and child. It should be possible to provide competent midwives in all cases to do the nursing, but this probably could only be done by legal prohibition of any person except a trained midwife doing the nursing, and wider powers for local authorities to provide this.

The position of the midwife in this country is unenviable. Her work is very hard, with very few holidays, low fees, and no pension. In the country a private midwife can rarely get enough cases even to pay her way. Unless she is a trained nurse, she has to have a year's training to obtain the C.M.B. certificate—for a nurse, the period is six months. The Joint Council of Midwifery recommended that a salaried midwives' service, with adequate pay, allowances, and pensions, should be established by every local authority. In this way alone could the training and status of midwives be improved.

The Departmental Committee criticised the practice of some hospitals in dealing with complicated and difficult cases. They recommended that an experienced senior surgeon should always be in charge, instead of an inexperienced house surgeon, as is often the case to-day. Hospital accommodation is inadequate in many areas. Sepsis should always be

treated in a separate block instead of in the gynæcological wards, but this separation is not effected in many hospitals.

Above all, the major criticism of existing maternity services is the lack of co-ordination between the several parts. Doctors, midwives, and local authorities are insufficiently linked up to create either an efficient service or an adequate public opinion about maternity matters. The Departmental Committee, in referring to this state of affairs, reported : " The Committee desire to see the completion of the schemes of maternity services already envisaged by Parliament and in a large degree available. A foundation has been laid, and what seems to be needed is the more adequate co-ordination of the several parts of the scheme designed for an improved and comprehensive domiciliary service. The Committee are of opinion that it will not be possible, even to secure the full value of the existing knowledge of the science and art of midwifery, until there is a unified service in which hospitals, clinics, specialists, general practitioners, midwives, and local authorities are all interdependent units, and that such co-ordination can only be brought about by the administrative local authorities appropriately organised by the Ministry of Health." What can be achieved by such organisation has been amply shown in the case of Rochdale. From 1921-31 the maternal death rate was 10 per 1,000. An intensive campaign was carried out from 1931 onwards by

the local authorities, with complete co-operation of doctors, midwives, antenatal clinics, hospitals, and the general public. In 1932-4 the rate had fallen to 3·9. In the report published in the *British Medical Journal*, February 16th, 1935, are the conclusions : " The experience of Rochdale provides an impressive and invaluable example of an area which by deliberate effort has achieved a reduction in its maternal death rate by a method that is capable of being applied with success in other centres. The success of this effort has arisen primarily from the circumstances that it has its origin in the public health department in the borough, which was in the position of being able in the first place to obtain the relative facts, and in the second case of supplying the administrative machinery required for the inception and the development of the changes called for in the maternity services. In addition the success may be traced to the mutual co-operation between the public health authorities and all those engaged in the maternity services—the doctors, the midwives, the hospital, etc. Further we are of opinion that great importance is to be attached to the propaganda inspired by the public health department, by which there was carried out a wide and frank dissemination of relevant information throughout the borough." That this could be done in other areas, there is no doubt. As long ago as 1924, Dr. Janet M. Campbell, at the conclusion of her suggestions for improved maternity services, in her Maternal

Mortality Report, said : " Many of these suggestions are already in operation, though often to a partial and imperfect degree. It is recognised that the establishment of a comprehensive and efficient maternity service designed steadily to improve the standard of midwifery, and thus to eliminate the avoidable risks of childbearing, is largely a matter of administration and finance." Rochdale has shown what can be done in a space of three years. Dr. Campbell's report was made eleven years ago, and during that period the maternal death rate has increased. We do not believe, for reasons already given, that the improvement of maternity services alone can lower the death and morbidity rates, but that this can be a very potent factor is beyond dispute. How much longer are we to wait before " administration and finance " take the matter in hand adequately ?

Social Circumstances. We may next examine the causes of deaths. The Ministry of Health conducted an enquiry into the social circumstances of those women who died in childbirth. The following were the results compiled from the various returns :

Well-to-do	68
Comfortable	956
Poor	866
Destitute	24
Unnoted	234

These figures have been used to show that maternal mortality is as frequent among the well-to-do as

among the poor. As recently as March 25th, the Parliamentary Secretary of the Ministry of Health stated in the House of Commons that maternal mortality "was not a question of poverty. Figures showed that at least half the cases were in homes where there is no poverty at all." Frankly these figures must be viewed with grave suspicion. There is no definition of the various categories ; the reports were sent in by many different medical officers, whose judgments were subjective, and who had no definition of the terms given them. How far did these 956 comfortable homes have skilled nursing as well as doctor or midwife, and all the extra nourishment to give the strength to support the demands of child-bearing ? It is very doubtful if the standard of comfort was high enough for the women to afford all these extra expenses. The experience of many doctors is that families who might be classed as comfortable, rather than poor, in fact employ "handy women" with a doctor, in order to save the expense of a doctor and a midwife and extra domestic help.

Another point which the figures fail to make clear is what was the cause of death of the women in the various sections. There has been a suggestion that the causes in the different sections varied. It may be that those in the more comfortable homes and the well-to-do die as a result of interference, and that the deaths among the poorer are more due to poverty and malnutrition. There is insufficient evidence to prove or disprove this, but in the absence of accurate

figures we cannot rely on those of the Ministry of Health. Let the Departmental Committee (p. 98) speak on this subject : " One aspect of the problem is clearly fundamental and ultimate—namely, the standard of health and physical capacity of womanhood, which may be favourable or unfavourable to normal pregnancy and childbirth. . . . We cannot expect a low maternal mortality rate unless the women subjected to the strain and stress of the physiological function of childbirth are physically fit to undergo it. Such a proposition is obviously a truism, but unfortunately it is a truism which is widely unappreciated, and it exerts a profound influence on the whole problem of maternal mortality."

Causes of Death. The following table gives some of the chief causes of deaths due to maternity, the figures being percentage of the total number of deaths, taken from the Ministry of Health Report covering 2,148 maternal deaths in 1933.

	per cent	per cent
Sepsis		24·9
Following normal labour	13·5	
Following abnormal labour	11·4	
Hæmorrhage		11·8
Toxæmia		12·1
Obstetric shock		7·1
Abortion		16·0
Associated illnesses		16·9

Now the factors upon which the recovery of the woman depends can be tabulated as :

- (1) The robustness of her constitution, enabling her to withstand fatigue and pain.
- (2) Her natural powers to resistance to infection.
- (3) The skill of her attendants.
- (4) The suitability of her surroundings for operative interference.
- (5) Facilities for suitable convalescent treatment to enable her to get back health and strength before continuing her work.

(Committee Against Malnutrition, Bulletin No. 7.)

It is easy to see how far these factors depend upon the social position of the woman.

Sepsis following normal labour is usually due to the hæmolytic streptococcus germs, infection being conveyed from the attendant's or patient's throat or nose. Face masks have been shown to give protection, and are easily provided. Sepsis following complicated labour (half of the total figures from sepsis) may be due to various types of infection, the most important causes being injury to the tissues during labour, exhaustion, and hæmorrhage.

The danger from abortion results from a woman making or procuring unskilled attempts to terminate an unwanted pregnancy. As abortion is illegal, except in certain limited circumstances, any doctor who undertakes the necessary operation charges a large fee beyond the means of all except the well off.

The chief reasons for wanting an abortion are that the mother is unmarried, or cannot afford to rear a child ; and very often the prospective mother of an illegitimate child procures an abortion, not so much in fear of public opinion, as of the knowledge that she will be unable to support the child for economic reasons. Abortion is a social rather than a medical problem, and can only be dealt with in terms of social opinion and legislation.

Deaths from associated diseases are usually those due to heart disease, kidney disease, and tuberculosis. Safety depends on early diagnosis and treatment, but this is more difficult for a working-class woman than for one in better-off circumstances. The working-class woman has to look after her home and husband, and often other children, and lying-up would mean their neglect.

Social circumstances must exercise a profound influence on maternal welfare. Skilled attendance costs money, even in these days of clinics and other assistance, and it is this factor that in so many cases will save a maternal death.

Post-Natal Care. The focusing of attention on mortality rather than on morbidity has tended to the neglect of the need for post-natal care. Even when normal labour has been experienced, it is possible for some disability to follow, and after abnormal labour this is nearly always the case. Insufficient post-natal care may turn this temporary

disability into permanent ill health, or, if neglected for too long, into disease. A well-to-do woman will have nursing for at least a month after confinement and even then will often not have to do domestic work. A working-class woman, on the other hand, will be attended by a midwife for about ten days only, or will remain in a maternity hospital for ten to fourteen days. As soon as the midwife leaves, or the return from hospital is made, the woman will often have to do the housework and to look after the baby straight away. The strain which this procedure imposes often shows itself in the failure of breast-feeding, which is so common in working-class mothers.

Even worse is the case of the mother who, by virtue of her economic position, is forced to resume work only a few weeks after confinement. So often this means that she has the housework to do after she comes home, and thus incurs a double strain. Not many people will have heard of the Washington Draft Convention of 1919. This has not been ratified by Great Britain, despite the constant assurance of the Ministry of Health that everything that can be done is being done. It embodies an extended system of monetary benefits for an employed mother. The main provisions are that, during the period six weeks before and after confinement, a woman shall not be permitted to work in any industrial or commercial undertaking as defined in Article I. On production of a medical certificate to the effect

that her confinement is expected within six weeks, she should be given leave of absence until six weeks after confinement. She should also receive free attention by a doctor or certified midwife, and, on resuming work, be granted two half-hour periods daily in order to nurse her child.

Now the Factory and Workshop Acts, in 1901, provided that a woman should not return to work until four weeks after giving birth to a child ; this provision is practically never enforced. Although a working-class mother may not wish to return to work, economic necessity forces her to, and it is impossible to prevent her from so doing in the absence of any adequate benefit. The Draft Convention states that benefits are to be paid sufficient to provide "full and healthy" maintenance for herself and her child for the whole period of twelve weeks.

Sir Alfred Watson, the Government Actuary, calculated that, with an average benefit of £14, the cost of the scheme to the national authority would be round about £1,700,000, provided that effective safeguards were provided—that the benefit did not result in married women being drawn into the labour market, to reap benefit, and that there was not an increase in illegitimacy.

At the moment the National Health Insurance Act (1911) provides for the payment of maternity benefit of £2 to the wife of an insured man, and, if she is insured and in benefit, she may also claim a further benefit of £2. No other benefit claim can be

made on account of pregnancy. In practice, some, but not all, insurance societies pay sickness benefit to a woman during her confinement, if a claim is made. In this case it is made for sickness and not for pregnancy, which does not entitle a woman to benefit, even though she may be incapacitated from work. This system is obviously unsatisfactory, and in any case the benefit is insufficient. We have the Government Actuary's figure of £14—being the amount necessary to provide "full and healthy" maintenance for twelve weeks. What working-class woman is able to afford anything like that sum—even with maternity and sick benefit?

Provision of Milk and Food. An interesting side-light on the way in which Government provisions are interpreted, and the lack of standards between different districts, is given by the supply of milk and food by local authorities. The Local Government Board Circular on Maternity and Child Welfare, August 9th, 1918, in explaining the Act, which "widens the powers of local authorities in the matter of maternity and child welfare," laid down that "the Board considers that schemes for the supply of food and milk should, where this provision is necessary, be undertaken by the authorities carrying out the Maternity and Child Welfare Scheme. Where the local authority of a country district which is not carrying out such a

scheme considers that expectant and nursing mothers and young children in its district are not obtaining a proper supply of food and milk, it should consult with the county council as to the best means for supplying this need : A scale of charges should be laid down for the supply of food and milk, but the charge may be reduced or remitted in individual cases where the circumstances justify it."

It can only be supposed that local authorities in the flush of the years following the war took a too generous view of how well looked after mothers and children must be, for, three years later, the Ministry of Health (then in charge) issued their Circular 185, March 31st, 1921, qualifying the position :

"Many local authorities have incurred expenditure very greatly exceeding what is necessary or desirable for the purpose in view. Local authorities must in future obtain the sanction of the Minister under the Maternity and Child Welfare Act, 1918, to schemes for the supply of milk to expectant and nursing mothers. . . . Milk should be given only where the Medical Officer of Health, or, in certain areas, the Medical Officer of the centre, is satisfied that a supply is essential on the grounds of health. . . . For the purpose of determining whether applicants are generally necessitous, a scale of income should be adopted suitable to the circumstances of the locality. . . . It is a first principle of administration that overlapping with other bodies concerned in the matter should be absolutely prevented."

As examples of how the income scale works, we give three London ones below :

Chelsea. Rent and insurance deducted from income, remainder divided by number in family.

Under 4s. a head free

4s. to 5s.	„	1d. a pint
5s. to 6s.	„	1½d. a pint
6s. to 7s.	„	2d. a pint
7s. to 8s.	„	2½d. a pint

Hackney. Rent and insurance deducted from income, remainder divided by number in family.

Under 7s. a head free

7s. to 8s.	„	¼d. a pint
8s. to 9s.	„	½d. a pint
9s. to 10s.	„	¾d. a pint

Shoreditch. Rent, insurance, pensions, and hospital contributions deducted, remainder divided by number in family.

Number in Family	Free Milk	Half-Price
1	14s. a head	16s. a head
2	12s. „	14s. „
3	10s. „	12s. „
4	9s. „	10s. „
5	8s. „	9s. „
6	7s. „	8s. „

It is difficult to see why a pregnant woman in Chelsea has to pay 2½d. per pint for her milk if the

income per head of her family is 7s., while if she lived in Hackney she could get it free or for $\frac{1}{4}d.$ a pint. Suppose she drank a pint a day, which is by no means too much for a pregnant woman, the difference in payment might be as much as 1s. $5\frac{1}{2}d.$ —an appreciable sum in a poor family.

The clause on overlapping would presumably refer to the practice of the local authorities of reimbursing themselves from the Public Assistance Committee for part of the free milk supplied at clinics to families who are in receipt of public assistance. As such committees must usually make up money so claimed out of the total amount of relief given, such a practice is obviously undesirable, and may lead to a reluctance on the part of expectant mothers to obtain free or cheap milk at the clinics.

Is there an ideal amount of food at which an expectant mother should aim? Here, at any rate, is the opinion of Sir George Newman (1933 Report, p. 261): "After all, sound nutrition in a pregnant woman is obviously the only way of sustaining her own health and strength and that of her forthcoming child. She should become accustomed to a diet which includes ample milk (2 pints a day), cheese, butter, eggs, fish, liver, and vegetables, which will supply her body with the essential elements, salts and vitamins, without overburdening the organs of excretion." The cost of such a diet is absolutely prohibitive for a working-class woman. Milk alone, at, say, 7d. a quart, would cost 4s. 1d. a week.

However valuable the clinics and welfare centres are, the limitations of the present legislation are such that they fall far short of being able to provide food and milk enough to ensure that the expectant mother is, from a nutritional point of view, fit and ready to give birth to her child.

Summary. To sum up this section : as a community, we cannot be satisfied with the rate of maternal mortality, nor with the widespread incidence of maternal morbidity. To reduce these, it is imperative to combat poverty and malnutrition, which not only make a woman less able to produce a healthy child, but also increase the dangers associated with confinement. At the moment there is more attention given to the co-ordination and improvement of the midwifery services, perhaps because achievement is easier in this sphere, but this can never be a complete solution, which depends also on a more satisfactory state of health and nutrition in the mothers.

CHAPTER IX

THE UNEMPLOYED

IN THIS CHAPTER we shall analyse the position of men, women, and their families where there has been, or is, unemployment. Fundamental to this position is the fact that the money income is seriously diminished, and that therefore less is available to purchase food, warmth, and shelter. Has this income for the primary necessities been so reduced that there is an appreciable number of people who, by virtue of their economic position, are unable to obtain, for instance, enough food?

We have already noticed that both the Ministry of Health and the British Medical Association have formulated minimum scales of diet, which can be expressed in money values, the figures for an adult man being 5s. 11d. per week (B.M.A.), and for a woman 4s. 11d. The Ministry of Health figure for an adult man would be 5s. 1½d.

Now Sir John Orr (again quoting from the Chadwick Lecture), on the Ministry of Health scales, considers that, to allow for some variety and a margin of safety, 6s. would be a safer minimum. Then "enquiries into the amount of money available in

the households of the poor have shown that in many instances the amount available for food falls below this level. Both in industrial and in rural districts there have been found many families whose incomes are so low that after deducting the fixed charges for rent, fuel, etc., the amount left for the purchase of food is less than 4s. 10d. per man. Here again our information is inadequate. We do not know what proportion of the community are so poor that they are unable to purchase a diet which will maintain them in health. So far as the evidence goes, it suggests that people living at the economic level of the dole are living near or below the threshold of adequate nutrition. The number at this economic level must run to nearly 20 per cent of the population—somewhere in the neighbourhood of ten million.”

The Effects of Unemployment. With these general conclusions in mind, let us now examine the results of an enquiry, made by Sir George Newman, into “The Effects of Unemployment on the Health of the Insured Population.” This was a repeat investigation of one made by the Regional Medical Staff in 1932, with regard to the effects of unemployment noted by them in the course of their work among the insured population over sixteen years of age.

“In addition each member of the Regional Medical Staff who had observed the existence of any harmful effects whatever was this year asked to say

KH

whether in his opinion those harmful effects were now more or less pronounced than they had been at the time of the previous enquiry. It may be well to explain that these officers have all had long and varied personal experience of general practice ; that their present work consists largely in the examination of patients in receipt of sickness benefit, with a view to determining their fitness or otherwise for work, over half a million insured persons being referred to them year by year for examination and report." Sir George notes that " an enquiry of this nature, which depends entirely on the medical opinion of a number of investigators, must necessarily be affected to a considerable extent by the personal factor and be lacking in statistical exactitude." Yet he says, " the personal factor in this enquiry may be partly discounted by the large number of reports taken into consideration, as a small number introduces the risk of personal bias, leading to an inaccurate conclusion. It will be understood that the whole of this enquiry is concerned only with insured adult persons, and excludes all persons under sixteen years of age and all uninsured ' adults.' "

Despite this caveat the results are placed in a table with the utmost semblance of statistical accuracy. We reproduce it below :

TABLE

Area	No ill effects observed personally	Some ill effects personally observed		No marked variation	Total
		More pronounced than last year	Less pronounced than last year		
Cumberland, Westmorland, and N. Lancs.	—	—	1	1	2
Central, S. and W. Lancs., and parts of Cheshire and Derby	—	4	—	7	11
Northumberland, Durham, and N. Riding	—	2	1	2	5
Yorks (E. and W. Ridings), and parts of N. Riding	4	—	—	4	8
Midlands	7	1	—	3	11
Eastern Counties	—	—	1	1	2
London and Home Counties	8	2	3	3	16
W. and S.W. Counties	4	—	—	2	6
Wales	2	1	1	1	5
Total England and Wales	25	10	7	24	66

Although Sir George has stressed the fact that the Regional Staff came in contact with 16,000 insurance medical practitioners, it will be noticed that the figures only relate to effects observed personally. He now mentions that 4 of the 25, who observed no ill effects personally, say that medical practitioners have reported sundry ill effects. So that, out of 66 replies, 45 state that they or their colleagues have

observed ill effects from unemployment. This seems to present a serious picture. How does Sir George deal with the figures? He goes on: "So far as can be judged, 25 out of the 41 replies which state that the writers have personally observed certain conditions which they attribute to the ill effects of unemployment relate to minor conditions only, e.g. slowness of recovery-reaction (which is the commonest), or to conditions affecting only a very limited section of the population. This leaves only 16 replies in which substantial ill effects are reported." Here follows the geographical distribution: "Of the 16 Medical Officers who alone have noted any substantial ill effects, 7 find the conditions observed more pronounced either in degree or in extent than they were last year . . . while 4 find the conditions less pronounced. The remaining 5 find no marked variation in the conditions noted."

The arrangement of these figures in a gradually diminishing form may be comforting to a general reader and explain away for him what at first sight appears a pretty bad position. But it can deceive no careful reader. Sir George has the reports, but it is open to serious doubt whether slowness of recovery-reaction is a minor condition. It would seem that when a person recovers more slowly after an illness than the so-called normal person there must be something seriously wrong with his general health. At any rate the figures remain—45 reports of ill effects, and 16 of substantial ill effects. Yet, in face

of these figures, Sir George concludes : " To sum up the results of this enquiry, the replies appear to confirm the finding of the previous enquiry in 1933, viz. that ' Taking the country as a whole the evidence appears to point to the conclusion that except in certain localised areas, and in some special and restricted groups, there has been no general excess of sickness, ill health or physical incapacity attributable to unemployment.' " We hesitate to say what we think of such a conclusion from the evidence as presented by Sir George. Perhaps the following comment on that previous enquiry, by Dr. R. A. Lyster, Lecturer in Public Health at St. Bartholomew's Hospital, reported in the *Lancet*, may be of value : " We read in the Report of the Ministry of Health that ' There was no available medical evidence of any increase in sickness or mortality owing to depression or unemployment.' If this evidence was not available at the Ministry of Health, the Ministry of Health was the only place where it was not available. The Report also pointed out that, except in localised areas, there had been no increase in physical disability owing to unemployment. In fact, if we ruled out the bad places, England was doing well. When the Ministry of Health declared that there was not much available evidence, it meant that there was not much of this evidence in the reports of Medical Officers of Health for 1932, but the officers were bound by restrictions. Also, although the public health service was preventative in aim, it only met

the casualties. The Ministry of Health was waiting for the casualties of malnutrition."

Sir George quotes one Medical Officer, who reports some malnutrition in both sexes in the Eastern Counties, "but says that the ill effects of unemployment (including malnutrition) are definitely less pronounced in this area than they were a year ago in his previous region in Lancashire." Is this a fair sample of the type of evidence Sir George considers to be of statistical value?

There is perhaps a more serious criticism of the figures. The Report is concerned only with insured adult persons. But a person who ceases to be insurably employed only gets medical benefit for a limited period—usually a year and a half. In 1932, 120,000 persons ceased to be entitled to medical benefit. Again according to the *New Statesman* of October 6th, 1934, in a paragraph on the Unemployment Assistance Board: "Apart from those in receipt of insurance benefits there will be at least a million workers to be dealt with by the new authority, or, including dependants, at least three and a half million." Of these it is safe to assume that a good proportion have ceased to be entitled to medical benefit. Now it is fairly obvious that those who are likely to be most badly hit by the depression are those who have been unemployed for a time which causes them to lose medical benefit. So that the enquiry nowhere touches those who have suffered most by the industrial crisis.

We maintain that, in view of these criticisms, the

enquiry is worthless, both on account of the conclusions not being in accordance with the facts as stated and, more fundamentally, that the whole subjective nature of the enquiry, and the fact that those whose health one would expect to be undermined most are excluded, makes one genuinely mistrust the whole investigation as a scientific piece of work. Yet, as Sir George well knows, his conclusions, thus so flimsily arrived at, will be constantly used as a true picture of the unimpaired health of the working class.

An Income Standard of Nutrition. The absence—and indeed the impossibility of establishment—of satisfactory medical standards of health leads one to ask if there is any scale or standard that can be used in order to assess the health of a family. To meet the need for such a yardstick there has been drawn up, by a group of Cambridge dietitians and social workers, and used by the Committee Against Malnutrition, an income standard of nutrition. This has been designed to analyse actual weekly budgets of working-class families. The basis is that, since the B.M.A. and the Ministry of Health have established money minimum scales of diet, anyone who spends less than that amount cannot be satisfactorily nourished.

The family budget as a whole is taken, and it is found that items of expenditure fall into two categories—the weekly necessary expenditure on rent,

heating, etc., and then what is spent on food. A sample of a form that has been used is given :

Name
 Address
 Members of family. Man, wife, and children
 Ages of children
 Other members of family

Group I. Total Income

Weekly Expenditure

Rent

Insurance

Clothing and other clubs

Coal

Light

Gas

Sundries (soap, matches, soda, etc.)

Travelling Expenses

Total

Leaving for food

Group II.

Food Allowance

Bread and Flour

Sugar

Tea

Margarine

Milk

Meat

Vegetables

Jam, etc.

Cheese

Other food, fish, tinned
 food, etc.

Total

The method of use is to get a family to fill in an account-book, giving the actual expenditure on the various items each day. Given the composition of

the family, it is possible to assess the money requirement for food on the B.M.A. or Ministry scale. The overhead expenses of group I. are deducted from the total income, and the balance spent on food compared with the amount calculated from the B.M.A. scale. A deficit will not necessarily mean that all the members of the family are under-nourished. In a family where there is a shortage of food, very often the children will be fed at the expense of the mother's supply. Milk and meals at school for children, or meals at clinics, must, of course, be taken into consideration.

To show in detail how this budget analysis works, we give the results of an investigation made in the East End of London, amongst the families of men attending the Poplar Unemployment Centre at Lower North Street, E. 14. Ten families were selected at random, and agreed to keep a detailed account-book of actual expenditure and income during a week. Six of these returned books with sufficient detail to prepare tables. (See pp. 154, 155.)

That is, out of a random selection, five out of six families show a deficiency in food expenditure as compared with the B.M.A. In three cases the deficiency would have been greater if money had not been borrowed (two families) or a suit had not been pawned. Families Nos. 3 and 7 had members at work ; family No. 2 a lodger. If we deduct the money borrowed or pawned, the percentage deficit on food becomes 14·5, 23, 38, 37, and 20·5.

TABLE

Ref. No. of family	Composi- tion of family	Income per week			Expenditure					
					Household food			Group II		
2	Father Mother 6 children 1 lodger	£	s.	d.	£	s.	d.	£	s.	d.
		3	14	6	1	13	8	2	0	10
3	Father Mother 2 children	1	14	0	0	18	9	0	15	3
5	Father (borrowed)	2	1	6	1	4	5	1	5	9½
		0	8	8½						
	Mother 5 children	2	10	2½						
6	Father (borrowed)	1	17	6	0	19	5	1	1	7
		0	3	6						
	Mother 4 children	2	1	0						
7	Father (pawn)	2	19	9	1	13	4	1	10	1
		0	3	8						
	Mother 4 children	3	3	5						
10	Father Mother 1 child	1	8	6	0	13	1	0	14	5

I

B.M.A. scale			Deficit on food	Per cent deficit	Notes	
£	s.	d.	s.	d.		
2	7	9	6	11	14.5	Father diabetic 9s. panel pay. 3 un- employed children receive 35s. 6d. ; lodger pays 10s.
0	19	9	4	6	23	Mother working
1	7	9	1 11½ (10 8 real)	38		5 children : 9, 7, 5, 3, 2
1	5	5	3 10 (7 4 real)	37		Father transitional 37s. 6d. 4 children : 8, 6, 4, 3
1	13	1	3 0 (6 8 real)	20.5		2 children at work 30s. 6d. 3 children : 11, 7, 2
0	13	6	11d. excess	8 excess		Father 7s. 6d. panel pay

TABLE

Ref. No. of family	No. of rooms	Rent		Clothing and other clubs	
		s.	d.	s.	d.
2	4 (house)	17	5	8	5
3	2	5	0	3	6
5	2	8	6	4	0
6	3	6	4	3	0
7	4	8	6	4	2½
10	1	3	0		2

In only one case is there a food expenditure in excess of the B.M.A. scale. All three members of this family—father, mother, and eighteen-month-old baby—live in one room with the exceptionally low rent of 3s. per week. The father is an unemployable asthmatic, and 3s. 3d. was spent in medicine, etc., for him in the week under review. In family No. 7, where the mother is working, her expenses in getting to and from her work are nearly 10 per cent of the total income.

Table II. gives, in more details, important items from the budgets.

The vegetables include no fresh salads, and in only one case fruit, cherries. Milk consumption is very low—far too low in the case of families with young children. One pint of milk per day per head for the children of family No. 5 (by no means in excess of what would be necessary for a child to

II

Meat	Vegetables	Milk	Children's ages Years
<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	
9 10½	6 6½	3 6	13, 11, 8
4 2	2 4½	2 0½	11, 9
4 3	5 10 (2/8 debt)	10½	9, 7, 5, 3, 2
6 10	2 10½	1 3	8, 6, 4, 3
5 11½	2 3½	1 3	11, 7, 2
4 5	2 7½	1 5	18 months

ensure sound health) would cost 8*s.* 9*d.* per week (at 3*d.* per pint). As will be seen, only 3½ pints were consumed by the whole family.

Worse, perhaps, is the dietetic value of the diets. Qualitatively the diets are appalling, and quantitatively poor. A dietetic examination showed them to be deficient in all particulars.

We must make it clear that particulars of the above investigation are given with no claim of statistical significance—it is given for example only. Other investigations have shown that in many families there is extremely little to eat on one or two days during the week. Although at the moment there are insufficient numbers of working-class budgets analysed to make any statistical summary, in no case, to our knowledge, has this type of analysis revealed that unemployed families as a whole are having money sufficient to buy the minimum food according

to the B.M.A. scale. In many cases it has been shown that in families with an employed bread-winner the income falls below what is necessary to ensure adequate nutrition. This method of assessment is not, of course, perfect, but it can, and does, give a far more accurate picture than personal impressions, and even, in many cases, clinical tests. It is useless to argue that there is only theoretical under-nutrition, and, in fact, things are better than they appear on paper, in view of the care with which both the B.M.A. and the Ministry insisted that their diets were minimum diets designed to prevent malnutrition, and in no way to be held up as adequate or desirable diets in themselves. If the Ministry has gone to the trouble to formulate a minimum diet, then surely it is part of their job to use this criterion in assessing the health of the nation.

Local Surveys. To show that there are responsible local bodies not sharing the Ministry's complacency, we give short extracts from various special surveys, etc.

Merseyside. The Social Survey of Merseyside has calculated that 16 per cent of the families in the Merseyside area are below the poverty line. These include those with the main bread-winner in or out of employment. In addition, 332 family budgets were studied in detail, the results of which are shown in the following :

THE UNEMPLOYED

159

	Group I.	Group II.	Group III.	Group IV.
Income as percentage of "poverty line"	0-79	79-100	100-149	149 or more
No. of families investigated	62	64	106	100

EXPENDITURE "PER ADULT MAN" PER WEEK

(B.M.A. min. 5s. 10½d.)

Total food :

Mean : 4s. 4d. 5s. 1d. 6s. 4½d. 10s. 8d.

Extremes :

3s. 6½d.-5s. 7½d. 4s. 1½d.-5s. 11½d. 5s. 5d.-7s. 8d. 8s. 2d.-12s. 7d.

So that, out of 332 families picked at random, 62 are below and 64 on the line of minimum diet.

The following table gives a comparison of the cost of minimum needs (including rent 5s. 1d. to 7s. 4½d.) with Unemployment Benefit and the local scale of Public Assistance.

Constitution of family	Survey poverty line	Unemployment Benefit	Liverpool scale of Public Assistance
Man, wife and 1 infant	s. d. 27 7	s. d. 28 0	s. d. 22 2
1 infant and 2 school children	37 7	32 0	29 0
2 infants and 2 school children	46 2	36 0	35 0

Southampton.! *Work and Wealth in a Modern Port : An Economic Survey of Southampton*, by Dr. Ford, gives a figure of 21 per cent of families unable to afford the absolute necessities of life ; 559 working-class families, selected at random, were the material of this investigation. Actual income was used.

If instead of the poverty line we use Rowntree's

“human needs standard,” 41 per cent of the workers in Southampton and 30 per cent of those in Merseyside are below this standard, “below which no class of workers should be forced to live.”

Becontree and Dagenham. The Report on Becontree and Dagenham, made for the Pilgrim Trust by Terence Young, considers that there is a substantial minority of the population on this new housing estate below the poverty line, and gives examples of working-class budgets where the amount spent on food is below that of the B.M.A. scale.

Newcastle. In Newcastle an “Enquiry into Diet and Household Expenditure of Unemployed Families” was made for the Newcastle Dispensary. “Thirty-three unemployed families’ and three employed families’ budgets were investigated. The unemployed families were found to be living on a diet markedly below the standard considered necessary to maintain in health and working capacity. The deficiency was most marked in the first-class proteins. In slum areas this amounts to a 50·58 per cent deficiency. In the new housing area the shortage amounted to a 64·14 per cent deficiency. . . . In the slum areas the lack of accommodation for food storage makes it difficult to buy in anything but daily quantities, and this increases the cost of food. There is evidence from the employed ‘slum’ families’ budgets that where a larger food income is

available this increase is used for food and, on the whole, wisely spent.

“The average weekly food income of the unemployed under investigation in the new housing area is 3s. 1½d. per man, and in the slum areas 3s. 5½d.”

Hull. The Unemployment in Hull Report, prepared by the Social Survey Committee of the Hull Community Council, states: “The income of the unemployed is undoubtedly below the requirements of a decent standard of living. Blood relationship still has its obligations, and the family rallies to the help of those of its members who are unfortunate enough to lose their jobs. . . . The efforts of the local community, whether under voluntary bodies or under statutory authority, are as inadequate as the Unemployment Insurance Scheme to deal with the problem. All the statutory efforts are designed to meet a problem of one-fifth the magnitude of the present one. Voluntary effort scarcely copes with one-hundredth part of it.”

Manchester. *Poverty and Housing Conditions in a Manchester Ward*, published by the University Research Section. “Out of 159 families for which an estimate of income could be made, 15 were found to be definitely below the minimum standard in the week in which the enquiry was made, and 15 more on the minimum standard; a total of 18 per cent.

Another 41 families were less than 10s. above the minimum. Thus only the remainder—a little over half of the families in the sample—had any appreciable margin to spare after meeting minimum requirements. There can be little doubt that there must be a considerable degree of malnutrition among these children at a time when it is likely permanently to affect their health. In Manchester as a whole the number of children in conditions of poverty through dependence on Public Assistance must run into thousands.”

Bethnal Green. Bethnal Green Medical Officer of Health's Report, 1933. “A large section of the population has been subsisting for some years on the limited resources of unemployment benefit, public assistance, and the charitable help of relatives and friends. Recent enquiries concerning nutrition go to show that the amount of assistance they receive is inadequate to maintain the families of the unemployed or low-wage workers in a proper state of health.”

Sunderland. Sunderland Medical Officer of Health's Report, 1933. “In order to satisfy ourselves that the people, especially the children, in an industrially crippled area were being maintained on a suitable standard, particulars were taken of 36 consecutive applications for assistance in the way of milk, milk foods, etc. . . . An analysis of these particulars showed

that not only were the families existing on a weekly allowance much below a suitable scale of maintenance, but that there were several items of expenditure out of the total weekly income which prevented a sufficient amount being allocated for the purchase of essential foodstuffs. . . . During each of our Health and Baby Weeks, held yearly since 1927, a section has been devoted to domestic economy and the practical preparation of meals for families of various sizes.

Summary. These are only a few of the very many possible quotations. The special feature of practically all of them is that they start with some carefully formulated standard of diet, exact particulars are taken, not subjective impressions, and the results can be taken as an accurate picture inside the scope of the investigation. Again, we conclude that we know of no investigation among lowly paid and unemployed workers which shows other than that a large proportion are living below the minimum standard which the B.M.A. considers necessary to maintain health.

In considering the special position of the unemployed, it is insufficient to say, as Mr. Stanley did recently, that there are relatively few families with permanent unemployment. Families may vary from the verge of adequate nutrition to serious malnutrition, but the times during which there is more food are insufficient to compensate for the

lean periods, even if irreparable damage were not done by a period of under-nourishment. In its survey of the effects of unemployment, and its general conclusions, the Ministry has not given a true picture of the conditions. We suggest that if it were to undertake a more strictly scientific investigation than asking its regional officers for their impressions, it would be forced to draw very different conclusions.

CHAPTER X

TUBERCULOSIS AND POVERTY

IT IS TWENTY-ONE YEARS since the National Tuberculosis Scheme for the Prevention and Treatment of Tuberculosis was established as a result of a Departmental Committee recommendation. The first unit of the fight against the disease was to be the *dispensary*, an organisation with six main functions :

- “ (1) Receiving-house and centre for diagnosis.
- “ (2) Clearing-house and centre for observation.
- “ (3) Centre for curative treatment.
- “ (4) Centre for examination of ‘ contacts.’
- “ (5) Centre for ‘ after-care.’
- “ (6) Information Bureau and Educational Centre.” (M.O.H. Report, 1934.)

Further quoting from this report : “ The second unit comprised *sanatoria*, hospitals, and other institutions. It was estimated that one sanatorium and one hospital bed per 5,000 of the population in the United Kingdom would be necessary—subsequently, in industrial areas, this standard was shown to be insufficient.”

The third unit was to be the Tuberculosis Officer

to administer the dispensary, and to co-ordinate the work of general medical practitioners.

To-day tuberculosis is responsible for over 9 per cent of the total mortality from all causes in England and Wales, and 45 per cent of the total mortality between the ages of twenty-five and forty-five—that is, nearly half the deaths of men and women in the prime of their life. There were, in 1933, 33,259 deaths from tuberculosis. There has been a steady decline since 1911 in the number of deaths from tuberculosis, yet there are certain factors in the decline which are disturbing.

Firstly, since 1900 the decline in mortality of young men and, especially, young women in the age groups 15–25 has been much slower than in other groups, and has recently gone up in some districts. Secondly, the comparative figures between various districts show large variations in the death rates, as, for instance, in the depressed area of Jarrow, where the death rate from tuberculosis has for the last ten years been more than twice that of the aggregate of urban districts in England and Wales. Thirdly, the decline was interrupted during the war, but resumed the downward trend almost from the cessation of hostilities. The rise among the civilian population during the war was without a doubt due in part to the conditions of reduced food supply, and, in this regard, war conditions are being repeated by the mass unemployment caused by the world-wide economic depression.

It is because of these three factors, we feel, that an examination of the whole position of tuberculosis is necessary to see if there are any special dangers confronting us to-day to which inadequate attention is being given.

As far as figures are available, in 1933 there were 66,351 new cases of tuberculosis notified, and it has been calculated that there are well over 300,000 people with tuberculosis, all of whom are potential carriers.

The following table, taken from the M.O.H. Report for 1933, gives the death rates per 100,000 at ages fifteen to twenty-five in England and Wales :

	Males	Females
1911-14	101	108
1921-25	99	123
1926-30	83	114
1931	84	110
1932	80	107
1933	79	105

The Report also gives the figures for certain districts, from which the following (p. 168) are taken.

According to the Report, "the statistics for Rhondda Urban District show a substantial similar rise in the young adult mortality rate from pulmonary tuberculosis." As an explanation of this increase, Sir George Newman states: "Many social and geographical features of coal-mining districts favour tuberculosis, such as the loss of sunlight in the deep and narrow valleys in which

	1911-14	1921-25	1926-30	1930-32
Durham and Northumberland Administrative Counties :				
Males	103	114	112	—
Females	124	148	152	—
Newcastle :				
Males	149	151	157	—
Females	140	142	155	—
Norfolk and Suffolk Administrative Counties :				
Males	81	100	61	—
Females	112	124	113	—
Merthyr Tydfil County Borough :				
Males	—	131	—	197
Females	—	185	—	268

the villages are situated, the tendency to crowd into small rooms and halls, some lack of playfields and facilities for open-air recreation, sometimes an unsuitable dietary and the tendency to conceal the presence of tuberculosis. In the case of young women, economic depression has accentuated another factor—their migration to domestic service, a migration often followed by their breakdown and return to home when the disease is found to have already reached an advanced stage. It is probable that most of these patients contracted their original infection at home and lost their normal resistance under the stress of work in unaccustomed and possibly unfavourable conditions.” Now the geographic and

social conditions mentioned first have presumably not changed over the last few years. There is no evidence that the valleys are deeper and narrower to-day than formerly, and migration to service does not account for the increase in male mortality. We recall that in 1929 special attention was paid to tuberculosis in an investigation into the conditions in the coalfields of South Wales. Then it was pointed out that, "the importance of tuberculosis . . . is that it is a disease to which resistance is decreased by insufficient and improper feeding." Would it not seem more reasonable to suppose that in this district, where there is a large section of unemployed and lowly paid workers living, on account of poverty, on food insufficient to maintain resistance to tuberculosis, these are the conditions which would give rise to an increased tuberculosis rate? We have already drawn attention to the fact that Sir George Newman, in his Report on the Effects of Unemployment on Health, has omitted to mention the increase in tuberculosis in the distressed areas. Now, in this section, he fails to diagnose the cause of this increase.

Poverty and Tuberculosis. There is a good deal of evidence of the connection between poverty and tuberculosis—evidence collected during various social investigations. Thus F.C.S. Bradbury, in his book, *Casual Factors in Tuberculosis*, 1933, gives the results of his studies in the Tyneside areas of Jarrow and Blaydon on the influence of poverty in promoting

the development of tuberculosis. His investigation concerned morbidity (case incidence) rather than mortality. In Jarrow a series of 1,300 families was grouped into those who had an average income of less than 10s. a head per week, and those who had this or a larger income. He found that 55 per cent of the former families contained a sufferer from tuberculous disease, against only 35 per cent of the latter. The results in Blaydon were : 34 per cent in the families with under 10s. per week per head, 18 per cent in the better-off families. Bradbury considers this investigation of environmental factors on tuberculosis to be statistically significant, and therefore the association of poverty with tuberculosis to be proved. His further evidence points to the conclusion that of this association it is poverty which causes tuberculosis rather than that it is tuberculosis which leads to poverty.

In 1929, Cox and others carried out an investigation in Lancashire into the fate of young children born into tuberculous households under ordinary working-class conditions. A control group of families without a tuberculous individual was taken. Among a group of young children living in homes where an adult was suffering from open pulmonary tuberculosis, the death rate from non-pulmonary tuberculosis (in two-thirds of the cases, meningitis being the cause of death) was found to be nine times greater than that of the control population in the age group 0-1, fourteen times greater in the age

group 1-2, and nineteen times greater in the age group 2-5. Under working-class conditions tubercular infection most frequently results in active tuberculosis rather than, as sometimes has been thought, giving immunity or at least protection from it.

P. D'Arcy Hart, in a special Medical Research Council Report, states that the frequency of infection by the tubercle bacillus is "usually high among the poorest classes of densely populated cities where pulmonary tuberculosis is rife, the standard of hygiene low, and the milk supply defective, but tends to be lower where living conditions are better and phthisis (active pulmonary tuberculosis) less common."

In 1921-23 an extensive survey was made in this country by the Registrar-General of the incidence of tuberculosis among different social classes. Adolescents and adults were divided into five groups according to their social position. It was found that the mortality from phthisis in class V. (unskilled workers) was approximately three times that in class I. (upper and middle class). Many similar investigations have yielded the same results. In Vienna, in 1913, it was found that the death rate from tuberculosis in the poorer working-class areas was more than four times that in the richer districts. An investigation, in 1901-05, in Hamburg, disclosed a similar difference between the mortality figures for those with incomes under £60 a year and those with

incomes of over £250. Biraud, in 1930, states that in the slum quarter of Menilmontant, in Paris, the mortality from tuberculosis is four times that in the wealthy Elysée district. R. J. Ewart, in 1922, found a relationship between mortality from the disease and real wages between 1850 and 1920 in England. It should be remembered, however, that these particular investigations, although they establish the connection of tuberculosis and poverty, do not by themselves prove what is the causal factor. We have seen earlier, however, that evidence points to the fact that more often poverty gives rise to tuberculosis rather than vice versa.

Village Settlements. The most significant experiment in connection with tuberculosis is probably that of Papworth Village Settlement. This was established in 1918, and now consists of three sections, the Hospital Section, the Sanatorium Section, and the Village Settlement and Industries—in all occupying about 400 acres. The Sanatorium is used as a testing-ground for possible new residents on the settlement, so that a patient, “ while re-establishing his health, becomes acquainted with the conditions and opportunities of life in a village settlement, and can make up his mind as to whether he will become a permanent settler or not. The Medical Director is enabled to see whether the man has the right qualities and temperament for settlement life ” (M.O.H. Report, 1934). Permanent settlers “ are under

medical supervision, and any sign of illness is detected and dealt with at once. The hours and rate of work are adjusted to their individual capacity and physical condition. They thus live a protected life in healthful surroundings, and are free from the circumstances of slum life, the uphill competition with normal workers, and the fear of losing their occupation should they relapse. In this way the after-care problem of the consumptive is successfully solved." The men are employed on a trade-union rate of wage on the various industries—carpentry, building, poultry-farming, to name but a few. In 1933 the sales amounted to £88,000. The report continues : " Sir Pendrill Varrier-Jones has shown that on a trade-union rate of wage it is possible to nourish and bring up a family and to prevent the children from contracting tuberculosis." No single case of tuberculous meningitis has been recorded, although most of the children give a positive reaction to the tuberculin test—that is, children who are born of infected parents, and are shown clinically to have been exposed to tubercular infection, yet remain healthy and do not contract the disease. The following are the conclusions of Sir Pendrill Varrier-Jones, who is in charge of the Settlement, as to why this is possible (quoting again from the M.O.H. Report, 1934) :

" (1) Adequate food supply. Ignorance as to dietetic values is dispelled by advice at the clinic,

by lectures, and by the village nurse. Also the actual demonstration of food supplied from the Central Institute at small cost.

“(2) Adequate food supply is possible because there is an adequate and prolonged parental income, maintained by means of assured employment.

“(3) Freedom from anxiety as to loss of employment ; therefore expenditure can be budgeted in advance.

“(4) No risk of unemployment after breakdown ; the income being maintained meanwhile (a) in the case of pensioners, by a pension, and (b) in the case of non-pensioners, by the Friendly Societies' contribution, supplemented by the Welfare Fund.

“(5) Proper housing, which allows medical advice to be put into immediate practice : such as through-and-through ventilation in living rooms ; isolation of infected persons in bedrooms or verandahs. That is to say, avoidance of mass dose.

“(6) Public opinion which makes it possible to live with windows open without being jeered at ; to use sputum-pots in the house, and pocket-flasks out of doors, without being shunned or made conspicuous.

“To sum up : Economic conditions determine the spread or otherwise of disease. To prevent disease it is necessary to create an environment rather than to give a dole where there is no opportunity for

money to modify the condition of its recipient. The child's resistance to disease is maintained by (a) adequate nutrition, and (b) the absence of mass dose of infection."

Dr. E. L. Sandiland, the Medical Superintendent of the Barrowmore Tuberculosis Colony in East Lancashire, spoke in Manchester on "Some problems in the After-Care of Tuberculosis," on April 4th, 1935. We quote from the report (*Manchester Guardian*, April 5th, 1935) : " If the disease was discovered early the patient could be treated in a sanatorium and the disease eradicated in a fairly reasonable period. . . . The trouble was that a man would go to a sanatorium, receive the treatment, and become fit to return home again and take up his employment if the employment were of a suitable nature. But in the winter he would probably get cold or influenza, and the cough, instead of clearing, would stay. He would say nothing, being anxious about employment. His wife would notice it, send him to the doctor, and so he would come back to the sanatorium for a still longer stay. The employer, however generous, would eventually feel that things could not go on like this, and the man would persuade the superintendent to let him go back before he ought. The man would break down again, and so this would go on until the man came into the sanatorium only to go out in a coffin. . . . Consumption was not only a medical problem ; it was an economic problem "

Tuberculosis and Food. We have been informed that war conditions converted Vienna into a vast clinic for studying rickets. So did these conditions provide an opportunity for investigating the effects of the shortage of food. It was not only the belligerent nations which suffered from the food blockade; neutral countries, such as Holland, also went short. This is borne out by the fact that the increase in mortality from tuberculosis occurred in both combatant and neutral countries. Since, at least in the neutral countries, there was no marked deterioration either in housing conditions or in medical service, we must conclude that it was the admitted shortage of food which led to the increase in the figures of tuberculosis mortality.

In Germany all age groups were involved in the increase, except infants under one year, while it was officially stated that the relatively large share in the increase of mortality in various countries suffered by inmates of mental institutions was due to the shortage of food supplied—a shortage both qualitative and quantitative. The increase in the rise in tuberculosis mortality showed itself as early as 1915, and, as we have already said, subsided rapidly once the food blockade was raised. In Germany there was a rise in tuberculosis mortality in 1922-23, when the inflation of the mark caused widespread temporary shortage of purchasing power and food. It would appear, then, that a shortage of food was a predominant factor in causing the increase of tuberculosis

mortality during the war, although it is not quite clear whether this was due to the increase in deaths of persons already consumptive when the war broke out, or to the deaths of an increased number of new cases caused by war conditions of food scarcity.

There is further evidence of the relation between tuberculosis and malnutrition. A Tyneside investigation showed that malnutrition was a contributory cause of tuberculosis even when the effect of overcrowding was eliminated. This supported the conclusion of Dr. Carver's enquiry, in 1914, into the dietary of labouring classes in Birmingham. Dr. Carver found that the total energy-value of the food consumed by families of tuberculous patients was well below that in the families of healthy controls. Mrs. Burns, in 1934, discovered a connection between non-pulmonary tuberculosis and a low consumption of milk. Children who drank more milk appeared to be freer from the disease, although it may be possible that the higher milk consumption was only an indication of a general higher social position.

The Incidence of Tuberculosis. Open tuberculosis is an infectious disease. This means that any change in trend of tuberculosis incidence will tend to continue spontaneously. If there is a decrease in a given area of tuberculosis morbidity, then there is less danger of further infection. To some degree

the population of this and other countries such as Germany acquired a certain amount of immunity by becoming "tuberculised." This occurred somewhere about the middle nineteenth century, and resulted in a steady decline of tuberculosis mortality in inverse snowball fashion. Accompanying this was a continued improvement in social conditions, and over later years medical and social measures aimed definitely at reducing tuberculosis. Now this snowball effect works both ways ; it was undoubtedly at work during the war years, when the incidence of tuberculosis was on the up-grade, and, equally, after the war assisted the downward trend. We have found that in certain age groups in the distressed areas tuberculosis is increasing, and it is this focal distribution that we must now examine. For this is the special effect of the industrial depression as compared with the effects of war, which are more generally distributed over the country. In examining the figures, it is necessary to remember that a smaller decline in mortality than the normal is equally significant as an increase, in that the number of deaths is greater than it ought to be or is necessary. The following table summarises the position for two types of areas. The 16 depressed county boroughs are Barnsley, Bootle, Gateshead, Grimsby, Hull, Lincoln, Liverpool, Newcastle upon Tyne, Norwich, Rotherham, St. Helens, Sheffield, Sunderland, Walsall, West Ham, Merthyr Tydfil, classed as such in Sir George Newman's Report for 1932. The data

RESPIRATORY TUBERCULOSIS

	A	B	C
	Aggregate of 16 depressed county boroughs	Aggregate of county boroughs England and Wales exc. Greater Ldn.	B-A (More fortunate boroughs)
1925-27			
Mean deaths	3,401	12,501	9,100
Mean population (100s)	33,805	130,145	96,339
Crude death rate per million	1,006	961	945
1930-32			
Mean deaths	3,219	11,389	8,170
Mean population (in 100s)	33,717	128,732	95,015
Crude death rate per million	955	885	860
Reduction in death rate per million 1925-27-1930-32	51	76	85
Percentage reduction in death rate 1925-27-1930-32 reckoned as 100	5.1	7.9	9.0

are taken from the Registrar-General's *Statistical Reviews*.

From the table on p. 179 we can see that if the death rate in the group of distressed boroughs in 1930-32 had been the same as that of the more fortunate boroughs, nearly a thousand fewer people would have died of consumption in the three-year period under review.

The mortality from pulmonary tuberculosis in Group A is 61 per million greater than Group C. A similar type of investigation made for Merthyr Tydfil gives a figure of an increase of 40 per cent in mortality between the two periods. It is interesting to compare these figures with some published by Sir George Newman in his 1932 Report. He selected five county boroughs, three of which were contiguous, which had a large amount of unemployment, and computed the average annual percentage change in death rate from pulmonary tuberculosis for the group between the years 1921 and 1931. These figures were compared with those calculated in a similar manner for another group of six county boroughs less affected by unemployment. It was found that the more fortunate areas showed a smaller improvement than the bad districts. However, as far as we can see in his calculations, Sir George Newman obtained the average death rates for each group by taking the mean of the death rates of its individual component areas rather than the ratio of mean of deaths to mean of population, which is the method used above.

This procedure would only be justifiable if the populations of the component areas were approximately equal, and this we believe not to be the case. It cannot be claimed that the table given here is entirely satisfactory from a strict statistical point of view, but, in the absence of other calculations, it would appear to be correct.

The Check to Decreasing Mortality. Some twenty years ago, in England and Wales, the fall in tuberculosis mortality began to slow down. The check affects the country as a whole, but especially certain groups—for instance, women aged 20–25, where the rate is almost the same in 1931 as in 1911, whereas in the age group 5–10 it has been reduced by half during that period. Various reasons have been given to account for this check. Dr. P. D'A. Hart considers that members of urban communities (other than those actually living with tuberculous relatives) appear, on the average, to receive their first infection later in childhood than did former generations, this process being deferred for an increasing proportion of them until adolescence or early adult life. This period is one of greater strain, and, therefore, one in which a person may more readily fall a victim to infection. The Registrar-General, in his 1931 Report, states that “for the female population of urban areas such postponement of the inevitable contest with tuberculous infection so that it coincides with the period

of greatest biological stress, may not be wholly advantageous and may continue to check the fall of tuberculosis mortality at that period of life." The strain of this period of early adult life is so much greater when the material comforts are not abundant and there is little margin of security.

We cannot do better, in concluding this section, than quote in full the summary from an article, on "The Influence of Tuberculosis on Poverty," in the May issue of the Bulletin of the Committee Against Malnutrition: "The adverse conditions produced in many countries by the war were generally acute and severe: those of the world industrial depression are focal, milder, but more chronic. The results are correspondingly different. Although the general mortality statistics for tuberculosis in the various countries have not yet been apparently affected by the crisis, danger signals have appeared even in England and Wales, indicating that, in not inconsiderable areas of the country, underfeeding and the other accompaniments of poverty have become sufficient to constitute an insidious danger to public health by influencing the morbidity and mortality of this disease. The presence of these foci must necessarily give rise to anxiety. It is essential that they be prevented from increasing in number and extent as they appear to have increased in Germany. In so far as the situation has been created by a fall in the standards of living of the poorer classes below the safety level,

so its alleviation would best be undertaken by raising those standards. The public health services have already been keyed up to meet the abnormal conditions. It is suggested that, in addition, a more basic change is required, namely, a consistent increase in the net real wages (taking into consideration the amount of unemployment) of the poorer sections of the community throughout the country. When it is considered that an increase in the amount of tuberculosis in a community, or a check in the rate of decline of this disease, is one of the earliest signs of organic weakness in a crisis, such a course becomes justifiable, if for no other reason. Further, it would constitute a sound measure of economy in the cause of preventive medicine, since every increase in morbidity increases the risk of spread of the disease and is an inevitable forerunner of a rise in mortality."

Tuberculosis and Social Conditions. Enough evidence has been adduced in the foregoing pages to establish the connection between tuberculosis and poverty. Not only has this been clearly demonstrated, but equally clearly the means for prevention and for cure. The experience of the village settlements is conclusive. Perhaps the greatest single tragedy is the 26,773 sanatorium beds. In effect, as Dr. Sandiland points out, unless adequate after-care can be given, the cure in a sanatorium is perfectly useless. Sir George Newman states, in his

1934 conclusions on tuberculosis: "Nor should the sanatorium be the end of a blind alley. It should be a sanatorium hospital for occupational therapy and for medical and surgical relief, leading to the re-establishment of the patient, and the beginning of connected and intelligent medical supervision, which if necessary should be lifelong." For how many of the 300,000 sufferers from tuberculosis has this been true? Papworth can only take some hundred families—the other colonies far fewer. For most of the others there are but the alternative between sanatorium and near poverty. The average stay for adults in sanatoriums is 22 weeks, and 18½ weeks in hospitals, while children usually stay some 25 weeks. Half of the adults who enter sanatoriums are discharged as improved. The following table was calculated, in 1928, on the results of treatment in London sanatoriums. It contains the percentages of patients alive five years after discharge :

I.	Out of 468 cases with negative sputum	83·5	per cent	were alive
II.	„ 330 „ positive sputum	61·5	„ „	(incipient cases)
III.	„ 1,299 not very advanced cases	61·5	„ „	
IV.	„ 858 advanced cases	3·7	„ „	

In Hull, in 1928, Dr. Daley reported that, out of 559 cases of phthisis notified, 134 of the patients did not have a bed at home of their own, while of this number 34 were sharing a bed with two or three healthy persons.

Can we wonder, then, that the decrease in

tuberculosis mortality has been checked? At the root of the problem are the questions of poverty, of overcrowding, insufficient food, anxiety, economic insecurity, and we cannot see these being resolved in terms of medicine alone.

CHAPTER XI

THE WORKING-CLASS HOUSEWIFE

Preparation and Storage of Food. It is a common accusation that the working-class housewife could provide sufficient nourishing food if only she would take the trouble to do so. Those who make this type of statement forget two things : firstly, the limitations against which she has to struggle in the way of lack of equipment to store and prepare and cook food ; and, secondly, that knowledge of the dietetic value of food is not easy to come by—it is only recently that organisations such as the Women's Institutes have begun a campaign of instruction on what to eat to get maximum nourishment at minimum cost.

There is very little direct evidence of the first set of limitations. It is obvious that in many working-class homes there are not facilities for dealing with food. Social surveys of overcrowding do not deal with such points in sufficient detail beyond making the general statement that the facilities are poor. To obtain more exact details of the situation a *questionnaire* has been drawn up recently by the

Committee Against Malnutrition. As yet insufficient data have been collected to draw any generalised conclusions, but what there is is exceptionally interesting. The *questionnaire*, which is given below, is designed so that answers "Yes" or "No" can be given to most of the questions.

This *questionnaire* is in use in two districts in the Borough of Finsbury, London, one of which is a fairly typical London working-class area composed partly of tenements and partly of small houses, and the other is an improved district into which slum-clearance tenants are being moved. It must be emphasised that this first area is not slum property according to slum standards. The following results are taken from 25 and 18 replies in each area respectively. They are not given as statistically significant, but there is every reason to believe that replies on a larger scale would bear them out. We will give some results of the first area.

That a good supply of fresh water is a first essential for health, and for all activities connected with food, is unquestionable. Yet out of the twenty-five cases only three have water laid on inside the dwelling. Five have the water supply on the landing, and for the remaining seventeen the only available supply is in the yard or basement. Every drop of fresh water used in the home has to be fetched up in buckets or jugs. Everyone has access to a common wash-house in the yard or basement, where the washing can be done, but in most cases these are

1. ADDRESS

- (a)
 (b) Position of Dwelling or Rooms
 (c) Type of House

2. COMPOSITION OF FAMILY.....

3. WATER SUPPLY.

- (a) Laid on (c) Landing
 (b) Yard or Basement..... (d) If Common Wash-house.....

4. FOOD STORAGE

- (a) Ventilated Pantry..... (d) Non-Ventilated Pantry
 (b) Ventilated Cupboard..... (e) Non-Ventilated Cupboard.....
 (c) Ventilated Landing (f) Non-Ventilated Landing
 Storage Storage.....

5. COOKING A. Apparatus

- (a) Gas-cooker (c) Coal Range
 (b) Gas-ring (d) Open fire

B. Position

- (a) Living-room (with separate Sitting-room).....
 (b) „ „ (without separate Sitting-room)
 (c) Landing

C. Does anyone habitually sleep in the room where
 food is cooked or stored? If so, who?.....

6. FACILITIES FOR WASHING AND PREPARATION OF FOOD?
 WASHING UP, ETC.

7. DISPOSAL OF GARBAGE

- (a) Inside Room (b) Outside Room.....
 ,

8. IS THERE AN ADEQUATE SUPPLY OF

- (a) Cooking Utensils (b) Cutlery, Crockery and Table
 Linen

9. GENERAL REMARKS

.....

small cold places where the chief difficulty is heating the necessary water. Let us take but one example of the difficulties which this inadequate water supply implies. A diet expert may come to these housewives and tell them they ought to eat more green vegetables, more tomatoes, and more salads. Now these will be bought out of shops, or off stalls, where they are subject to all kinds of contamination and dust and dirt. Before eating any of these foods it is imperative that they shall be well washed. The common wash-house cannot, in general, be used. For one thing it is unpleasant, for another there would be no time or place for everyone to do such washing there, and, for another, all the paraphernalia—knives, basins, bucket for refuse—would have to be taken down. Yet if the foods are to be washed inside the home, several washings of water have to be brought upstairs for it. It is not amazing that working-class housewives eat so little fresh greenstuff; it is amazing that under such difficulties of preparation they eat as much as they do.

The next point is that of food storage. Economical buying depends largely on being able to buy in reasonable quantities and to store in the home until required. For this a cool pantry or cupboard with ventilation to the open air is necessary. None of the homes investigated had pantries, four only had ventilated cupboards, and twenty-one had a non-ventilated cupboard as the only place in which to store food. This means that it is almost impossible

to buy more than a day-to-day supply of fresh foods, and difficult to keep milk and meat from going bad during the summer. The actual cooking of food is generally easier. All except six homes have a gas-cooker in addition to a coal-range, and, of these, three have coal-ranges while three have gas-rings ; while in three cases there are no data. In fourteen cases, however, the cooking apparatus is in the main living-room, without a separate sitting-room. To live perpetually with the smell of cooking is unpleasant, and worse than this is the fact that the appetite becomes weakened and listless under such conditions. In nine cases out of the twenty-five, one of the family habitually sleeps where food is stored or cooked.

These are the main data from the ordinary working-class area. Let us now examine the returns from the improved area. All eighteen dwellings have water laid on. Two actually have a bath. (Incidentally it was not considered necessary to put in a question about a bathroom or scullery. These are unknown in the first district.) Four have separate sculleries. Regarding food storage, fifteen have ventilated cupboards, while three have separate ventilated pantries. All have gas-cookers, while one has a small kitchenette. In only three cases is the cooking done in the main living-room—all the rest have a separate sitting-room. In no case does anyone habitually sleep in the room where food is cooked or stored.

Perhaps the most striking feature of these latter case-sheets is the general remarks. In several cases the investigator has been led to make such comments as : "Improvement noticeable on removal from overcrowded conditions" ; "Comfortable home" ; "Great improvement on removal from two small rooms."

It is hoped to obtain more extensive information about the conditions under which a working-class housewife works. In the meantime, there is enough evidence to show that, with all the goodwill in the world, the physical background is such as to prevent many millions of housewives from taking any real advantage of a better knowledge of what to buy and how to cook and eat it. We have seen, in an earlier chapter on food and health, that it is just those foods which require careful storage and preparation which are commonly lacking in the working-class diet. Until these limitations of inadequate storage and cooking facilities are disposed of, no amount of propaganda on correct food can be in any way effective.

The Shopping Bag. In the absence of any special considerations of the dietetic value of food-stuffs, what are the factors which determine the foods which a housewife will buy to supply meals for her household ? In the case of a middle- or upper-class family, the criterion of shopping is mainly what is pleasant to eat, although this is conditioned for

most people by the previous habits from childhood onward. But in the case of a working-class family the first and almost only criterion is what will satisfy the appetites, to be relieved wherever possible by something "tasty"; strongly flavoured foods like pineapple or other tinned fruits, or fish and chips. The food which satisfies hunger most easily is food supplying calories—the carbohydrate group. These, then, both for their power in supplying energy and their cheapness, will, of economic necessity, form the bulk of the food eaten by working-class families. The following table (which is taken from Dr. Ackroyd's book, *Vitamins and Other Dietary Essentials*, p. 160) shows quite roughly how many calories would be contained in a pennyworth of various food-stuffs bought in England in 1932.

Food	Calories for 1d.
Flour	1,000
Bread	600
Sugar	800
Potatoes	500
Dried Peas	500
Margarine	500
Butter	250
Mutton (frozen)	250
Beef (frozen)	200
Fish	200
Cheese	200
Milk	130
Eggs	75
Cabbage	50

Our next table is taken from the Social Survey of Merseyside. This is some of the evidence which shows that with a rise in income the compulsion of buying calories is not so urgent. The table gives comparative figures for the consumption of various foods, and shows the proportional distribution per cent of median weekly expenditure in groups classed according to their relation to the poverty line.

Group I.	has an income of	0-79 per cent above the	
		poverty line	
„ II.	„ „	80-99 per cent	„ „
„ III.	„ „	100-149 per cent	„ „
„ IV.	„ „	150 per cent and over	
		the poverty line	

	Group	I.	II.	III.	IV
Meat, etc.		25·3	28·3	30·6	32
Bread, etc.		27·1	24·8	20·4	13·9
Dairy Produce		20·5	21·3	23·1	27·8
Tea, etc.		7·5	6·7	6·9	6·4
Cereals		1·4	1·4	1·2	1·0
Sugar and Jam		8·9	7·0	7·1	5·4
Vegetables and Fruits		9·3	10·5	10·7	13·2
Condiments		—	—	—	0·3

These two tables together can be taken as typical of what are the factors determining the food habits of working-class families. Poor people are not buying cheap food out of ignorance and perversity. The preponderance of bread and potatoes is necessary because the first consideration is to satisfy hunger and not to supply health and vitamins. As

soon as the necessity for the strictest economy vanishes, so there is in general an improvement in diet, the consumption of just those foods which the dietitian says should be eaten more plentifully goes up immediately—vegetables and fruit from 9·3 to 13·2 in the table ; dairy produce from 20·5 to 27·8, and, on the other hand, bread falls from 27·1 to 13·9, sugar from 8·9 to 5·4.

The Rent Factor. We have seen that, in the case of families in two areas in Finsbury, the change into a less crowded area resulted in a general improvement in health. This is not always the case. Perhaps the earliest and at any rate one of the most striking instances of the lowering of health, as shown by mortality statistics, etc., on the transfer of a slum population to council houses, was that reported on by Dr. McGonigle, the Medical Officer of Health for Stockton-on-Tees. He investigated the fate of 152 families moved in 1927. The average new rent was 9s. a week, that of the old district 4s. 10½d.

Dr. McGonigle's figures for the distribution of income are given below in tabulated form. Comparison is made with an essentially similar population left in the Riverside slum area.

It is clear from this table that the increase in rent meant that there was proportionately less money left for food. In the case of the unemployed the amount spent on food was actually reduced. In

	Mount Pleasant Re-housing		Riverside Slums		
	Employed	Unemployed	Employed	Unemployed	
Rent	20.5	31.3	14.7	20.8	} Per- centage of income
Other necessary expenditure	30.7	29.3	36.6	33.3	
Food	42.9	36.7	46.3	43.3	
Unnecessary expenditure	5.9	2.7	2.4	2.6	
Food expenditure per man	5s. 2½d.	2s. 10½d.	4s. 3½d.	3s. 9½d.	

these circumstances the health of the district declined so rapidly that the death rate rose from 22.91 in the years 1923-27 to 33.55 in 1928-32.

During the five years after the removal took place, the death rate per thousand in the population now moved to Mount Pleasant increased as follows : measles 1.15 ; heart conditions 2.59 ; bronchitis and pneumonia 3.74. No such increases were found in the Riverside area. This still remained a slum, without the increased rents, and therefore more money for food.

On another estate, the Becontree Housing Estate, Mr. Terence Young reported : " It seems likely that most, if not all, of the families who moved to Becontree found that their family expenditure increased in one or more of the following ways :

" (a) Increased rent and rates.

" (b) Furniture repayments.

" (c) Increased travelling expenses.

" There is little doubt that a goodly proportion of new entrants had not estimated at all accurately

the cost of living, and consequently some found life rather difficult and others had to leave."

The point is that before food is bought there are certain fixed charges which have to be met. These are mostly rent, fuel, cleaning, light, and clothing. If any new item of expenditure is incurred, then it is usually the amount spent on food that is decreased. As no family lives in a slum for preference, but because of economic necessity, it is just those families who are already subsisting on a meagre, or even inadequate, diet. These, again, are precisely the families who are slum-cleared, and the increase in rent is the factor which turns the scale and forces the family on to a diet definitely inadequate.

We must conclude that in any slum-clearance scheme it is incumbent upon the local health authorities to take especial care that the health of the moved families does not deteriorate. The M.O.H. for Bethnal Green sums up this matter in his Annual Report for 1933: "The additional and better accommodation provided by the borough council and the L.C.C. has done a little to ameliorate this state of affairs [overcrowding], but it is hopeless to attempt to solve the problem merely by accommodation. Unless the accommodation is within the means of the overcrowded families, it is useless to them. . . . The demand, both residential and industrial, in and around the central districts of London is so great, and the rental level accordingly so high, that the tenements set free by the families entering municipal

estates are in practice rarely available to the poor overcrowded families in slum property. Another aspect of the same matter is seen in the danger of families with limited incomes taking housing accommodation, the rates or incidental expense of which are beyond their means, except at the expense of nutrition. Much valuable research during the last few years has shown that serious malnutrition may be an unexpected but wholly evil result of well-meant efforts for improved housing."

Milk. As we have already seen, milk is an excellently balanced food, and so well recommended by experts that it should be considered essential in diets of children and expectant mothers. Milk, however, in comparison with other foods, is an expensive way of buying calories, and has not so far been regarded in working-class families with any favour as food. Milk is difficult to keep for any length of time, and tinned milk is much easier to store and cheaper to buy. A good deal of propaganda is being put out to make everyone more milk conscious, thereby increasing the milk consumption. Acting right against this is the price of milk. A large body of potential consumers cannot afford to buy milk at its present price. The following evidence shows something of the food habits of working-class families with regard to milk.

The Merseyside Survey made detailed studies of 332 family budgets, and these showed that the

average consumption of milk was $\frac{1}{2}$ pint a day per "adult man." In the group 0-79 per cent below the poverty line, one family in six bought no fresh milk, while in the other groups, 79 per cent below-149 per cent above the poverty line, one in four bought more condensed milk than fresh. Incidentally, tinned milk was the only tinned food purchased.

An article in the *Welsh Journal of Agriculture*, Vol. X, 1934, gives particulars of the consumption of milk in Cardiff. The following table generalises the results :

Area	Liquid milk in pints per person per week	Percentage of households taking no liquid milk
(1) Good middle class	3.88	nil
(2) „ working class	1.87	9
(3) New housing scheme	1.32	15
(4) Poor working class (not slum)	1.1	26

Here is the familiar story told again. With a rise in income, so there is more milk drunk.

Sir John Orr gives the consumption of milk as 0.35 pints per day in the families of 1,000 unselected elementary school children.

It is everywhere agreed that milk is especially important for young children. Yet investigation shows that as the number of children in the family increases so the *per capita* consumption of milk goes down. Mrs. C. A. Burns (*Journal of State Medicine*, Vol. XLI, No. 7) gives the figures of the milk consumption of 1,000 families receiving milk assistance in County Durham. The average of fresh milk

purchased per week by families of three persons was 0·7 pints per head; that for families of five persons 0·4 pints per head.

Mr. E. R. Bransby reports, in his investigation into the consumers' demand for liquid milk in Brighton and Lewes, that he has observed similar decreased consumption as the size of the family grows. For families in a Brighton district, he gives the following figures :

Size of household		Average No. of pints per day consumed
Adults	Children	
2	—	0·80
2	1	0·76
2	2	0·70
2	3	0·50

Mr. Bransby found that milk puddings were not eaten so much as meat or suet puddings, for the two reasons that the price of milk is higher and that milk puddings have less "stay." When they are made, tinned milk is used. One family of five (three children, two parents) used ten tins, at $2\frac{1}{2}d.$ each, per week, on an average. The reasons for buying tinned milk given by this and other families were that it was cheaper and would keep, whereas fresh milk went sour, and that it was thought to be cleaner. Milk was regarded as an extra not as a food, and, because of its price, looked on almost as a luxury or a flavouring for tea and cocoa.

Over and over again the evidence shows that it is poverty that cuts down the supply of the better kinds of food. As the number in the family grows, so

the amount of money per head available decreases, with the consequent increase in the consumption of foods giving more calories for the amount expended and the sacrifice of quality for quantity.

The minimum guaranteed price of milk to producers is now 5*d.* a gallon in summer, 6*d.* a gallon in winter. The retail price is round about 2*s.* 4*d.* a gallon. It has been stated, on good authority, that the "very finest milk service in the world could be provided for 9*d.* per gallon in London, and less in the provinces, and leave a good margin of profit" (*New Statesman*, March 9th, 1935). The distributive margin in London is 1*s.* a gallon. The Children's Minimum Campaign Committee have estimated "that the number of children under five and expectant and nursing mothers in England and Wales in the strata of society from which the elementary school children are drawn is about 3½ million. If half this number took only ½ pint a day their total consumption would amount to 26 million gallons a year."

So we are led to another contradiction—on the one hand the assertion by the experts, and not least the Ministry of Health, that milk is a life-giving fluid, the most nearly perfect food, on the other hand millions who want more milk, who would consume more if they could, and the economic barrier of their being unable to afford it, a barrier not of "natural" force, but of our own construction.

CHAPTER XII

THE CHALLENGE TO MEDICINE

The Unemployment Assistance Board. Perhaps the most important change in the administration of unemployed relief was the creation of the Unemployment Assistance Board, under which the bulk of Public Assistance was to be centralised instead of under the various local and national bodies as before. As from an appointed day, those unemployed and their dependants who were relieved out of local rates were to be brought under a national scheme and authority. It was hoped that in this way some standardisation of treatment, and a more satisfactory adjustment of relief, would be obtained.

The Experts' Letter. Now in this connection perhaps the most important statement so far made is that of a number of leading medical and physiological experts, which was sent to the Board and circulated to the Press. In view of its importance, we reproduce it in full below :

We understand that under the new Unemployment Act a very large number of the unemployed and their families will come to depend partly or entirely for their support upon the allowances granted by the Unemployment Assistance Board.

Our experience as physiologists and members of the medical profession leads us to believe that there will be grave danger of widespread physical deterioration, especially among the growing generation, if a considerable section of the population, obliged for reasons beyond its control to depend for maintenance on public funds, is unable to purchase sufficient food and other necessities for healthy existence.

We therefore welcome the provision made in the Act that the allowance granted to an applicant "shall be determined by reference to his needs, including the needs of any members of the household . . . who are dependent upon him."

The definition of "needs" is necessarily left to the Board to determine; it is stated, however, that it is the function of the Board to promote the welfare of the unemployed and "to provide for the re-establishment of such persons with a view to their being in all respects fit for entry or return to regular employment." We suggest that a standard of needs which will fulfil the intention of the Act can only properly be arrived at in consultation with medical and other expert opinion qualified to estimate the minimum requirements of healthy living and the cost of satisfying them for families of various sizes.

"Needs" are conveniently divided into (1) food, (2) rent, (3) fuel, (4) clothing, (5) light, cleaning materials and sundries. With regard to food, scientific knowledge has now reached the point where it is possible to determine fairly accurately the minimum necessary to maintain health and working capacity. The findings of the recent Joint Conference representative of the B.M.A. and Ministry of Health Committees on Nutrition on the constituents of a physiologically desirable dietary, and the work of the B.M.A. Committee on specimen minimum diets, can no doubt be used as a basis for estimating the minimum expenditure necessary.

With regard to other needs, further investigation might have to be undertaken before a satisfactory standardisation could be agreed upon. An adequate expenditure on food will only be secured if some margin is

allowed for the small conventional necessities of civilised life.

A scientifically determined scale such as we have in mind would obviously have to be adjusted to changes in the cost of living from place to place and from time to time.

Below we give the names of the signatories in full, and, in parentheses, the positions which they hold in the medical and scientific world.

SIR E. FARQUHAR BUZZARD, Bt., F.R.C.P. (Regius Professor of Medicine in the University of Oxford).

DR. A. K. CHALMERS (late Medical Officer of Health for Glasgow).

PROFESSOR S. J. COWELL, M.B. (Professor of Dietetics in the University of London).

DR. J. S. FAIRBAIRN, F.R.C.P. (President of the British College of Obstetricians and Gynaecologists).

PROFESSOR J. B. S. HALDANE, F.R.S. (Professor of Genetics in the University of London).

DR. LESLIE HARRIS, D.Sc. (Director of the Nutritional Laboratory, Cambridge).

SIR GOWLAND HOPKINS, F.R.C.P. (Professor of Biochemistry in the University of Cambridge and President of the Royal Society).

PROFESSOR J. C. G. LEDINGHAM, F.R.C.P., F.R.S. (Director of the Lister Institute of Preventive Medicine).

PROFESSOR J. J. R. MACLEOD, F.R.C.P. (Regius Professor of Physiology in the University of Aberdeen).

DR. G. C. N. M'GONIGLE (Medical Officer of Health for Stockton-on-Tees).

PROFESSOR CHARLES MCNEIL, M.D. (Professor in Child Life and Health in the University of Edinburgh).

PROFESSOR V. H. MOTTRAM, M.A. (Professor of Physiology in the University of London).

SIR JOHN BOYD ORR, F.R.S. (Director of the Rowett Institute for Research in Animal Nutrition at Aberdeen).

PROFESSOR L. G. PARSONS, F.R.C.P. (Professor of Infant Hygiene and Diseases of Children in the University of Birmingham).

DR. CHARLES PORTER (President of the Society of Medical Officers of Health).

SIR HUMPHRY ROLLESTON, BT., F.R.C.P. (formerly Regius Professor of Physics in the University of Cambridge and President of the Royal College of Physicians).

Here, at length, we have an authoritative group of scientists pressing the need for some objective standards. The new board was to be given the widest terms of references—far wider than Sir George Newman ever admits as applicable to the Ministry of Health. Such a board could investigate and experiment as no other public body has ever been able to do. In its work it could have the support not only of those distinguished scientists who signed the letter, but also of all medical and welfare workers throughout the country.

What has been the result? As soon as the Board commenced operations it was found that its provisions were totally inadequate to meet the situation, and operations under the Board were suspended

almost immediately. Perhaps the most significant act of the Board was to lay down a set of scales of relief. As far as we know, this is the first time in history that a Government has in times of peace drawn up a scale of living which it says is adequate to maintain health. Little wonder, then, that certain sections of the public have seen in this a sinister experiment at rationing the unemployed with a view to seeing on what amount of food the civilian population can exist for purposes of calculating war needs. Be that as it may, the scales were immediately attacked on grounds of insufficiency. The particular interest in the scales laid down by the Board was that previously it had always been the endeavour of public authorities not to draw up scales of relief. In the days of the Poor Law Relief, it was incumbent on local authorities merely to relieve destitution actually existing. The most concise definition of destitution was perhaps given by the legal adviser of the Local Government Board, in 1909, in reporting to the Poor Law Commission : " Destitution . . . implies that he is for the time being without material resources (*a*) directly available and (*b*) appropriate for satisfying his physical needs (i) whether actually existing or (ii) likely to arise immediately. . . . By physical needs in this definition are meant such needs as must be satisfied (i) in order to maintain life (ii) in order to obviate, mitigate or remove causes endangering life or likely to endanger life or impair health or bodily fitness for self-support."

The Ministry of Health has always been against the setting up of scales in the administration of relief. In 1930, Circular 1069 reiterated the Local Government Board dictum that relief was to be limited to cases of destitution and that the guardians or local relieving body should decide whether or not a particular person is destitute. In 1932 the Ministry refused to call a conference to discuss scales of relief, again stating that relief was to be according to needs and not to scale. In practice, however, it is difficult, if not impossible, to grant relief without having in mind some scale. There is evidence from official sources that local authorities are using scales. The Report of the Royal Commission on Unemployment Relief gives the number who are and are not using scales. From Greenock was reported a case before the Court of Enquiry considering allegations that the Greenock P.A.C. had granted illegal relief. The Burgh Auditor appointed by the Scottish Office claimed that relief payments made in January 1934 were higher than were necessary to relieve destitution. In December 1933 a newly elected council decided that the then prevalent scales of relief were inadequate for needful sustenance, and increased the maximum payments for any one household, despite the opinion of the Town Clerk that such payments might be illegal. The Auditor, in fact, assessed the payments in normal circumstances in relation to the scale in operation prior to December 1933. In doing this, he stated he "was

guided by the fact that nothing had been brought to his notice, either by way of application to the Board of Health or to the local authority or by any complaint lodged, that the scale prior to December 1933 was inadequate (*Greenock Telegraph*, August 3rd, 1934). It is clear from this that the two councils and the Auditor had in mind scales of relief. In the absence of any authorised scales these must be a matter of opinion alone, for every case has to be decided on its merits, and involves calculations in money of how much needful sustenance will cost or how much is necessary to avoid destitution. All these terms are relative, and in practice will depend upon the local standard of living. Obviously in a depressed area the whole standard will be very much lower than in a district which has not been so much hit by unemployment, so that to bring the income of a destitute person in the former area to the general low standard will not cost so much as in the latter, where the general standard is higher. This may and, in practice, has resulted in the anomalous procedure of higher relief being given in an area where it is perhaps not so urgently required.

As a further example of the division of opinion between a local and a central authority, we give the case of the granting of extra relief in Manchester. In October 1934 the Manchester City Council recognised that extra relief for the unemployed and low-paid working-class would be necessary

during the winter months to allow for additional heating and nourishing food. They accordingly budgeted to spend an extra £22,600, of which £4,200 was to be spent in additional outdoor relief in cash and kind in respect of children's allowances, and the remainder to allow 2s. a week for coal and gas to persons receiving relief on account of sickness, to widows with dependent children, and to aged and infirm poor. The Chairman of the Finance Committee warned the Council that this grant approximated to a flouting of the Ministry of Health, who had already intimated that the scales of relief in Manchester were too generous. On the one hand we had the Ministry stating that it was the province of the local authority alone to assess the needs of those who applied for relief according to their merits, and on the other by their auditors reprimanding or surcharging local bodies when they seek to interpret relief according to what they consider necessary.

Perhaps the following quotation from Ford's survey of Southampton, *Work and Wealth in a Modern Port*, sums up the position. "It is, however, pertinent to press the need for some scientific basis of action, whether scales are used or not, and to point out that if in practice scales have little scientific basis, it is equally true that individual consideration may be often likewise condemned. What individual enquiry can do is to establish facts which make it possible to allow for the infinite variety of circumstances which these cases present, but, as relief

is designed to make up wholly or in part some deficiency of income compared with needs, there must be some standard, however vague, in the minds of those granting the assistance. Standards based on half-realised assumptions may be as devoid of scientific basis as those formulated into explicit scales. Dragging these lurking assumptions into open and formal discussion—which the establishment of a detailed scale involves—is one of the services which the local debates on projected scales have rendered ” (pp. 145-6).

The failure of the Unemployment Assistance Board so far to make adequate arrangements for the relief of the unemployed with all the powers, knowledge, and advice at its disposal is a disaster of national magnitude. The terms of reference gave rise to such hopes that a satisfactory system of relief would be established, that its failure has aroused opposition not only from the unemployed themselves, but also from the scientific and medical world which followed its creation with so much interest. This opposition was expressed by immediate and effective demonstrations by unemployed meetings all over the country, and by conclusive evidence being given that the new scales were inadequate. The Children's Minimum Committee prepared a memorandum, from which the following is extracted: “ It should be pointed out, however, that for families with two or more children the proposed scale will not even now permit an expenditure sufficient

to satisfy the standards laid down for food by the British Medical Association Committee on Nutrition, and for clothing and other necessities by the Merseyside and other sociological surveys. The following table (A) compares the proposed children's allowances at different ages with the estimated cost of food on the B.M.A. standard plus the bare minimum of 1s. 2½d. per child for clothing, cleaning, and light allowed in the Merseyside survey."

TABLE A

Age of Child	U.A.B. Scale		B.M.A. Food plus 1s. 2½d. for Clothing Cleaning and Light		Deficit	
			s.	d.	s.	d.
2	3	0	4	3½	1	3½
4	3	0	4	7½	1	7½
6	3	6	4	9½	1	3½
8	4	0	5	4½	1	4½
10	4	0	5	11½	1	11½
11	4	6	6	6½	2	0½

Table B compares the scale for families of various composition with estimated minimum needs, taking the B.M.A. scale for food, and the Merseyside estimates for clothing, cleaning, light, and fuel.

TABLE B

Scale	Man and Wife		1 Child 2 years		2 Children 4, 9 years		3 Children 3, 7, 10 years		5 Children 1, 4, 7, 11, 13 years	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
B.M.A.										
Merseyside	24	2	27	9	34	5	40	7	51	4
U.A.B.	24	0	28	0	31	0	34	0	40	6

Both the above scales assume the following basic rents allowed by the Board are the actual rents.

	Man and Wife		1 Child 2 years		2 Children 4, 9 years		3 Children 3, 7, 10 years		5 Children 1, 4, 7, 11, 13 years	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
Rents	7	6	7	6	7	9	8	7	10	1
Unemployment Benefit	26	0	28	0	30	0	32	0	36	0

An important point to remember is that when the regulations of the U.A.B. come into force it will not be possible for a family receiving unemployment assistance to obtain extra relief from the Poor Law authorities. This was always possible before, and, although not widely used, this power did allow for extra necessities to be obtained when by reason of a low estimate of needs a family was still destitute.

The same committee also submitted a memorandum on the evidence of malnutrition. This gave figures of malnutrition from official sources existing in this country to a degree which was denied by Sir George Newman. This memorandum was designed to meet the argument of those who maintained that, in spite of the theoretical inadequacy of the present scales of benefit for those with children, there is no evidence that the children are suffering from lack of food.

We can only suppose that the postponement of the appointed day at which the Unemployment Assistance Board will take over its duties of administering public relief is due to the pressure from

these two sides. The Government must recognise both the inadequacy of its arrangements and the determined opposition to them. We cannot conceive a political party continuing in proposals which have proved so unpopular without at least some modifications. That there will be modifications we have no doubt, but we find it difficult to believe that the new scheme will be to any large degree more acceptable unless a radical change of principle is involved—that is, that the satisfactory health of the unemployed is recognised to be the first concern, not merely the relief of destitution.

Feeding the Nation. We are continually hearing of new schemes for getting extra food to the unemployed and lowly paid working class, designed as a rule to unload surplus stocks rather than to give extra nourishment. Mr. Elliot announced, on April 1st, an enquiry into the nutritional value of milk, under the supervision of a representative expert sub-committee of the Advisory Committee on Milk Publicity of the Milk Marketing Board. The experiment is to be on a large scale and to last for a year. But surely such an experiment has been made years ago, and the food value of milk proved up to the hilt? Have we, then, to wait for at least a year for any extension of the “milk for school children” schemes pending the conclusion of an experiment the results of which we cannot but know to be a foregone conclusion? We have already seen,

in the section on Milk, the striking results of giving milk : in better physique, health, and intelligence.

Two days before Mr. Elliot's announcement, an experiment undertaken by the Potato Marketing Board came to an end. The experiment was in supplying potatoes at 4*d.* a stone to the unemployed of Bishop Auckland and district. The following quotation from the *Manchester Guardian*, April 1st, 1935, summarises the results : " From a quantitative point of view the scheme has been a great success. In each of the first seven weeks an average of 23 tons of potatoes were disposed of from the Board's warehouse in Peel Street. In the closing week over 33 tons were sold, bringing the total sales for the whole period to nearly 200 tons. This figure has exceeded the expectations of the Potato Board officials, but there has been no difficulty in obtaining supplies from various producers in Durham County. After purchasing their potatoes at current market price, allowing wholesalers 10*s.* a ton for transporting the potatoes to the warehouse and also for certain loss of trade, and allowing the local retailers compensation at the rate of 1*d.* per stone for all supplies granted on permits stamped by them, it is estimated that the Board has suffered a loss of between 25*s.* and 30*s.* a ton, or between £250 and £300. It is still to be decided by the Board whether the expense incurred is justified in clearing the potato market of some of its surplus stock in this way, but all the factors will be taken into consideration during the

next few days. The official decision as to the advisability of extending the scheme to other hard-hit industrial areas of England and Wales will be announced shortly." We wonder how far the factor that the health of those who received the potatoes has improved will be taken into consideration. At any rate the experiment does show the need, and the demand, for supplies of cheap food by those for whom expenditure on food is so limited by their poverty.

We return to Sir John Orr, who, both in his Chadwick Lecture and at the British Association meeting of this year, pressed for some progressive policy. Again quoting from the Chadwick Lecture : " It may be assumed that any Government would accept as the first essential the necessity for ensuring that every individual in the State shall be able to get a diet sufficient to maintain health. If a system of production and marketing food-stuffs fails to do this, the State, through its medical and social services, must pay for the treatment for those suffering from an inadequate diet." Sir John then suggests an enquiry to find out " to what extent could the health of the community be improved by improving the dietary. . . . One way by which we could get an answer is to take a section of the community—say, ten thousand poor families in one of the depressed areas—and ensure that they had an adequate diet for a period of at least five years. The effect of the improvement in the diet on mortality and on health

would afford an answer to the question. The State is spending large sums of money on research of one kind or another. The experiment suggested would be of more immediate interest to the State than almost any piece of research at present being done. The results would be of more value than the findings of half a dozen commissions. If it be found that there is an appreciable amount of ill health due to faulty diet, the next question to be answered is to what extent is the faulty diet due to poverty. This information can be obtained. The price of food, the family income, and fixed charges, such as rent, are all ascertainable facts, and other items of family expenditure can be assessed with sufficient accuracy to give a fairly reliable answer to the question."

We do not consider the results of such an investigation to be for a moment in doubt. Sir John Orr has already suggested that probably 20 per cent of the population are living without sufficient food. The Elgin Committee on Agriculture considered the question for Scotland, and concluded that food prices should be kept low enough for everyone to buy adequate food.

We suggest that it is not likely, however, that such an experiment will be carried out, not from any inherent difficulty, but because of the certain results. No Ministry of Health, no Government, could confront the results of the enquiry without revolutionising its present conception of its function.

The Limit of Medical Treatment: A question that we are compelled to ask when we have made any survey of modern problems of public health and ill health is, Have the medical service and the Ministry of Health in fact reached the limit in their effort for improved health *working along medical lines*? We are, on the one hand, told by the medical profession and its allied experts that rickets is a vitamin deficiency disease which can be prevented by suitable additions to the diet of young children; that infantile mortality could be cut down by half if only the mother were supplied with enough blood-building food to build up a sufficient stock of iron in the liver of the new-born baby; that the dangers of tuberculosis can be averted given adequate economic conditions (in this case, assured employment, at trade-union rates, in healthy surroundings); and so we could enumerate the various other diseases for which the conditions of cure or prevention are fairly accurately known. On the other hand, we have statements from Sir George Newman that, "with an infantile mortality rate at 64 per 1,000, no spectacular improvement can be expected"; that "unemployment, under-nourishment, and preventable malady and accident seem to be the unavoidable concomitant of current civilisation in Western Europe in the present day." Does this, then, mean that improvement in the health of the people is no longer possible in terms of medical attention and care? And that, as a corollary, the path to

public health is along the road of improved social and economic conditions alone ?

In the various sections of this book we have many times arrived at this impasse. Further medical cure is held up by social circumstances. We have seen, also, that there is a gulf between the standards of health of different sections of the population—that secondary school children are on the whole on a different level of physical development and health from elementary school children, that measles is a fatal illness in young children only among the poor.

It is this position which constitutes a challenge to the medical profession and to the Ministry of Health. If, as we believe, a further substantial improvement is not possible in the public health under existing economic conditions, is the Ministry going to take any lead in creating those conditions in which alone there can be further progress ?

It is not our purpose in this book to examine the political changes which might be involved in such a lead. We have attempted to analyse the position from the view-point of enlightened medical opinion itself, and have only given solutions to the problems raised from within this framework.

If the health service of this country has the courage to face the problems with the full implication of the knowledge to which it has itself contributed, there can be no doubt as to the kind of solution that will be chosen.

We recall that at a public meeting of the Committee Against Malnutrition, in June last year, Sir F. Gowland Hopkins (President of the Royal Society), chairman of this meeting, said that, "he would have been glad to be present in any capacity, so great was his sympathy with the meeting. The outstanding duty of the moment was to see that all classes of the people were properly nourished. The abundance in the world was common knowledge. Science and enterprise had reproduced the miracle of the loaves and fishes. But they were not being fed to the multitude. . . . The aims of the Committee were non-political. They were to give the widest publicity to facts which could then be used by whoever wished to initiate political demands and campaigns. The necessity for quick action should be kept to the front if the physical descent of the nation was to be arrested. The inhibitions to proper progress were apathy and disbelief in a few—ignorance in many."

Throughout this book we have been concerned to expose this ignorance; where possible we have quoted from an official source rather than given our own opinion.

We have quoted from the President of the Royal Society, from Medical Officers of Health, from local social surveys, from research workers—all of whom are recognised as leading figures in their respective fields of knowledge. Yet this book was conceived in anger—anger at the way in which Sir George

Newman's Report for 1933 was being used. We quote from the *Observer*, September 23rd, 1934 : " THE TRUTH ABOUT ' MALNUTRITION.' — Malnutrition cannot with any honesty be used as a political stunt after Sir George Newman's reference in his Annual Health Report. Scarcely anywhere is there the slightest evidence of such a result from unemployment. But the unemployed and many others could be helped both to fuller nourishment and to a lower expenditure if they were given a closer knowledge of food values. If those who have been agitating on malnutrition would throw their energy into such propaganda they would be doing a timely service. No one wants the ' dole ' to be synonymous with a bare subsistence. What we suggest would help the unemployed to get something more out of it." This, we maintain, is the type of propaganda to which the Report lends itself. The paragraph is typical of the attempt which is being made to persuade the general public that there is no need to worry about the health of the nation.

We have no desire to use malnutrition as a political stunt, but we do question the honesty of the Report in dealing with unemployment and malnutrition. In view of the facts and figures we have given, we have written this account not so much in a spirit of attacking the medical service for what it has done, but in an attempt to present a truer account of the state of public ill health, and to expose the present complete inadequacy of the assumptions which

presumably underlie the service and the narrow view-point taken in the Annual Reports.

What, then, are the motives behind the Report on Public Health? Apathy, disbelief, ignorance; a pride in the medical service to make it seem that it is able to continue in steady amelioration, even over the effects of the depression, or political influence, to paint a bright picture? Whatever it is, the Report and what it stands for is an indictment of our objective accuracy, a stigma on professional honesty.

We can only conclude, wherefore, that, in the face of the strongest medical and scientific opinion in the country, the Ministry of Health stands convicted of ignoring the main issues it should be its primary business to discuss, and, in its Report, by failing to give an accurate, scientific picture of the state of public health, of erecting a barrier of complacency to obstruct those efforts which are being made to build a healthier community.

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