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EFFECTS OF WAR ON CHILD HEALTH*

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The influence of any environmental factor on a growing organism must be measured in terms of the immediate effect produced and also of the ultimate effect on subsequent development. When the growing organism is a child the matter becomes infinitely complex, since the health of the child is intimately bound up with his physical, intellectual, emotional, and moral development. The last of these is least accessible to scientific evaluation but is of profound importance in determining the child's immediate and subsequent adjustment to society.

Furthermore, war conditions themselves are so fluid and variable that by their very nature they are ill-adapted to planned survey or statistical assessment. It will be clear, therefore, that my subject is one where the broad generalization, the clinical impression, and all the uncheckable quotations so anathematized in modern scientific medicine still hold pride of place. In saying this I have not lost sight of the many excellent surveys of children under war conditions which have in fact been carried out. But it is true in general that many of the effects of total war involving the child population will necessarily be unassessable. One has only to consider the unorganized movement of populations and the disruption of civilian services and records for this to become plain.

My own direct interest in the subject dates from the Spanish Civil War, when in 1937 I was brought abruptly into contact with the problems of large-scale evacuation of children from a city in a state of siege. During the succeeding ten years I have had the opportunity of seeing something of the effects of war on children in a dozen different countries, and of comparing the problems arising and the methods adopted for their solution.

The particular points I wish to illustrate are these: the disruption of home and family life of the individual child; the instability of his environment, varying from constant movement before an advancing army to evacuation under aerial bombardment; the lowered and often conflicting moral standards with which the child is likely to be brought into contact; the commonest disease processes likely to affect the child; and the means taken to safeguard the welfare of particular childhood populations in countries at war.

Broadly speaking, total war as it affects the child may be considered as an infectious disease: the first phase or period of incubation is that during which a peacetime economy is being rapidly turned over to wartime needs; the second phase is the period of eruption or invasion, which is likely to be fulminating, when a rapidly moving front will result in mass movements of civilian refugees; the third

phase is the long-continued period of sickness represented by life under enemy occupation or aerial bombardment; and, finally, we have the stage of convalescence, often protracted and incomplete, which continues through the immediate post-war years. The individual child may succumb at any stage of the disease, and those that survive the period of convalescence may well carry the effects of the illness throughout their lives.

The biological effects of the pandemic will also affect the race as a whole. Against the advantages of earlier marriage and reproduction which commonly result from war conditions must be set the prolonged separation of couples during the reproductive period, the rise in illegitimacy, and the increased number of divorces and broken homes.

Periods of severe nutritional deprivation will result not only in a rising infant mortality but also in a lowered conception and birth rate. Thus in Rotterdam and The Hague, where there was a period of acute undernutrition affecting the whole population for a relatively short and well-defined period in 1944-5, it was calculated that 50% of the female population became amenorrhoeic, and that nine months later the birth rate was less than a third of the normal for the same cities (Smith, 1947). In Berlin the infant mortality rate in the British zone rose to well over 200 infant deaths per thousand live births between July and December, 1945—approximately four times the pre-war rate in Germany.

But in spite of these large-scale disasters there is one feature of the recent war which personally I consider of the utmost social significance—namely, the attention paid to the protection of child life during the war years in almost every country involved. This was in marked contrast to conditions in the past, when children were to a large extent treated as members of the general civilian population, and were likely to be the first rather than the last to suffer during periods of prolonged deprivation. It may reasonably be argued that war conditions themselves have changed; that the introduction of large-scale aerial warfare has directly involved the civilian population to an unprecedented extent; and that the occasional sack and elimination of cities in the Middle Ages are more than counterbalanced by the systematic destruction of newborn infants and children which was practised in certain concentration camps. Without questioning the validity of this argument, the fact remains that in most countries the importance of preserving child life was realized from the outset.

Movement of Refugees in Spain

I make no apology for taking many of my illustrations from the Spanish Civil War. This is now an old story; but while the conflagration in Spain was at first on a smaller scale it illumined many of the problems which were to

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develop world importance later. As in every war, the movement of refugees in Spain was conditioned by a number of different factors, including not only the movement of the front line but also the nature of the terrain—e.g., the relationship of agricultural land to the larger cities, the position of the sea coast, and the nature of the frontiers. Though not the first war in which aerial bombardment had been deliberately used against civilians, this modern weapon introduced new and unexpected factors into civilian behaviour. The picture was further complicated by the fact that the war was essentially a civil war, in which the presence of a fifth column introduced the atmosphere of mutual distrust and betrayal which was to prove perhaps the most degrading of all the attributes of war.

The first movement of refugees—trekking by road and under shell-fire from the sea—was from the southern extremity of Spain toward the north; the greater part of this mass movement was to Barcelona and the province of Catalonia, bordering the French frontier in the Pyrenees. With the evacuation of Madrid through the narrowing life-line linking the capital with any agricultural area, the refugee population in the north steadily increased, whilst living accommodation and food supplies as steadily deteriorated. The number of refugees in this comparatively small province was subsequently swollen by the arrival of Basques, whose native province had been overrun, and later by an increasing number of Catalans who had been rendered homeless by the enemy advance. Ultimately, with the final defeat of the Republican Army, over half a million refugees poured over the Pyrenees into France.

The clearest impression that remains after talking to many of these refugees while still in Catalonia is not so much of their often appalling living conditions, inadequate food, and lack of soap and fuel as of their complete insecurity and homelessness (Ellis and Russell, 1937b). Many women with young children had literally been on the road for weeks, while they knew they might be moved on at any moment to some other very temporary asylum. A small boy of 5, who arrived in Barcelona with forty others from a children's colony which had just been machine-gunned, told me with pride that he had already been evacuated three times from the neighbourhood of an advancing army. I was to see him moved three more times before he finally reached France, though even here the prospect of his finding any permanent refuge was remote. A peasant woman from near Malaga, with an infant in arms and two other small children, told me that a fourth child of 5 had left her side during the first panic exodus from the south and had been lost in the stream of refugees on the road, and that she had never seen her since.

Although many had left home with such household goods as they could carry or pack into carts, by the time they reached France their belongings had for the most part been lost, bartered, or stolen on the way. The few donkeys that remained were slaughtered for food in the final trek over the Pyrenees, while any valuables that had been retained were requisitioned by the Sudanese troops guarding the concentration camps in France or finally exchanged for food.

My impression, and I can hardly call it more than this, is that the child can forget physical hardship (as distinct from deliberate cruelty) remarkably quickly, but that if he is brought up with no settled home that he can remember, no personal possessions, and no permanent friends he has a handicap which he can never completely overcome. This in essence is the lot of the refugee child.

To consider a particular, and in many ways more fortunate, group of Spanish children in detail I must go back to the middle period of the Spanish Civil War. In 1937 the Basque country at the Atlantic end of the Pyrenees became

an active theatre of war. By May of that year the main port, Bilbao, had been encircled by land and blockaded by sea, and in spite of the efforts of blockade runners and fishermen it was in a state of siege. Refugees escaping by boat or through enemy-occupied territory were still reaching France, but there remained a large child-population in the city, which at that time was living almost entirely on rice, dried beans, cabbage, and 35 g. of black bread a day per head. Unlike the refugees from the south, who in the early days of the war had been shelled from the sea but had not been bombed or machine-gunned from the air, the inhabitants of Bilbao were having the first bitter taste of aerial warfare. Since Bilbao was almost entirely lacking in effective air-defence, it lay open to continuous air attack by day, and full use was made of this weapon in keeping the population in a constant state of disturbance and anxiety. Although the tonnage of bombs dropped on the city and the loss of life may appear trivial by comparison with what was to happen later, the complete destruction of Guernica from the air was still fresh in the mind of every Basque, and had already shown how effective air attack could be against an unprotected civilian objective.

Evacuation of Spanish Children to England

It was at this time that the growing concern for the fate of Spanish children which was felt by many people in both Europe and America was expressed in England by an offer of the National Joint Committee for Spanish Relief to receive and support four thousand children from Bilbao until such time as they could safely return. Whilst this number of refugee children cannot be considered large by present standards, and indeed hardly touched the Spanish refugee problem as a whole, the venture can be taken as representing a considerable act of faith and something of a pioneer venture at the time it was undertaken. It must be remembered that it was allowed by the British Government only on the understanding that no expense should fall on public funds; that the length of time for which the children were to be supported was quite unknown; and that most of the lessons of large-scale evacuation of children had still to be learnt. Medical examinations in Bilbao were undertaken in circumstances which later became only too familiar; but at that time it was a new experience to see the population orientated around air-raid shelters, schools closed to aid dispersal, and every normal activity continually interrupted by raids (Ellis and Russell, 1937a).

After the inevitable delays, the children were embarked at night in an old passenger liner which had been gutted as a refugee ship. Every available foot of space was utilized, children sleeping tightly packed on the floor of the saloons, in corridors, and in the hold. The ship was escorted across the Bay of Biscay by a British destroyer.

The after-story of these children can be told briefly, though it illustrates in miniature many of the effects of war on childhood and their repercussions. First, the possible spread of disease by refugee movement had to be guarded against. The main dangers which were feared were the introduction into England of typhus and trachoma. These fears proved to be exaggerated, and although two cases of trachoma were subsequently diagnosed no case of typhus occurred.

The Commoner Diseases

The diseases which were found to be of greater significance were typhoid fever, pulmonary tuberculosis, pediculosis, and scabies. In spite of a much more thorough medical examination by the port medical authorities at Southampton than had been possible in Bilbao, a small outbreak of typhoid occurred in the tented camp into which the children were first drafted on arrival. This, however, was limited to five cases, and was rapidly controlled (Taylor, 1937; Gibson, 1937).

Tuberculosis

Pulmonary tuberculosis continued to be a source of anxiety throughout the children's stay in England, and a number of fatal cases occurred during the subsequent two years. It is difficult to estimate how far war conditions were directly responsible, though there can be no doubt that the period of severe nutritional deprivation which both children and the accompanying adults had suffered and the crowded life in air-raid shelters would favour infection, and that their subsequent life in residential colonies would increase the likelihood of spread.

The subsequent world war has also emphasized the increased mortality from childhood and juvenile tuberculosis; the two age groups most likely to be affected are children under 5 and adolescents. The figures given by the International Red Cross (Comité International de la Croix Rouge, 1947) for post-war Germany have been severely criticized as being grossly inaccurate. (Hart, 1947), and indeed they might well be regarded as a classical example of "sentimental arithmetic"; but if we take those for Scotland, where aerial bombardment and destruction were minimal, the effects of war are even here clearly evident. Comparing the mortality from tuberculous meningitis in 1940 and 1941 with the 1938 figures, the increases in the 0-5 age group were 66 and 28% respectively, and in the 15 to 25 age group 70 and 135% respectively. Although 1941 proved the peak of the war years for the overall mortality from tuberculosis in Scotland, it must be remembered that in most countries in Europe conditions deteriorated rapidly between 1941 and 1945, and in some they continued to deteriorate after the cessation of hostilities. There would be little question that the mortality and morbidity from tuberculous infection in the children of Europe as a whole seriously increased owing to war conditions, and in many countries is still a matter of the greatest concern.

Pediculosis and Scabies

I would say from ten years' experience that these two so-called "minor horrors of war" are in fact two of the major problems of war in dealing with a childhood population. In every country under war conditions there are likely to be lack of soap, lack of clothing, lack of hot water and washing facilities, and crowding in air-raid shelters. Add to these the closure of schools and the disruption of the school medical service, which are often inevitable, and it will be obvious that every factor favouring cross-infection and spread is present. The appalling incidence of typhus in the concentration camps in Germany is well known, and it was generally agreed that ambulant or mild cases occurring in children in Naples during the typhus epidemic in 1944 were an important source of spread. Had it not been for the magnificent work of the Typhus Commission in dusting the population of Naples, of which it was estimated some 50,000 were living in air-raid shelters, and the later large-scale importation of D.D.T. into Europe by Unrra (Sawyer, 1947), pediculosis might well have been responsible for a disaster having world-wide repercussions.

Although the possible effects of scabies are less dramatic, the degree of misery which it can cause in an untreated population is very great. This was well seen amongst the Spanish refugees in concentration camps in France after the major exodus in January, 1939, and could probably be paralleled wherever there has been mass refugee movement. Even in Holland, with its notoriously high standard of cleanliness, one of the major problems of relief work after the occupation was the treatment of scabies, particularly among children. Although I cannot give statistical support for this statement, several European colleagues have commented on the greatly increased incidence of osteomyelitis in childhood during the war and immediate post-war years, which was attributed as much to skin sepsis as to malnutrition. If this observation is correct it would suggest that scabies, as the principal cause of skin sepsis under war conditions, may have more far-reaching effects on child health than the primary infection would at first indicate.

One further disease the local spread of which has been favoured by war conditions is malaria, which in spite of

active antimalarial measures is still causing grave concern in Italy and the Balkans. An example of how it was disseminated by refugee movement was seen in the autumn of 1939, when many of the Polish refugees entering Rumania were drafted into camps in the Dobrudja, a highly malarious area where a large proportion became infected (Ellis *et al.*, 1939).

Disruption of the Family

That this is apt to occur with refugee movement is again well illustrated by the Spanish Basques; I have been able to follow the fate of many of these families over a period of ten years, and a typical example may be cited. At the time the Basque country was invaded, a number of countries, including France, Belgium, and Russia, were giving hospitality to child refugees. Although in the group selected for England an attempt was made to include so far as possible children from the same families, it happened in many cases that an older child was sent to a different country and a younger child remained with the mother. With the imminent fall of Bilbao many of the parents themselves escaped into France, thence back into the Catalan province of Spain, and from there back again into France with the final fall of Republican Spain. In the mass entry of half a million Spanish refugees into France husbands and wives were forcibly separated and drafted into separate concentration camps. Those who for political reasons were unable to return to Spain under the new regime either remained in France or were able to leave France for Mexico, North Africa, or elsewhere. I was able in 1944 to visit in French North Africa the mother of two Basque girls who were still in England. At that time the mother had with her in Algeria two younger children; one son was in Russia, the father had died in a German concentration camp in France, and the son who had been with him had reached Mexico. Her own mother was destitute in Spain, whilst the two girls in England she had not seen for seven years.

Although it was possible for the great majority of the four thousand children who came to England to be reunited with one or other parent within two years in Spain, France, England, or elsewhere, there remained a considerable number whose parents were untraceable, were dead, or were political prisoners, or who were separated from their parents and remained in England for a much longer period. In the case of younger children who were 5 or 6 years old on arrival, the difficulty of maintaining a working knowledge of their own language was often considerable. Although at first all had been maintained in Spanish-speaking groups, every effort had been made to encourage English foster-parents to take an interest in individual children, and when England was herself involved in war a number of children were adopted into English homes. There was the further complication that some of the parents were purely Basque and not Spanish-speaking or were illiterate, so that even when their whereabouts were known the children inevitably tended to become more and more out of touch with them.

Even within the microcosm of this small group, therefore, it was possible to see how soon children separated from the parents might acquire a completely different outlook and way of life, and even lose the capacity for writing or speaking the same language. Where children become separated from their parents before the age of 5, as happened in innumerable cases during the recent war, all these difficulties are infinitely magnified. The infamous policy of "Nacht und Nebel," by which the identity of parents and children was deliberately obliterated, was designed, amongst other objects, to make reunion of parents and children impossible, and was only too successful. The work of the International Red Cross and the Tracing Bureau of Unrra and the Allied Military Government after the liberation of the concentration camps in Europe was beset with insuperable difficulties where young children were concerned. That even some measure of success was achieved is a high tribute to those responsible for producing some sort of order out of the chaos left by war.

Enemy Occupation

The life of the child in a country suffering enemy occupation is lived under conditions which require the recognition,

if not the observance, of two completely different standards of behaviour. There is the code laid down by the occupying Power, which demands collaboration by the civil population and the unmasking of saboteurs; there is at the same time the code of the patriot, who regards sabotage and even terrorism as a duty and to whom the informer is a traitor. The example I have in mind, and with which I am most familiar, is that of Belgium; but I fully realize that the child of Jewish parents in Palestine may have been in essentially the same predicament. The parents and those most respected no longer represent the forces of law and order but are ranged against them. The child is required to bear a burden which has broken many an adult back. He must outwardly adopt a standard laid down by an enemy whom it is his duty to hate, since failure to conform may endanger not only himself but his immediate family; at the same time he will earn the admiration of his contemporaries by running counter to this standard and undermining authority in any way he can.

I do not wish to exaggerate or over-dramatize this situation. Indeed, from talking to many Belgian children of the "gang" age I was forced to the conclusion that the situation had been widely used as play-material, and that pin-pricking of authority when a spice of danger was added was not by any means alien to their inclination. The smuggling-in of potatoes from the country, the dropping of a lighted cigarette-end into a German overcoat pocket in a crowded tram, or even the insertion of a pinch of sugar into a military petrol tank all demanded ingenuity and received approval. An attempt to suppress the Scout movement resulted in an unprecedented increase in membership during the German occupation. Probably the children who suffered most were those whose parents were suspected of being collaborators. Nevertheless, there can have been few older children who were not affected to some extent, consciously or unconsciously, by the atmosphere of anxiety and distrust which prevailed. Since arrests were frequent, and an increasing number of able-bodied men were transported into Germany for forced labour, many families were dismembered and large numbers of children were cared for in children's colonies and orphanages.

Again, it is impossible to assess the permanent effects which such a period of enemy occupation will have on children who have experienced it during their formative years. But the fact that use of the black market became universal and virtually the means by which the civilian population could survive (Ellis, 1945), and that innumerable means of subverting authority became not only widespread but respectable, inevitably rendered difficult a return to normal standards of social behaviour. It speaks highly for the quality of the Belgian people that within three years of the liberation life in Belgium is as normal as it is at present; but there is nevertheless an appreciable difference between the social standards in any country which has suffered prolonged enemy occupation and those of a neutral country, such as Switzerland, which has not known the deprivations and subterfuges which such an occupation entails.

Aerial Bombardment

Child health in a country suffering prolonged and intensive aerial bombardment will be considered from the point of view of the secondary effects that aerial warfare will have on the organization of the community rather than from that of loss of life directly due to enemy action. These effects may be related to three major factors: evacuation of children from the danger areas to reception areas; the introduction of a rigid black-out; and conditions of life in air-raid shelters.

Evacuation of Children

Evacuation of children from vulnerable areas to reception areas was carried out on the largest scale and was most highly organized in England and Wales, and since the difficulties involved are well known I need only briefly recall a few points germane to our present subject. The official history of what must be regarded as a major triumph of civilian organization is told in the Report on the State of Public Health during Six Years of War (Ministry of Health, 1946), one of the most interesting documents which these years produced. Before the declaration of war, plans had been made for the evacuation of some three million persons, including young children accompanied by their mothers, expectant mothers, unaccompanied school-children, blind, deaf, and crippled children and adults.

Needless to say, this mass movement of an urban population into predominantly rural areas involved innumerable minor and some major difficulties. It was a rude awakening to many of the families who received evacuees into their homes to find what low standards of living still existed in certain sections of the community. Since the first evacuation took place at the end of the school holidays more children were found to be verminous than if they had been under regular school supervision, and the large-scale organization of inspection and cleansing facilities was necessary. In many reception areas the school population was so much increased that the buildings had to be used in shifts, and children could spend only half the day in school.

The unaccompanied school-children who were evacuated fell into three obvious classes: those who were fortunate in their foster-homes and who rapidly became adapted to their altered circumstances; the misfits; and the unbilletable. Of the first group little need be said except that their position was rather less stable than that of normal children in their own homes and that some loss of contact with the parents was inevitable; these children suffered relatively little, and many benefited physically from their changed environment. The child who was a misfit, usually owing to being billeted on foster-parents with different standards from those of his own parents, became an increasing problem. If the first foster-home were not a success, the child was liable to arrive at the second with the feeling that he was unwanted, and the scales were heavily weighted against a successful adjustment to new surroundings. With each subsequent move the difficulties became greater; delinquency, truancy, enuresis, or other behaviour disorders more or less directly due to the instability of his background were finally apt to bring him into the group of children who could not be billeted in private homes. This last group, of whom enuretics formed a high proportion, required special handling in children's colonies. As might be expected, the results achieved in these colonies varied very greatly, depending to a large extent on the quality of the house-mother and staff. In some instances the grouping together of children whose main need was usually individual attention and affection resulted in their condition deteriorating. In others, children were found to adapt themselves to community life organized on family lines better than they had done to a foster-home where the foster-parents had not had the understanding or devotion necessary for their proper care. Many of these more successful colonies have been retained since the war for the care of problem children referred by education authorities and child-guidance clinics.

Infants and pre-school children were so far as possible kept with their mothers, but with the intensification of aerial bombardment and the recruitment of women into war work there was an increasing necessity for the setting-up of

day and residential nurseries. In the case of day nurseries there was general agreement that these fulfilled a valuable function, and that such increase of infection as occurred was outweighed by their advantages. Residential nurseries were a much more serious problem, since these had for the most part to be housed in country mansions, often quite unsuitably constructed, or in day-nursery schools, which also had not been built with the sanitation necessary for residential homes. Except for a few serious outbreaks of gastro-enteritis, however, the infection rate was much less than had been originally feared. The psychological effects of community life on these "infants without families" have been made the subject of an interesting monograph by Burlingham and Freud (1943).

Black-out; Air-raided Shelters

Black-out.—While children of all ages suffered the minor discomforts of the black-out which were universally familiar, the life of the older child was radically changed during the winter months. He had either to remain entirely indoors after five o'clock on moonless nights or to wander about in complete darkness. The mounting number of street deaths during black-out hours made most parents prefer the former, with the result that the majority of children were largely cut off from youth organizations and other normal evening activities. Lack of parental control, as was inevitable in the case of evacuated school-children, was apt to lead to juvenile delinquency after school hours, and there can be no doubt that the black-out, coupled with the presence of great numbers of troops of different nationalities, was partly responsible for the many sexual offences against children and young adolescents which occurred.

Air-raided Shelters.—In spite of the measures taken for evacuation many children remained with their parents in danger areas, while some reception areas were also subject to air attack. An idea of the child population of London in 1944 can be gathered from the fact that over half a million children left in the organized evacuations which were restarted when flying bombs were first utilized against the city. During the periods of intense bombardment choice lay between children sleeping every night in crowded air-raided shelters or being roused from sleep and taken down to the shelters when the alarm was given. In any case, loss of sleep over long periods, overcrowding in a vitiated atmosphere, continual contact with adult anxiety, and the risk of cross-infection were inevitable. More thoughtful parents have complained that one of the worst features of this and other forms of overcrowding during the war was that every anxiety had to be discussed before children, and that circumstances made respect of personal privacy impossible.

Nutrition

The starvation conditions which occurred in central Europe after the 1914-18 war served to focus attention on the vulnerability of infants and young children in periods of nutritional deprivation: relief work was largely concentrated on children and expectant mothers, whilst the scientific study of deficiency diseases occurring among the childhood population was largely responsible for clarifying the aetiology of rickets and famine oedema. The blockade which was carried on after the signing of the armistice in November, 1918, served to increase the already high infant mortality and permanently crippled many of the children who survived.

The humanitarian reaction to this was the formation of the international Save the Children Fund, and the endorsement by many Governments of the Declaration of the Rights of the Child, which included amongst other provisions that the child must be the first to receive relief in times of dis-

stress. Needless to say, when war again broke out in Europe blockade was immediately used, and I repeatedly heard the view expressed in this country during the Spanish Civil War that it was in the last analysis a humane weapon, since starvation of the civilian population would bring the war to an end relatively quickly. The argument was used less glibly during the subsequent world war, since blockade and submarine warfare proved a double-edged weapon; I do not propose to discuss the somewhat tortuous rationalization of the view quoted except to say that the main premise was proved untrue. In every country involved the length of time for which nutritional deprivation could be endured proved far longer than was generally imagined, and it is doubtful if starvation was in any instance the crucial factor in determining defeat. This does not mean, however, that starvation as a war weapon was without profound effect. But many of its cruellest repercussions are seen only after the cessation of hostilities, and I think a reasonable case might be made out for regarding blockade and the systematic destruction of food supplies as the surest method of producing a further war within a generation.

Although by the time of the Second World War the lesson had not been learnt that it is a short-sighted policy to kill or starve other peoples' children, every nation had at least realized that it was essential to protect its own. The means by which the nutrition of children was safeguarded naturally varied from country to country according to local conditions, and in some was much more highly organized than in others. But certain general principles were almost universally followed.

Dispersal of children from large industrial areas into rural districts served not only to protect from air attack but also to take the child to the food rather than the food to the child. In many instances the principle of dispersal was carried further, and children were transported from war areas to neutral countries such as Switzerland, or to countries such as America and Canada which, though belligerent, were remote from devastation. Whilst the deepest appreciation of this hospitality was felt by the countries to which it was shown, the numbers of children received were of necessity only a very small proportion of those in Europe as a whole. With the increasing strain on shipping it became less and less practicable to transport children by sea, and the sinking in the Atlantic of a liner filled with children put an end to any large-scale evacuations by this route.

The great majority of children, therefore, had to be fed within war areas where food supplies were reduced and where at the same time maximum efficiency was demanded both of industrial workers and of military personnel (either of the country concerned or of the occupying power). The fact that priority rations, particularly of milk, were in almost every instance allocated to children and pregnant women is again an index of the importance attached to the preservation of child health. Thus in Belgium, when the official rations for adults provided only 1,230 calories a day (1941-2) those for children of 3 to 6 provided 1,500 calories and those for infants under 3 actually more than their estimated requirements (Ellis, 1945).

Communal feeding of school-children was widely practised, both as an economy in the distribution of supplies and often as a necessity owing to shortage of domestic fuel or to facilitate release of women for war work. This method was not always practicable in cities where schools were closed owing to aerial bombardment, but as a general rule it was found much the most equitable means of distributing food to the school-age group. In Great Britain the provision of school meals and milk was undoubtedly one of the most successful measures adopted for the welfare of children during the war years, and was carried out in spite

of the difficulties of inadequate accommodation, reduced staff, and limited transport in rural areas.

National Milk Scheme

One further measure which was worked out with singular success in Great Britain was the National Milk Scheme, which made milk available to priority groups at an economic price or free in necessitous cases. This is now taken so much for granted that the fundamental importance of the measure is apt to be forgotten unless it is viewed in some historical perspective. Even under peacetime conditions the consumption of milk by children of the lower, and sometimes even of the higher, income groups fell considerably short of the optimum. With the reduction in available agricultural labour and the unreliability of transport during the war, the difficulties of supplying clean milk in adequate amount to the childhood population became multiplied. The production of a standard national dried milk was then put into the hands of commercial firms having the necessary plant, and the price and distribution to infants were controlled by the Government. In addition, a priority distribution of liquid milk was made to older infants and expectant mothers at considerably less than the standard retail price, and dried or liquid milk was distributed in schools. Therefore, although both the quantity and the quality of milk available in the country deteriorated owing to war conditions, the National Milk Scheme resulted in infants being ensured an ample supply of absolutely safe milk, and children and pregnant women a more uniformly adequate amount of liquid milk than the majority had received before the war. The same general principle of priority distribution to these groups was adopted in most European countries, and though this inevitably meant that others had to go short: the principle was universally accepted as the right one. It is an interesting reflection on the social conscience that it required a national emergency to put it into practice.

Forewarned by the experience of the 1914-18 war and aided by the great extension of knowledge of deficiency diseases which had been made since that time, widespread provision for distribution of vitamin supplements to infants and young children was made by most Governments, substitutes being provided for the normal sources where these were not available. It cannot be said that the "take up" of these supplements in Great Britain was satisfactory, but there is little evidence that the incidence of rickets (British Paediatric Association, 1944) or infantile scurvy was significantly increased. In fact, in countries which have suffered much greater deprivation than has Great Britain the relative rarity of manifest deficiency disease in childhood, other than rickets, which in Hungary increased alarmingly in 1945 (Kerpel-Fronius, 1947), is in marked contrast to the state of affairs in Central Europe in the early nineteen-twenties (F.A.O.-W.H.O., 1947). The main nutritional needs of children in Europe at the present time are calories and protein.

Nutritional Surveys

Any attempt to give an overall picture of the nutritional state of children in even a single country is apt to be so misleading, and the accounts of different observers so contradictory, that the layman is naturally confused and puzzled by the lack of concrete evidence available. Having been hypnotized during the past twenty years into believing that human nutrition is an exact science, and having seen teams of nutritionists descend like locusts on hungry Europe, he is left to glean most of his information from official statements about calories or from the impressions of visiting journalists. It is worth while, therefore, to consider a few of the difficulties which are presented by nutritional surveys and their interpretation.

In the first instance the central administrator is concerned with the amount of food coming into or being produced within the country and its distribution as rations. Of the food coming in there will be a variable leakage into the black market which may assume very large proportions. Similarly the official returns for food produced within the country will inevitably differ widely from the reality, particularly in the case of a country under enemy occupation. Add to this the fact that some of the perishable food distributed will be inedible when it reaches the consumer, that some will be wasted in packing, preparation, and cooking, and that some of the rations will never in fact be supplied, and it will be seen that the chances of error when the official rations are compared with the food eaten are very considerable even when a standard percentage is allowed for wastage.

The child himself, on the other hand, is concerned primarily with what goes into his mouth. If he is cold and badly clad he is likely to want more food than he normally would; if he is sick he may want less. However hungry he may be, his appetite is likely to be affected to some extent by the palatability of the food and whether it is adequately cooked. Surveys have been undertaken on the basis of food actually eaten by individual children over a given period, but even under peacetime conditions these are extremely laborious, and where homes are liable to be broken, mothers employed on war work, or children evacuated the difficulties of their large-scale application to a childhood population are increased. The method has, however, been usefully employed on selected communities even during the war years (Bransby and Wagner, 1945). One such study undertaken in 1939 (Widdowson, 1947) served to illustrate the very large variation in the food intake of normal children: except in a closed community, such as a children's colony or orphanage, the standardization of rations in a country at war would probably be offset by the composition of the family group, access to the black market, home production of food, or other factors tending to maintain this variation in food intake between individual children. Indeed, when the official rations have fallen very low it has repeatedly been noticed that the possession of an allotment or articles that can be bartered may make the difference between borderline starvation and reasonably good nutrition. As would be expected, the nutrition of children in agricultural districts even in countries most affected by war has usually been found higher than could possibly be accounted for by the official rations.

A point that has hardly received the attention it deserves in nutritional studies made on older children and adolescents under war conditions is the possible effect of severe nutritional deprivation on the age of onset of puberty. There is good reason to believe that starvation may delay puberty, and it is known that more mature children will on the average be both heavier and taller than immature children of the same age. There is also a significant difference in the rate of increase in height and weight during successive phases of development (Ellis, 1946, 1948). If, for instance, it was desirable to compare the heights and weights of 14-year-old girls in a German school to-day with those of a similar group of 14-year-olds from the same school in 1938, the comparison would be much more informative if the maturity-composition of each group—i.e., the percentage immature, pubescent, and adolescent—were known, and comparisons made between groups who were both the same age and at the same stage of development. In the absence of routine maturity-grading in school medical examination it is very seldom possible to make retrospective comparisons on this basis. The practical result has been that priority rationing has been related to chronological age rather than

to physiological development, and many children ceased to get supplements at the phase of development when extra food was most needed.

Assessing the Nutrition of the Individual Child

In Europe this problem is not so much that of distinguishing optimum nutrition at one end of the scale or manifest deficiency disease at the other, but in deciding where the child should be placed in the wide region of suboptimal nutrition which divides the two. Innumerable formulae have been suggested, based on physical measurements, performance tests, and the like, their very number indicating the inadequacy of any one. It is interesting historically to remember that the American Relief Administration in Austria after the war of 1914-18 based its relief on the selection of children according to two formulae constructed by von Pirquet. The nutritional index used—namely, the cube root of ten times the weight in grammes divided by the sitting height in centimetres and multiplied by a hundred—showed on subsequent tests that whilst the error in estimating the sitting height was up to 5 cm, a difference of 1 cm. might cause a child to be placed in or out of the malnourished group (Faber, 1923).

Since this time the value of the haemoglobin, of physical performance, and of muscle tone in assessing nutritional status has been more clearly recognized; attempts have been made to standardize the measurement of subcutaneous tissue; the biochemist has added his contribution in estimating vitamin levels and saturation, blood pyruvic acid, phosphatase, and the like; the cornea has been examined for vascularization, and night vision has been tested. But despite the punching of innumerable cards and the clatter of concatenations of calculating machines it is still largely left to the clinician to decide what is or is not a malnourished child. I need not labour the fallacies of unaided clinical appraisal: this has now become almost a credo of medical education. But I would emphasize once again the difficulty of assessing the effect of malnutrition on subsequent development. A short-term loss of weight can usually be made good; but long-continued deprivation may result in retardation of growth or infantilism, which will partially mask, on a single examination, the degree of malnutrition from which the child is suffering. This difficulty cannot altogether be overcome by the use of standard height-weight-age tables, particularly when these have been prepared from normal children of a different race. It is only the long-term study of individual children which can in the analysis tell us the ultimate effects of such malnutrition as has been the result of the war years.

Conclusion

It would be only too easy to end on a note of disillusion and despair. We have widespread evidence in Europe of unrest, bitterness, disease, and destitution among those who suffered as children in the early war years and are now approaching manhood. But I feel rather that the experience of the recent war can give us certain grounds for hope. The general recognition that children must be preserved at any cost, the good will that alone made possible the evacuation of children from danger zones, and the equal distribution to children of rations on a scale which made the already heavy burden of the adult community even harder to bear all point to a new understanding of the child's importance to society. These may seem small advantages to set against the havoc and chaos occasioned by war. But they are certainly symbolic of the new spirit which has entered into the protection of child life and health. This is becoming less and less a matter of sentiment or charity and increasingly one of vital concern. The fact that every country

has put children first instead of last when survival was at stake is surely an omen for the future, and we can only hope that this at least of what has crystalized in the crucible of war may not be lost in the uncertain years which lie ahead.

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OBSERVATIONS ON RATIONING IN TUBERCULOSIS

BY

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Investigations into the adequacy of the diet of tuberculous patients carried out during the earlier war years (Ross, 1943; Keers, 1945) seemed to confirm the official view that the dietetic restrictions imposed by rationing had exercised no deleterious effect and that the patient's nutrition had been maintained at a level high enough to enable him to combat his disease successfully. In those investigations the average gain in weight was used as an index of the nutritional state of the patient, although it was recognized that this method did not provide full information regarding possible dietetic deficiencies such as mild degrees of avitaminosis. The years 1938 to 1942, as they affected the patients in certain Welsh sanatoria and a Scottish sanatorium, were covered, and the figures produced indicated that on the whole the average gain in weight recorded was no less than in the years preceding the outbreak of war.

The investigation has recently been reopened and extended at Tor-na-Dee Sanatorium, as it was felt that during the past two years the average gain in weight had been less satisfactory—an impression which it was considered necessary to confirm or refute by a detailed examination of the weight records. The method of investigation adopted was that which was used in the previous publication. Each patient in the sanatorium is weighed once a month, and the gain or loss in weight during the preceding month is noted. These gains and losses throughout the patient population, added together and divided by the number of patients