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NUTRITION
IN INDIA & ASIA.
By
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THE PROBLEM OF NUTRITION IN INDIA AND SOME ASIAN COUNTRIES

In the opening years of the twentieth century the concept of nutrition centred round the idea of adequacy. It was generally believed that if an individual had enough to eat there was no need to worry. Unfortunately one did not know for certain whether all human beings had enough to eat. With the advance in the science of nutrition it was gradually realised that not only the quantity but quality of the diet was an important consideration in the maintenance of health. With the discovery of deficiency diseases and their relation to faulty diets thinking people in many countries began to ask questions. Foodstuffs were analysed by the thousand and their quality in terms of essential nutrients was determined. Next followed the dietary surveys carried out in all parts of the world. Meanwhile, the knowledge about the basic requirements with regard to dietary needs was advancing steadily. The knowledge thus gained was applied to study the needs of communities. It soon became apparent that many communities subsisted on faulty and even insufficient diets. In the more advanced and richer countries the number of malnourished people was small although it was appreciable. In backward and poorer countries malnourishment was found to be widespread and what was more painful to find was that a fair proportion of the population was undernourished as well. If this was so, who was responsible for this state of affairs, the individual, the community or the state? The answer to this question has been forthcoming only recently.

In 1943, the United Nations' Conference on Food and Agriculture held at Hot-Springs, USA during the war declared that 'the primary responsibility lies with each nation for seeing that its own people have the food needed for life and health; steps to this end are for national determination. But each nation can fully achieve its goal only if all work together.' Thus the responsibility of the state in ensuring adequate nutrition for all of its citizens has now come to be accepted. The Nutrition Advisory Committee of the Government of India took this view fully into consideration when it recommended in 1944 that 'the welfare of a people is so dependent on good nutrition that governments must assume responsibility for assuring it by all means in their power.' It must therefore be emphasised that the problem of nutrition which has become acute in most Asian countries can only be solved if attacked by the governments concerned. Piecemeal efforts by lesser agencies are doomed to failure; this problem has reached a stage when it can no longer be ignored without causing almost incalculable damage to the health of the present and the succeeding generations. The problem itself can be stated in simple terms since it ultimately resolves itself into (a) the production of food in quantity sufficient to meet at least the basic needs of the population and (b) to increase the purchasing power of the people so that even the poorest among them can afford to purchase all that he needs for nourishment. Stating the problem thus is probably over-simplifying it. A moment's thought, however, will convince anyone that the entire range of a nation's activities are incorporated in these two sentences.

Till recently state administrations had a tendency to believe that nutrition was the sole responsibility of the Health Ministry and that no other Department

of State need bother about it. Fortunately for the people that idea has given way to a broader conception of the ramifications of the problem.

The production of food presupposes a very active Agricultural Department of the State. The agricultural produce has to be supplemented by food obtained from other sources such as milk, meat, eggs and products of inland and marine fisheries. Much of the food thus produced would go waste if adequate facilities for quick transport and preservation are not readily made available. The economics of food production and marketing also require close study in the interests of the producer as well as the consumer. The health organisation has the function of keeping a watch over the quality of marketed food and watching the effect on the health of the population of the shortage of food of any particular kind, or of all kinds. It has also the role of educating the public to eat the right kind of food, and to set up standards for requirements or allowances which should act as a guide for food production and distribution. It will thus be realised that co-ordinated action on the part of the whole administration is the only way in which the problems of nutrition can be satisfactorily solved.

Although basically the problem is the same for all nations in the world, it is bound to be different in details even for countries on the one continent of Asia. The area covered is vast spreading from the polar to the equatorial regions and differing in climate, racial distribution, density of population, dietary habits and the nature of the soil. It is natural, therefore, that local conditions would determine to a great extent the nature of the actual problem. The scientific knowledge on nutrition gained during the last twenty years, however, permits discussion of these on a common basis of certain fundamental principles.

The information relating to nutrition in different countries in Asia has been extremely limited. There is almost a complete lack of knowledge concerning Soviet Asia and countries of the Middle East. A certain amount of information used to be available before the World War II from China, Japan, Philippines, Indonesia and the British Colonies in Asia. The war, among other things that it did, put an end to this. Some authoritative accounts are obtainable, however, from the following publications: (1) *Report of the Inter-Governmental Conference of Far Eastern Countries on Rural Hygiene* held at Bandoeng in Java (1936), (2) *The Proceedings of the 10th Conference of the Far Eastern Association of Tropical Medicine* held in 1938 at Hanoi in French Indo-China, (3) *The Report on Nutrition in the Colonial Empire* published in 1939 by the Committee on Nutrition in the Colonial Empire under the auspices of the Economic Advisory Council of Great Britain and (4) 'A Review on Nutrition' by Van Veen of Batavia appearing in Volume XI (1942) of the *Annual Review of Biochemistry*. The reports of (a) the Nutrition Advisory Committee of the Indian Research Fund Association—which is also the National Nutrition Advisory Committee for India—since 1936 to date and (b) the Health Survey and Development Committee of the Government of India (1946) have been extensively drawn upon for information concerning India.

A study of all these reports points to the following general conclusions: (a) In most countries the food produced has not been sufficient to meet the needs of the

people, (b) poverty amongst a great majority of people compels them to remain undernourished, (c) ignorance coupled with prejudices and other psychological factors contribute to prevent the effective use of whatever nutritious food is available, (d) the deficiency diseases and subclinical states of deficiency are quite frequent in all countries under review.

Such were the findings before the outbreak of the War in 1939. The conditions have considerably worsened since then and there is hardly any doubt that the ill-effects arising out of all the factors mentioned above have brought the problem of nutrition to its present acute stage. The study of these reports also reveals the fact that the proposed steps towards ameliorating these conditions suggested by the authorities of the various nations concerned follow almost similar lines.

At this stage it would be useful to give in brief some information on nutrition in some of the Asian countries.

Ceylon : Nearly two-thirds of all food-stuffs consumed in Ceylon is imported. Rice is the staple article of diet, two-thirds of which is imported as polished rice. Unpolished rice is eaten in rural areas and in the dry zones of the north. Leafy vegetables, tubers, beans, gourd etc., are used as supplementary articles. Fish is eaten by the poor classes, meat is rarely taken, and milk, and milk-products, are seldom used. The diet of the people is deficient slightly in calories, calcium and in vitamins A and B complex. Among the poorer classes deficiency diseases such as phrynoderma and sore mouth are common. Much of the blindness is due to lesions resulting from vitamin A deficiency and is preventible. Infant and maternal mortality is also alarmingly large.

Malaya : Rice is the staple grain supplemented with pulses and vegetables and red palm oil. Fish is the only animal food, milk and meat being rare. The Chinese in Malaya have a better diet; besides rice they eat vegetables, soya beans and pork. Milk has no place in their diet. The diet in rural areas, especially among the poorer classes is deficient in energy value, proteins of high biological value, vitamins and probably minerals too. Beriberi, xerophthalmia and other deficiency diseases are not infrequent.

Indonesia : Rice, maize, cassava and sweet-potatoes form the principal carbohydrate sources. In some parts rice forms the more important article of diet; in others maize takes its place. In rural areas unpolished rice is used, the more affluent classes using the polished variety. The method of cooking rice is interesting in that it is cooked by steaming and not boiled with water. Soya beans, tubers and vegetables supplement the diet which in the main is vegetarian. Along the sea coast fish enters the dietary of the inhabitants. Meat is rarely eaten. Milk is still more rarely taken. The animal proteins and animal fats in the diets are at an extremely low level. The calories vary between 1,800 and 2,600. The general state of the health of the people is not bad. Beriberi is a potential danger mainly to city dwellers. Scurvy, rickets and pellagra are unknown. Xerophthlmia,

keratomalacia and haemeralopia are known to occur in many places. Phrynoderma and angular stomatitis are also met with.

Siam : Polished rice together with curry containing small amounts of fish and meat, mashed red pepper with negligible amounts of fish parts or small bits and occasionally vegetables and fruit form the Siamese meal. Two meals a day is a common practice. The poor dietary has its effect on the health of the people. Children and pregnant women are undernourished and malnourished. Beriberi is a pressing problem. Rickets, goitre, anaemia, vesical calculi, parodontal disease, skin disease, etc., are other common diseases having their origin in a faulty diet.

Philippines : In addition to rice the Filipino diet contains vegetables and fish. The last is abundant, cheap and forms an important article of the diet. Milk consumption is practically negligible. In general, however, the diet is characterised by deficiency of calcium and iodine and vitamins A, B₁ and C. The rates of incidence and mortality from beriberi are unusually high. Rickets is fairly widespread and scurvy is not unknown. Even the well-to-do people frequently show signs of malnutrition.

Japan : The population of Japan is 80 millions and the density 374 per square mile. Even with intensive farming Japan was not self-sufficient with regard to its food. Foodstuffs obtained from her colonies and a very well developed fishing industry supplemented the produce of the land. Rice, which is the staple cereal, is sometimes supplemented with other cereals like barley, wheat, maize, millet, sweet-potato, potato etc. Vegetables and fruits, fish and meat are served with rice. Soya bean and some pulses are also consumed. Sea-weed and its products are used as human food. Meat and milk consumption is extremely small. Beriberi, Scurvy, rickets and eye diseases are frequently met with. The infantile mortality for 1934-1939 was 115 per thousand live births.

The foodstuffs consumed in Japan have been thoroughly analysed for their nutritive value. The Imperial Institute of Nutrition at Tokyo has been interested in all problems connected with practical aspects of nutrition. Prof. Saiki, the Director, favoured the idea that not only must the daily diet be balanced, but that every meal should be so.

During the war food was rationed in Japan, the ration being fairly generous. During later stages of the war fish was scarce resulting in protein shortage. This may have a deleterious influence on the health and growth of children and adolescents.

Indo-China : Rice is the most important cereal food. Maize is eaten where rice is not available. Soya bean in its various preparations also features prominently in the dietary of the Indo-Chinese. Tapioca, sweet-potato, yams and other fruit, root and leafy vegetables supplement the diet. Where people can afford it, fruit is also eaten. Pork and fish, fresh or pickled, supply the animal protein moiety of the diet. Milk consumption is practically nil. In the poorer classes the diet is often insufficient in quantity and very poorly balanced. Beriberi is an important public health problem. No information on other deficiency diseases is available.

China : The Chinese diet shows preponderance of cereals with a low proportion of animal food and lack of milk. Rice forms the staple food in South China, while wheat takes the first place in North China. Millet and maize are also used as human food. In 1937 the soya bean consumption was estimated at not more than 4% of the total consumption of staple foods. Roots and tubers and leafy vegetables are commonly used and fruits only rarely. The consumption of meat and fish is very limited. The Chinese diets are deficient in (a) proteins of high biological value, (b) calcium and (c) vitamins A and B₁. Among the deficiency diseases xerophthalmia, phrynoderma, rickets and osteomalacia are commonly met with. Goitre is endemic in certain regions of North China, whereas beriberi is common in South China. Scurvy and pellagra are comparatively rare.

India : The Indian diets are also based primarily on cereals. In the provinces of Bengal, Madras and the coastal areas of Bombay province rice forms the staple cereal. On the Deccan plateau rice is largely replaced by millets like 'jowar' (*sorghum vulgare*) and 'bajra' (*Pennisetum typhoideum*). In wheat-growing areas of north and west, that is the staple cereal. There are certain regions where mixtures of cereals are used in daily dietaries. In the south another cereal called 'ragi' (*Eleusine coracana*) is the only cereal found in the diet of very poor people. Pulses and vegetable oils form useful adjuncts, vegetables being used sparingly. The use of meat, fish, eggs, milk, and milk products is determined by the economic status of the individual. Fruit is consumed occasionally, mainly during seasons when particular types of fruit are abundant and cheap. In the main, therefore, the poor man's diet in India does not materially differ from that of his opposite number in the other countries mentioned above. The deficiencies are multiple. The diet is insufficient in calories, deficient in calcium, and many vitamins. The influence of this faulty diet is reflected in the health of the population. The infant and maternal mortality is high, the resistance of people to infectious diseases is low and specific deficiency diseases, e.g., night-blindness, Bitot's spots, keratomalacia, beriberi, angular stomatitis, phrynoderma, rickets, simple goitre and anaemias are prevalent.

The information presented thus far shows beyond doubt that the bulk of the people living in the most populated regions of Asia and amounting to nearly half the total population of the globe have been subsisting on faulty and probably insufficient diets. That the respective governments were not unaware of the fact is not in doubt. It can reasonably be concluded that basically the causes for this state of affairs were almost similar. There should be little wonder, therefore, that the remedies suggested have also been somewhat similar. They amounted to (a) intensive and extensive dietary surveys, (b) improvement of methods for the assessment of state of nutrition of representative population groups, (c) evaluation of dietary allowances having regard to local conditions, (d) research, and (e) education and propaganda. It must be emphasised that these steps by themselves are not sufficient as a permanent solution. As has already been pointed out the only solution lies in (i) growing more food of all kinds, (ii) distributing it equitably, (iii) devising ways to utilise it to the fullest extent, and, the last but not the least important, (iv) improving the economic condition of the poorest population groups. These suggestions, simple as they appear, cut across the entire national activities of a people

and more often than not the administrative difficulties deter the most stout-hearted administrator from attempting to put them in practice. Immediate and drastic action has to be taken and, that too, on a co-ordinated basis by the government of any country if success is to be achieved.

In view of what has been said above it will be instructive to present now a brief account of the manner in which the Nutrition Advisory Committee in India proposed to tackle this problem. The Committee is a representative body and its personnel consists of (a) the Public Health Commissioner with the Government of India (Chairman), (b) the Director of the Nutrition Research Laboratories, Coonoor, (Secretary), (c) other representatives of research workers in nutritional science, (d) one or two Provincial Health administrators, (e) the Agricultural, Animal Husbandry, Food, Education and Economic Advisers with the Government of India and (f) one non-medical scientist of repute. The body thus represents all interests likely to be connected with nutrition and therefore the recommendations of the Nutrition Advisory Committee carry great weight. The Committee meets once or twice a year to (a) take stock of the work on nutrition carried out in different provinces and states of India, (b) consider the research work in progress and the proposals for new investigations and (c) to consider any subject sent to it by Government agencies, provincial or central. It is thus in a unique position to have its finger always on the nutritional pulse of the nation.

In 1943, the then newly appointed Health Survey and Development Committee of the Government of India charged the Nutrition Advisory Committee with the task of preparing a report on Nutrition dealing with '(a) the existence and extent of under and malnutrition in India as shown by agricultural production data and surveys of diet and state of nutrition; (b) Deficiency diseases; (c) Education and Propaganda; (d) Nutrition departments in Provinces and States and public health nutrition work generally; (e) plans for improving nutrition.' It is not necessary to give in detail the deliberations of the Committee. Its recommendations are briefly outlined below :

1. The Government must assume responsibility for ensuring adequate nutrition for every individual.
2. The statistics regarding the production of foods of all kinds whether from soil, stock or sea are extremely inadequate and hence immediate steps should be taken to remedy the situation.
3. Taking into consideration the incomplete and unsatisfactory data of food production and the results of dietary surveys the Committee felt that the total amount of food was grossly inadequate. It therefore urged the Government to take steps immediately to increase the production of food of all kinds. The Government should be guided in this respect by the dietary standards or allowances based upon scientific assessment of the quantity and quality of food required for positive health.
4. The diet surveys carried out in India indicate that the bulk of the population suffers from undernourishment and malnourishment through poverty and ignorance. This is reflected in the high figures for the infant mortality and of women

of child-bearing age. The condition also is one of the factors responsible for the low expectation of life in this country. The Government should therefore take all necessary steps to collect accurate mortality and morbidity statistics.

5. The central and provincial public health departments should institute and develop well-equipped and adequately staffed nutrition sections to carry out public health nutrition work in their respective administrative jurisdiction.

Apart from these recommendations certain specific measures were also considered consisting of (a) the special care of vulnerable groups such as the expectant and nursing mothers, and infants and children, (b) encouragement of the social feeding habit and (c) education of (i) specialised nutrition workers, (ii) those who will in turn educate the public and (iii) the public itself.

In the event of the Government deciding to implement these recommendations, the action should logically proceed along the following lines :

- (1) Increase in production of food of all kinds.
- (2) Planning for the best utilisation of all available food with special provision for the vulnerable population groups.
- (3) Periodical health surveys and checks on the effect of food control on the nutrition of the people.
- (4) Education of the public to make them nutrition conscious.

FOOD PRODUCTION

Total quantity of food: In India an approximate estimate of food required by 400 million adult males has been attempted. The figures quoted below are from the report of the Twelfth Meeting of the Nutrition Advisory Committee, November 1944.

TABLE I

Estimated annual requirements of foodstuffs for human consumption

	<i>In million Tons</i>
Cereals	57
Pulses	12
Vegetables—	
vegetables	16
(1) Green leafy	7
(2) Non-leafy including tuberous	24
Fruits	12
Sugar and jaggery	8
Fats (oils and ghee)	8
Milk	46
Fish & Meat	9
Eggs	102,000

Assuming that 30% of the population is vegetarian and would not partake of these foods.

(b) *Dietary allowances* : It is necessary to have some basis for calculating the total food requirements, and it could only be provided if the daily requirements of the population of various age groups were known. A considerable amount of work on the requirements of energy and the essential nutrients such as proteins, vitamins and minerals, etc., has been done in India during the last decade although much more remains to be done. The Nutrition Advisory Committee in November 1944 formulated a table of dietary allowances applicable to Indians and the main consideration in drawing up these allowances can be best expressed in the words of the Committee Report which says, 'Our purpose is to establish objectives for long-term planning by assessing the quantities of different foods required to balance the diet and indicating the changes in existing production necessary to attain this end.'

The dietary allowances in terms of the foodstuffs given in Table II are taken from the Nutrition Advisory Committee Report of the Twelfth Meeting.

TABLE II

Composition of a balanced diet

(Adequate for the maintenance of good health)

	Ounces	Nearest gramme
Cereals	14	398
Pulses	3	85
Vegetables—		
(1) green leafy	4	114
(2) root	3	85
(3) other	3	85
Fruits	3	85
Milk	10	284
Sugar and jaggery	2	57
Vegetable oil, ghee etc.	2	57
Fish and meat	3	85
Eggs	one egg	

The present population of India has been estimated at 400 millions. This should be equivalent to 320,000,000, consumption units as the whole population will consist not only of male adults but also of individuals of different age groups. In making provision for 400,000,000 adult males therefore sufficient food will be left over to provide for the special vulnerable groups such as expectant and nursing

mothers and infants and children. From these two sets of data the total food production could be calculated as given in Table I. It must be pointed out, however, that the figures given in Table I are estimates of foodstuffs for human consumption only. The requirements of livestock, seed, wastage etc., have not been considered, for which extra allowance will have to be made.

Similar attempts to set down dietary standards for the people have been made in China, Japan, Philippines and Indonesia. They have helped in estimating the extent of undernourishment and malnourishment prevalent in various strata of population.

That the existing agricultural statistics are not reliable has been mentioned above. Most experts seem to agree, however, that the present food production is grossly insufficient. It will require an all out effort to reach the state of adequacy ; even then it may not be possible to achieve it within fifteen to twenty years. The target has now been defined, however, and it is the duty of those concerned with the food policy to see that it is reached within a reasonable period.

UTILISATION OF AVAILABLE FOOD

Even while the campaign for increased food production is gathering momentum, it should be possible to make the best use of the available food by taking measures designed to promote that end.

(a) *Rationing* : The first step to ensure adequate distribution of food in times of shortage is that of rationing. In India rationing was introduced in 1943 and has since then consistently expanded. In March 1943 the population included under the rationing system was 1.9 millions; by the end of June 1946, 130 millions were under the rationing scheme. The system of rationing involves the State procurement of food, for then the responsibility to provide the rationed quantity lies with the State. Storage, transport, price control and effective distribution agencies are other considerations involved in rationing. Lack of accurate knowledge of food production and the administrative difficulties in procuring foodstuffs such as meat, fish, eggs, milk, pulses, fats, etc., have made it necessary to confine the rationing in India to cereals and sugar only. Thus all protective foodstuffs have remained uncontrolled and unrationed. In this, rationing in India has been faulty. The scheme provides a minimum of food mainly for energy needs and leaves the individual to find by himself ways and means to obtain the essential foods. The poor do not succeed in this. The result has been that although acute starvation has been avoided, undernourishment and malnutrition are becoming chronic. The ideal condition would have been the rationing of protective food stuffs and the foods providing mainly the energy requirements. Unfortunately it has not been possible in India partly for reasons given below.

Recently some interesting information on food procurement has been made available. During the last three years 50 to 60 million rupees have been spent to support the food production drive. During the same period 910 millions have been

spent in importing food from abroad and an additional 150 million rupees is estimated as the cost of distribution of the imported food to be spent in one year only. The highest agricultural authorities in the Indian government now proclaim that had these vast sums been spent in increasing food production in the country India would never have been in the position of having to beg at the doorstep of other nations for import of food. It is reasonable to state, however, that before the war the Government would never have dreamt of spending even a tenth of the amount for producing more food. To-day India has to pay through the nose for these supplies. It is hoped that this lesson once learnt will never be forgotten.

(b) *Social feeding* : In times of food shortage social feeding goes a long way to conserve the available food. This was first tried on a large scale in Soviet Russia during the first Five Year Plan. It is true that the average individual does not take kindly to the idea of social feeding. He looks on it as a last resort. The objections however, are mainly based on false conceptions. The questions of monotony of diet, infringement of personal liberties, disruption of family life etc., have at one time or other been raised, but a moment's thought will show that they arise from certain preconceived notions and are not based on actual experience. In USSR where the experiment of social feeding has been fostered and carefully watched great strides in improving the diet of the people have been taken by using this very method.

The experiment has demonstrated that (1) improvement in the quality of food made ready for consumption, (2) decrease in wastage of food, (3) lowered cost of preparation, and (4) saving of labour can be achieved by means of social feeding. The preparation of food on a large scale in kitchens attached to factories or on collective farms has made it possible to exercise scientific control for the purposes of retaining the nutritive value of the raw foodstuff in the finished product. Kitchens are kept scrupulously clean and cooking is done under hygienic conditions and proper supervision. Restaurants, attractively decorated and kept scrupulously clean, provide healthy and cheerful surroundings during mealtime to persons who cannot afford these luxuries in their houses. The food is thus eaten and the meal enjoyed in a wholesome environment. A few figures (quoted from *Men, Medicine and Food in USSR* by Le Gros Clark and Noel Brinton) will well illustrate the benefits above referred to. When meals are prepared by families individually it has been estimated that for every 1,000 persons 1,370 work-hours a day are spent on preparation of meals. In communal feeding rooms only 120 work-hours were required for the same number of persons. In a family with an average of 7 square metres floor space, one square metre per person is used for kitchen purposes, whereas in a communal feeding establishment less than 0.3 sq. metre per person was required for kitchen space. In addition to the saving of time and space considerable labour saving can also be effected. In every house women spend valuable time on cooking. In social feeding programmes most of them would be available for more productive jobs. The wastage of food which accompanies preparation and the plate wastage can also be minimised and whatever wastage occurs can be more easily collected for feeding the livestock.

Thus there is hardly any doubt that resort to social feeding on a large scale sponsored and supervised by the state will provide more nutritious food at less

cost and under hygienic conditions. The schemes are workable in large cities, state and industrial establishments, schools and colleges, etc. With proper control and judicious choice of propaganda methods the scheme can be made a success.

FEEDING OF VULNERABLE GROUPS

One of the essential requirements for raising a generation of healthy individuals is the adequate care of expectant and nursing women and infants and children. A nutritious diet during these stages of life will have a great influence on the health of the population as a whole. In India the infant, maternal and general mortality rates are high. The experience of those connected with welfare work suggests that deaths among infants and women of child-bearing age are due to chronic malnutrition. In 1941 the infant mortality rate was 158 per thousand live births, and it amounted to 24% of all deaths, the corresponding figures for England being 59 per mille and 7%. Further it is to be noted that half the mortality recorded in India in a given year occurs in children under 10 years. The death rate among women is greater than for men for the years 15 to 45 and this preponderance is due to mortality from child-bearing. The anaemias of pregnancy associated with faulty nutrition which by themselves are responsible for many deaths, materially contribute to the decreased resistance to puerperal sepsis which is the main recorded cause of maternal mortality.

Much of this unsatisfactory state of affairs can be remedied by ensuring proper nutrition to these vulnerable groups. In times of food shortage these groups should be given preferential treatment in any food distribution and rationing schemes.

It has been observed in many countries of the Far East and in India too—that the weights and the development of the infant during the first six months of life are comparable to those in European infants. But when the infants in Asian countries are weaned and start receiving faulty diets their growth and health shows deterioration which continues till adolescence. The effects of malnutrition during the stage of development leave their mark for the rest of life. The nutrition of children of pre-school age is thus an intricate problem difficult of solution. The adequate nutrition of poor children of school-going age can be ensured, however, by giving them at midday (1) a balanced meal or (2) milk with vitamin supplement, so that at least a major portion of the child's mineral and vitamin requirements would be regularly provided. With the likelihood of compulsory primary education schemes being launched in most provinces a school feeding programme for age groups of 6 to 11 years should represent no insuperable difficulty in India.

PUBLIC HEALTH AND NUTRITION

Deficiency Diseases

(a) *Vitamin A deficiency*: The mildest clinical manifestation is night-blindness. When the deficiency becomes chronic it may lead to blindness. Certain skin manifestations such as phrynoderma have been ascribed to this deficiency

although the evidence is not quite conclusive. Widespread occurrence of diseases to vitamin A deficiency has been reported from India, China, Ceylon, Malaya, Indonesia and Philippines.

(b) *Thiamin deficiency* : Beriberi is endemic in several regions under survey. Mention of the extensiveness of its occurrence has been made earlier. In South India, Siam and Philippines its incidence is alarmingly great. Considering that this disease is entirely preventible by the very simple procedure of preventing extreme milling and polishing of rice it is a wonder that the step has not been widely taken by the authorities concerned. During the war complete milling and polishing of rice has been statutorily prevented in many parts of India. What effect it has had on the beriberi incidence is not yet known.

(c) *Deficiency of vitamins of B₂ complex* : Mild aribo-flavinosis has also been reported widely. Pellagra in its classical form is not commonly met with. The occurrence of certain non-specific chronic diarrhoeas has been traced to nicotinic acid deficiency, and recently a condition described as burning feet has been reported to yield to pantothenic acid therapy. Some types of macrocytic anaemias are associated with folic acid deficiency. Sprue also has been associated with a general deficiency of vitamins of the B₂ complex.

(d) *Vitamin C deficiency* : Fortunately frank scurvy is relatively rare. It must not be thought, however, that chronic state of subnutrition with regard to this vitamin does not exist.

(e) *Vitamin D deficiency* : At one time it was believed that rickets which is associated with the deficiency of vitamin D was not found in the tropical countries. Recently it has been shown that it is not so. Rickets has been reported to be fairly common in China and India. Osteomalacia in both these countries is also not infrequently met with.

Nutritional anaemia, nutritional oedema, and simple goitre are diseases having their origin in deficient diets. In addition to these frank manifestations of deficiency the chronic malnutrition in a general way has left its mark on the health and physique of the people.

Other Diseases Associated with Malnutrition

Faulty nutrition has now come to be accepted as a major contributory factor in determining individual resistance to disease. There are a number of diseases which are directly or indirectly associated with malnutrition. Respiratory diseases—mainly tuberculosis, leprosy, dysentery and other intestinal disorders, peptic ulcer, dental caries, infantile biliary cirrhosis and certain forms of chronic hepatic cirrhosis in adults are only a few selected for mention. Although the role of diet in the etiology of many of these diseases is not quite clear circumstantial evidence is such as to associate them with faulty nutrition as one of the predisposing factors.

Public Health Administration and Nutrition

The modern trends in public health practice suggest that the scope of the public health administration will have to be considerably widened to include public health nutrition work. The activity of these departments was mainly directed till recently towards (a) the collection of morbidity and mortality statistics, (b) supervision of sanitation and hygiene, (c) supply of prophylactic biological products for prevention of spread of infectious disease, etc. Now they may have to look after the health of the population from a new angle. The Public Health Administration will have to carry out nutrition surveys in rural and urban areas, schools and industrial institutions and suggest means for combating malnutrition. Even in the best fed countries such things are done on a fairly large scale. It is hardly necessary therefore to stress its need for the Asian countries, although it is only fair to mention that a start in this direction has been made.

The supervision and control over the sale of food, prevention of adulteration, control of communal kitchens and restaurants and education of suitable personnel will be other duties in connection with food and nutrition. These functions can only be adequately discharged by properly staffed and equipped nutrition sections in the Public Health Administration.

EDUCATION AND RESEARCH

Education: It must have become clear on the strength of what has been said up to now that ignorance of fundamental principles of nutrition not only among the public but probably also among the people who are in charge of public health has been partly responsible for the present state of affairs. One does not need to go far to seek the underlying reason. The science of nutrition is comparatively a new acquisition of mankind. Its phenomenal progress during the last thirty years has been quite bewildering, and knowledge has been accumulating so fast of late that even the scientists often find it difficult to keep pace with it. The nutritional science as a part of physiology and hence also of the general medical curriculum was almost non-existent about twenty years ago. Naturally the public health personnel which graduated in those years and which probably is in charge of the health of people in different countries has had no proper opportunity to grasp the significance of nutrition in the etiology of disease and maintenance of—what we choose to call for want of a better term—positive health. Of course, there are exceptions, especially the workers who had the urge for gaining knowledge and those others who, although being administrators, had the capacity and keenness to apply the knowledge gained by others to practical problems. But their number is exceedingly small.

The first step to improve the nutrition of the people is therefore to so educate the public health workers that the importance of correct nutrition as one of the prime factors in the prevention of disease is fully impressed on their minds, for theirs will be the primary responsibility to look after a nation's health by putting in practice what they learn. The modern trend in the teaching of medicine lays great stress on its preventive aspect and it is good to know that nutrition is one aspect which is no longer ignored.

The health personnel will also consist of non-medical men including health visitors and social welfare workers. These latter will have to perform important functions in the future health programme of the country. It should not be difficult to impart to them the basic knowledge of nutrition which can be applied in their work.

The public has recently become highly nutrition conscious, the main reason being, of course, the protracted food shortage. The layman is therefore in a mood for receiving correct information. But this will have to be given in such a way as not to completely upset his own ideas of food. After all, it cannot be denied that prejudices and traditions die hard. One who has been eating rice throughout his life will not take kindly to the suggestion of substituting part or whole of it with wheat or millet and *vice versa*. A thorough knowledge of the dietary habits, their merits and demerits, the nutritive value of local foodstuffs and an understanding of the underlying psychology and the economic limitations of the class of the people whose diet one wants to improve are therefore a few requirements which a nutrition teacher or reformer must possess. A great help in this direction would be the institution of the village, town, district and provincial nutrition committees consisting of scientific workers, public health staff and respectable and intelligent members of the public itself. The incorporation of simple lessons on nutrition in the general science curriculum of the schools is another step which in the long run will certainly yield good results.

Research : Active research on the fundamental and applied aspects of nutrition is an integral part of any programme devised to attack the problem of nutrition. As the Indian Nutrition Advisory Committee says, 'All progress is based on research and there is abundant evidence that nutrition research can make valuable contributions to human welfare'. In the scientifically advanced countries large sums are annually spent on financing programmes of nutrition research. On the continent of Asia, active nutrition research centres existed before the War in Japan, China, Indonesia, Ceylon and India. Appreciable work was also being done in the Philippines. As a result of the War, however, research work in Japan, China, Indonesia and Philippines must have come practically to a standstill. India was far more fortunate in this connection. The researches on nutrition gathered strength during the War and have been intensified due to continued shortage of food with great benefit to the country as a whole. It is hoped that in the areas devastated by the War, new organisations, interested in nutrition research, will be built up and fostered by National Governments as an important nation building activity deserves to be.

GENERAL ECONOMIC CONSIDERATIONS

It will be unfair to bring this memorandum to a close without making a mention of what may turn out to be the most crucial point. The economic condition of the masses will ultimately determine the fate of the plans designed to improve their nutrition. A discussion of the possible ways and means to increase their purchasing power is beyond the scope of the present note. Besides, a critical appreciation of the issues involved can only be made by a competent economist. It is a pity to note

therefore that on a certain fundamental point such as the average annual income of a poor Indian there has been no unanimity among the Indian economists. Figures varying from Rs. 12/- to Rs. 65/- have been quoted by various authors as the average *per capita* annual income. These obviously have been arrived at by surveys in different places by different investigators using probably different methods of evaluation. But to a layman it all appears confusing.

In 1941 the average cost of a well-balanced diet was computed to be between Rs. 4/- to 6/- per person per month. A poor man earning Rs. 12/- a year would have to spend Rs. 48/- at least to feed himself, obviously an impossible position. Even with the best intention in the world such a person can never hope to obtain a diet which, far from keeping him in positive health, will hardly suffice to keep body and soul together. Based on the estimates of the average *per capita* income and the availability of food, the economists conclude that 30% or more of Indians do not get sufficient food to satisfy their hunger which may possibly be true. The question is whether such a thing can be allowed to exist in any country which lays a claim to be called civilised. If the answer is in the negative, is it not time that something should be done, and sooner the better?

The problem of the higher income groups need not bother us. Where the income exceeds the amount required to purchase basic dietary needs there is some scope for adjustment; sometimes these adjustments to obtain a better quality of the diet are instinctively done. In other cases they can be brought about by educative methods. But the problem of nutrition among the lowest income groups is the most difficult of solution. It is time that all activities of the state and all its talent are utilised to solve this problem, for on its satisfactory solution the existence of a nation is dependent. It would not be an exaggeration to say that the civilisation of a community or state will be judged by the yardstick of its successful efforts in warding off the fear of hunger among the masses.