

## *Chapter Ten*

# International Nutrition: A Resource and a Responsibility

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EFFORTS TO APPLY the science of nutrition to human welfare on an international scale have become spectacular. The universal concern for food supplies around the world is perhaps one of the major expressions of the humanitarian spirit of this age. A brief chronology of the milestones in world nutrition, along with a statement of the purposes of the Food and Agriculture Organization and the World Health Organization, is given in Appendix.

The need for continued concern about world food supplies is apparent in extensive analyses made by both the USDA and the FAO. Nutrition educators bear considerable responsibility in making known to the public the extent of world food needs and their significance to all human beings.

For detailed studies of the world food situation the reader is referred to "Food and People," by the subcommittee on foreign economic policy of the joint economic committee, Congress of the United States, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Also available from the Superintendent of Documents is "The World Food Budget, 1962 and 1966," Foreign Agricultural Economic Report No. 4, by the Economic Research Service in cooperation with Foreign Agricultural Service, USDA.

The reader is referred also to "The World Must Eat," a booklet prepared by FAO and UNESCO's Gaunting Institute, published in 1962 by Oceana Publications, Inc., Dobbs Ferry, N.Y. One of a study guide series, it includes much factual information about world nutrition. At the conclusion of each chapter appears a section titled "Things To Do," which offers suggestions to teachers for planning meaningful activities in international nutrition.

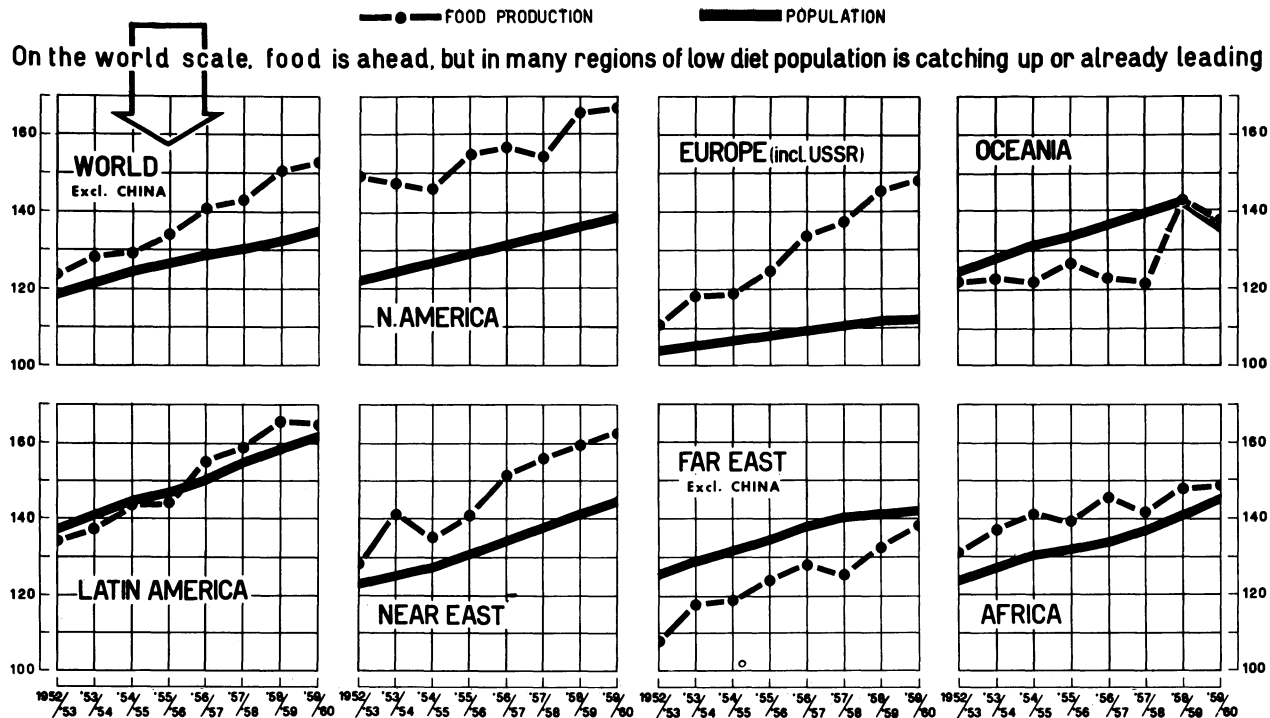


Fig. 10.1 — The race between food and population, with indices of prewar = 100. On the world scale, food is ahead; but in many regions of low diet, population is catching up or has taken the lead. (Source: "The Basic Freedom — Freedom From Hunger," FAO Bul., 1960.)

A most basic consideration in the world food situation — as in a family — is the number of mouths to be fed. Is there enough food to go around, and will there be enough in the face of the growing population explosion? On a world-wide basis, food production is keeping ahead of the population. In some of the most populous areas, however, the relationship between population and the food supply is not good (see Fig. 10.1).

The future depends upon how well we can keep up food production in relation to the growing population, and whether we can successfully distribute foods from lands of abundance to places of scarcity and from seasons of abundance to times of scarcity. Although the problem appears to be simple, the solutions for it are highly complex. Science must play a major role in increasing the productivity of lands and developing new ways to meet nutrient needs.

From available evidence, the world food situation presents these two basic aspects:

1. Diets are nutritionally adequate in the 30 industrialized nations of the temperate Northern Area, accounting for a third of mankind — more than 900 million people. Conditions are such as to assure the food supply in this region for the foreseeable future.
2. For most of the 70 less-developed countries in the semitropical Southern Area, diets are nutritionally inadequate because of shortages in proteins, fats, and total calories. The following are listed as exceptions to the general situation in the Southern Area: Taiwan, Turkey, Lebanon, Israel, Republic of South Africa, Federation of Rhodesia and Nyasaland; and in Latin America, Argentina, Uruguay, Chile, Brazil (in sections), Costa Rica, Cuba, and Mexico.

An impressive overview of the world's nutrition problems is afforded by three of the "diet deficit" maps prepared by the USDA from data available in 1958, Figures 10.2A, B, and C.

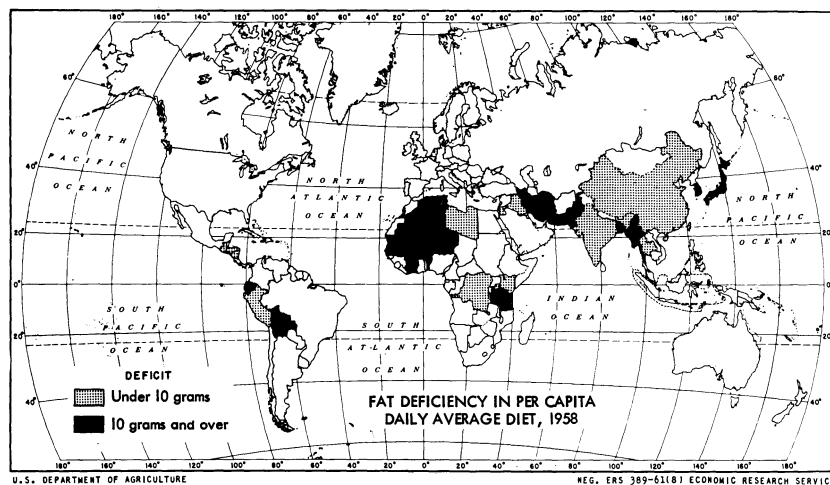
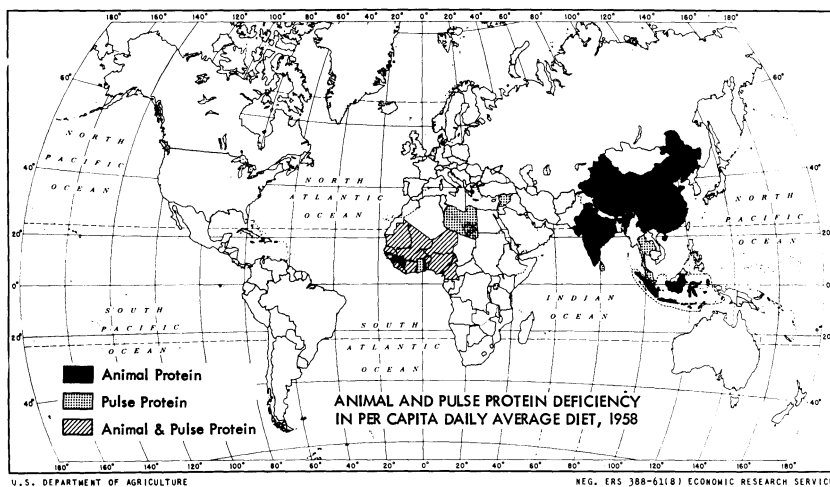
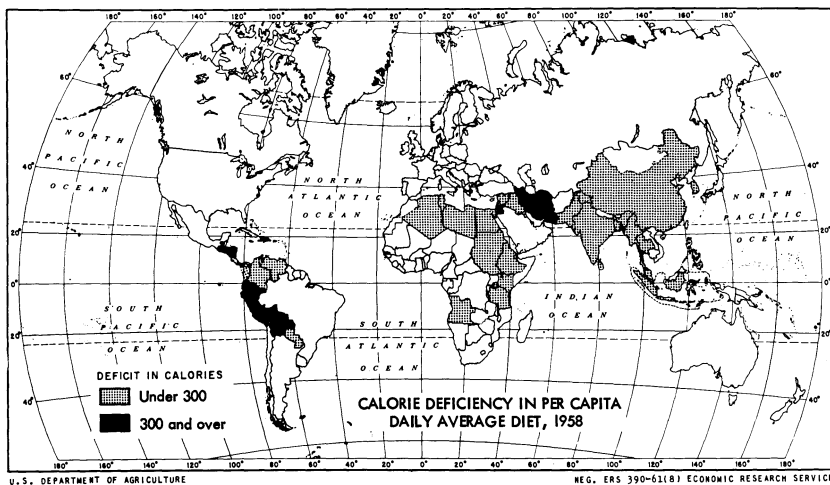
### **CLOSING NUTRITIONAL GAPS**

Existing nutritional gaps can be closed only by increased food production or by the production of goods that can be traded for food. Major problems affecting food production are:

1. Low income per capita
2. High ratio of population to land
3. Lack of chemical fertilizers

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Fig. 10.2A, B, C — Countries showing calorie deficits are generally those with high concentrations of population and low development of industry and agriculture. Protein deficits are less widespread than calorie deficits, and they occur in some countries where calorie deficits are not prevalent. A large number of countries have a short supply of fats. (Source: "The World Food Budget, 1962 and 1966," ERS, USDA.)





The "Food for Peace" program represents a major effort by the United States to work toward decreasing the food gap. It has received strong bipartisan support in the legislative and executive branches of our government. President John F. Kennedy stated on January 24, 1961: "We must narrow the gap between abundance here at home and near starvation abroad. Humanity and prudence alike counsel a major effort on our part."

Again in his State of the Union message on January 30, 1961, he said, "The product of our abundance must be used more effectively to relieve hunger and help economic growth in all corners of the globe."

The American people must be made aware of the fact that improvement of the world food situation will require much more than gifts of food in time of need. Only when food is given in a way which will not dislocate the economy of the recipient country can we dispose of agricultural surpluses to mutual advantage.

Public Law 480 represents an ingenious effort on the part of our country to divert some of our surplus foods to other countries. Commodities sent abroad are not paid for in American dollars, but the equivalent sums in the currency of the recipient countries are allocated to economic and social development of the country itself. Thus in India, where some of the largest transactions have been made, rupees generated by the program have been used for economic development, loans to private United States and Indian firms, and various agency programs. So-called "wheat" money has been important to India's developmental efforts.

Short-term food programs are only a stopgap measure. Long-range efforts to improve the total economy of a nation, together with education of the people, must be primary goals for aid programs.

An increasing force in international nutrition is the expansion of food industries around the world. According to a special report in *Food Engineering*, July, 1962, page 49, "A world boom in food manufacturing is in the making." This special report further states that North America and Western Europe are setting the pace, but other countries are making rapid gains in manufacturing output, as 80 per cent in Algeria, 67 per cent in Russia, and 40 per cent in Japan. The trend is not limited to the "developed" countries. United Nations economists predict a 154 per cent increase for underdeveloped nations in the value added by food manufacturing between 1958 and 1975. The Middle East is expected to gain 319 per cent; Africa, 224 per cent; Asia, 209 per cent; Latin America, 102 per cent; and four countries in Europe, 162 per cent.

American food industries now extend around the world. One well-known firm of the United States has plants in Canada, Argentina, Brazil, Colombia, Ecuador, England, Mexico, Panama, Paraguay, Peru, the Philippines, Southern Rhodesia, Trinidad, South Africa, Uruguay, and Venezuela. It has manufacturing agreements in several other countries.

These enterprises will have a far-reaching effect on the nutrition of the people both through economic development, dietary improvements, and perhaps nutrition education. In the United States, food industries have performed a major service in supporting nutrition research and in developing and disseminating nutrition education materials. We would expect food industries to continue these interests in their world as well as their national enterprises.

## THE MEANING OF MALNUTRITION

Along with the world's food needs, the nutrition educator has a responsibility to interpret to the public the meaning of malnutrition as it affects people in nations with wide food gaps. Malnutrition in poorly fed areas of the world is a complex situation in which adverse effects of nutrient shortages are compounded by many other conditions. The most prevalent form of malnutrition has been frequently described as simply the lack of enough food, although in many areas the primary problem is shortage of good quality protein, while in other countries vitamin deficiencies are paramount (1).

Results of malnutrition are evident in high rates of infant and maternal mortality. However, there is some evidence that the mortality rate of children age 1 to 4 years is more indicative of the nutritional level of the country than is the infant mortality rate, because these older children do not have the protection of mothers' milk and are generally exposed to the family's food — or lack of it.

Moreover, the mortality of infants from poor nutrition is greatly complicated by deaths due to poor sanitation. When the mortality rate of older children (age 1 to 4) exceeds 10 per thousand, a serious nutrition problem is said to exist in a country. In some nations this rate is as high as 30 per thousand; in the United States it is 1 or 2 per thousand. The infant and child mortality rates, as multiples of the corresponding rates in the United States in 1955, have been compiled by Scrimshaw (2), and given in Table 10.1.

TABLE 10.1  
INFANT AND CHILD MORTALITY IN UNDERDEVELOPED AREAS\*  
(Multiples of 1955 U.S. rates)

Africa and Asia			Latin America		
Country	Infant mortality	Mortality 1-4 years	Country	Infant mortality	Mortality 1-4 years
Egypt, 1947 .....	8	45	Ecuador, 1955 .....	4	26
Algeria (Moslems), 1948....	6	35	Colombia, 1956 .....	4	18
Federation of Malaya, 1947	7	22	Guatemala, 1955 ...	4	39
Singapore, 1947 .....	5	14	Brazil, 1956 .....	4	11
Ceylon, 1952 .....	3	21	Mexico, 1955 .....	3	22
Thailand, 1947 .....	2	16	El Salvador, 1956 ...	3	21

\* Source: See Ref. 2 at end of this chapter.

It is difficult for well-nourished and overfed people to understand the meaning of starvation. Actually to see it is a shocking experience

(see Fig. 10.3). Characteristics of the starved person have been described in a joint report of the Food and Agriculture Organization and the World Health Organization in grim terms which people can readily visualize and understand. The following paragraphs are excerpted from World Health Organization Technical Report Series No. 45, Nov., 1951, pages 22–27:

The typical starved person, without other complications, is emaciated, pallid, grey, apathetic, and depressed in appearance. Neglect of personal appearance, indifference to the impression made on others, and slow movements and speech give an impression of stupidity. The skin is dry and cold, and the hair is lifeless. In proportion to the degree of starvation, the individual will experience weakness, hunger, fatigue, and a sense of being old.

In starving children, characteristic findings include a facial expression resembling old age, loose folds of hanging skin, protruding abdomen, feeble crying, and, if unrelieved, sudden death with “acute laryngeal weakness and respiratory failure.”

Early in starvation, the patient’s world of concern shrinks and becomes limited to fewer persons and events. In severe to extreme starvation, almost the only interest is the patient himself and the question of food.

The starved person is accident prone. He moves away too late from the path of an oncoming vehicle and may trip and stumble because he pays too little attention to obstacles and drags his feet.

Social niceties quickly disappear and these are followed by progressive abandonment of moral niceties. Theft, especially of food and clothing, becomes common. Social and political organization are difficult to maintain. Basic intellectual capacity, surprisingly, is not altered except at the extreme level, but intellectual activity is reduced much as is physical activity. The extremely starved person is incapable of useful work. The moderately starved person has little endurance in heavy manual labor.

The report states that interesting age and sex differences in mortality have been observed in famine. Among adults, females almost everywhere seem to withstand starvation conditions better than males and this holds for all ages. Among both males and females, the older persons, especially those beyond middle age, usually show a much greater increase in mortality than any other segment of the population, with the possible exception of infants under one year. Children survive fairly well, but this may be due to conscious efforts to protect them. The highest mortality is observed among elderly urban recluses. It seems probable, according to the FAO and WHO analysis, that in famine conditions the greatest threat is to the males, the elderly, and to the youngest infants.

Only the most severe starvation suppresses entirely the linear growth of children, but the weight growth is very sensitive to the nutrient supply. Hence, periodic measurements of height and weight are a practical index of the nutritional status of the entire population. Normally a large part of the energy expenditure of children is devoted to voluntary activity which promptly diminishes when they are undernourished. *A simple observation at play, according to this report, can often allow a shrewd estimate of the level of prevailing undernutrition.*

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Fig. 10.3 — A quarter of a million copies of this poster blanketed France during the French National Week for the Freedom From Hunger Campaign. (Source: FAO News: II, 6, p. 2.)

# POUR LA PAIX DU MONDE VAINCRE LA FAIM



**JOURNÉE NATIONALE DU 11 JUIN 1961**

COMITÉ FRANÇAIS POUR LA CAMPAGNE MONDIALE CONTRE LA FAIM / 23 RUE LA PÉROUSE PARIS 16

The response of the severely undernourished to good food and care is little short of magic. (See Figs. 10.4 A and B.) But rehabilitation takes time, skill, and understanding as well as the provision of food and medical care.

### Dietary Excesses and Imbalances

By no means are nutrition problems in the underdeveloped countries limited to dietary deficiencies. Excesses or imbalances of nutrients may also cause major health problems. For example, in some countries there are mainly two economic groups: the "haves" and the "have-nots." The wealthy merchants who sit in their shops are obese; the burden bearers are thin but sinewy. Wives of the rich men are also fat because most of the housework is done by women who work hard and characteristically are thin.

In Somaliland, some nomadic tribesmen daily use 2.5 to 4 and even up to 9 liters of milk per day, thus acquiring an excessively high intake of protein, fat, and calcium. Such intakes apparently do not cause health problems.

The Bantu typically have an iron overload, consuming from 100 to 200 milligrams per day. Many suffer toxic effects and siderosis. Some consume large amounts of salt, but it is not known whether this contributes to hypertension or high mortality from cerebral-vascular diseases.

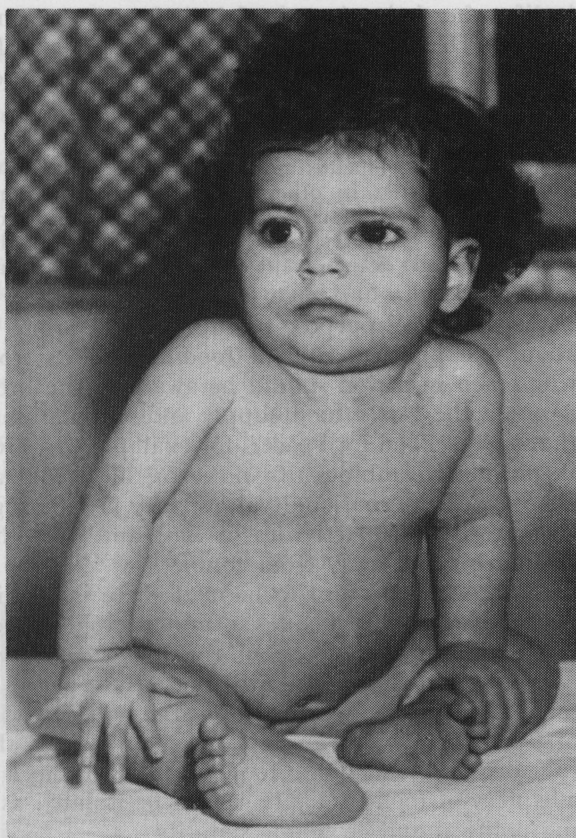
The Bantu are also heavy consumers of alcohol, most of which originates in a fermented porridge or a beverage similar to beer.



Fig. 10.4A — Molok, age 4 months, as she looked when admitted to a demonstration foundling home in Teheran, Iran, which operated on funds and aid furnished by UNICEF and WHO, with additional support from Government and municipal authorities. Molok's measurements were: weight, 3,100 kgs.; height, 60 cms.; chest, 36 cms.; and head, 38 cms. (Source: Iran Public Health Dept., issued by FAO, 1959.)



Fig.10.4B — Molok after 10 months in the demonstration foundling home. Her measurements: weight, 7,400 kgs.; height, 74 cms.; chest, 48½ cms.; and head, 45½ cms. (Source: same as Fig. 10.4A.)



Estimates are that they consume from 45 to 55 milliliters of alcohol per day, compared to an average in the United States of 30 milliliters.

### FOOD AND POLITICS

If the public could acquire a clear concept of the meaning of starvation, semistarvation, and the ravages of dietary deficiency diseases, national and international programs for improving world nutrition hopefully would be expedited. Perhaps then we would find more national public support of world food plans.

"Food for Peace" is a slogan critically challenged by some economists. Millikan and Rostow (3) have stated that it is likely a misconception that revolt and political instability within less developed countries result largely or directly from hunger; or that alleviation *per se* of hunger will reduce revolutionary tendencies among people; or that if people are only better fed, they are less likely to shift from one to another political extreme.

Dr. Earl Heady (4) has added the comment that major war does not typically come from the chronically destitute and illiterate strata of populations who, on the contrary, accept their status as their lot

in life, after being ingrained in it for generations and even centuries. Further, Heady says that food alone will not build up deep-seated political and economic convictions for people who cannot read. He continues:

Peace or not depends more on sustained general economic development, with opportunities in other vectors of consumption space, than on food alone. Hence, we direct our efforts to the extent to which food from the United States can serve either positively or optimally in promotion of sustained economic development of less advanced countries.

It is not the purpose of this book to argue the many viewpoints about the political role of food in today's world. However, those who teach nutrition should be aware of the broad interrelationships between the world food supply and international affairs. Regarding the slogan "Food for Peace," for example, Dr. Heady has said that the slogan itself combines two powerful ideas that are rapidly becoming deep-seated international values; they are serving as magnets to draw the international activities of East and West more nearly into the same orbit and away from conflict.

The essential point to be made here is that improving the health and productivity of people in underdeveloped countries through better food is probably one of the first steps toward improving their economy. Adequate food will not ensure peace, nor will peace necessarily result in enough food. But the political and economic problems of a nation are somehow related to food, and they can be alleviated to a degree by adequate food supplies. From a practical standpoint, adequacy of food probably cannot be isolated as a main factor bringing political and economic stability.

It is extremely difficult to assess the socioeconomic effects of nutritional levels. Therefore, we must concern ourselves first with nutrition as it relates to the health and productivity of the *individual and the family*, but we cannot overlook its effect on larger groups, as the community and the nation, confounded as they are with other factors. The interdependence of the peoples of the world in the maintenance of an adequate food supply makes of it a public issue which can best be met by an informed populace.

## **INTERNATIONAL NUTRITION AS A SOURCE OF NEW KNOWLEDGE**

The body of knowledge in nutrition science has been greatly expanded because of world-wide interest in it. Its very roots have international moorings: nineteenth century chemists, physiologists, and physicists of Germany and France laid the foundation for an understanding of energy metabolism, the nature of foodstuffs, fats, proteins, and carbohydrates, and the composition of foods.

Recognition of dietary deficiency diseases in the British navy, the Japanese navy, and in prisoners of the Dutch East Indies led to the

discovery of some of the vitamins. The entire problem of protein malnutrition and how best to cope with it is now being explored on a world-wide basis, because it is one of the most frequent and most serious forms of malnutrition in the world.

### **The Effects of Protein Malnutrition**

Protein malnutrition is evidenced by a variety of conditions. As in other dietary deficiencies, syndromes may occur in many degrees of severity, some barely recognizable, and some in the form of a now well-known disease, kwashiorkor, as it is named in Central Africa. In other regions, and in other languages, it has different names. South Africans call it "infantile pellagra"; the Jamaicans term it "fatty liver disease" or "sugar baby"; the French, Germans, and Latin Americans each give it labels which translate similarly into "nutritional edema syndrome" or "nutrition dystrophy." These names — and many others — all mean protein malnutrition, which is caused by diets high in carbohydrates and poor in quality and amount of protein. Protruding abdomens and skin lesions, characteristics of this disease, are apparent in Figures 10.5A and 10.5B.

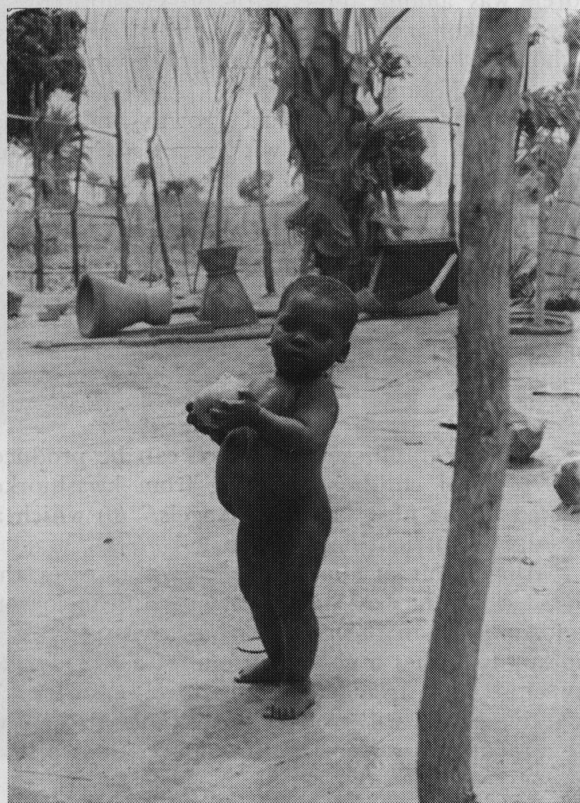


Fig. 10.5A — Child eating a paw-paw in Tanganyika village shows symptoms of kwashiorkor complicated with parasitism. (Source: FAO photo.)



Kwashiorkor strikes hard at children when they are changed from a diet of mother's milk to the family food, which is usually a starchy gruel made from such regional staple foods as cassava or manioc. The disease has been described as that of the "displaced child" (i.e., displaced from mother's milk) or "red boy," the latter indicating the dispigmentation of the black hair which is characteristic of a large segment of people in the countries where kwashiorkor occurs. Other effects of the disease are much more severe: the abdomen enlarges and the liver becomes infiltrated with fat.

For a dramatic account of the ravages of this disease, the reader is referred to an article entitled, "The Red-headed Negro," by J. F. Brock (5), one of the early observers of the disease.

Some of the most significant work on kwashiorkor in children has taken place in nearby Guatemala, where the incidence of kwashiorkor is high and where pre-kwashiorkor, an underlying protein malnutrition that has not reached the stage of diagnosis, is very great. Dr. N. S. Scrimshaw (2) described these latter children as being retarded nearly four years in bone formation when they reached school age. Furthermore, he stated that the highest mortality in preschool children was among those with pre-kwashiorkor, who later developed kwashiorkor when the added stress of infection was superimposed, or who died when the infection itself proved overwhelming because of lowered resistance.

Retardation in physical growth and maturation, according to Scrimshaw, is associated with retarded intellectual performance. He described the research of Gomez at the Hospital Infantil in Mexico. Gomez found a direct correlation between low scores on the Gesell and Goodenough tests and the degree of deficiency in weight below standard values. Scrimshaw concluded:

The evidence that performance on intelligence tests is also affected by malnutrition is a further indication of the urgency and purpose of efforts to improve the nutritional status of children in technically underdeveloped areas.

For the graphic effects which can be produced by improving the nutrition of children suffering from kwashiorkor, the reader is referred to the film, "Hungry Angels," (6) which also shows the tragic results of nutrient deprivation.

Alleviation of dietary deficiency diseases throughout the world bears a rich harvest in the cultural and socioeconomic realms but, in addition, it can bring spectacular expansion of knowledge. Kwashiorkor furnishes a good example of a world-wide condition that has precipitated a tremendous amount of research. The results of investigative efforts will lead to much more than just the prevention and treatment of kwashiorkor throughout the world.



Fig. 10.5B — Ravages of kwashiorkor (protein malnutrition) are clearly visible as potbelly, edema, altered hair texture, and expressions of misery. (Source: Regional Information Office, FAO, and courtesy of the Government of Kenya.)

Questions growing out of the world-wide problem of protein malnutrition for which answers are now being sought are:

1. What is the minimum protein requirement of individuals under different physiological and environmental conditions?
2. What proportion, if any, must be furnished by proteins from animal sources?
3. Can vegetable mixtures be developed that will meet the protein needs for growth, reproduction, and maintenance?
4. What are the irreversible effects of protein malnutrition and the delayed effects of early protein malnutrition in the re-alimented individual?

Kwashiorkor as an international public health problem thus has stimulated much basic laboratory research. One phase deals with the interrelationships of dietary nutrients and the integrity of the liver. The effects on the liver of low-protein diets and the relation of specific amino acids to utilization of dietary fat and carbohydrate at different levels are also being extensively studied. This has much bearing on the mysteries of the nutritive process, and it is of practical interest in developing a better understanding of the specific condition of liver cirrhosis, which affects a considerable number of our own adult population. Thus international nutrition has become an important resource for the expansion and application of nutrition research.

### **Hypertension and Coronary Heart Disease**

In a sense, the world is one large nutrition laboratory. Every country, with its particular set of food habits, offers an opportunity to study the results of eating regimes as they have affected generations of people. Unfortunately, there are many complicating factors so that population studies can seldom be used to establish cause and effect relationships. They do, however, show associations which may yield important hypotheses to be later tested in controlled situations.

From such observations an almost overwhelming amount of evidence has accumulated to show an association of diet with coronary heart disease — a health problem of immediate interest in the United States (7). Diets rich in total protein and in protein from animal sources are often high in cholesterol and fats containing mainly saturated fatty acids. When such diets are low in carbohydrates and fiber, they may result in a high level of blood cholesterol in middle-aged people — an age group with high incidence of atherosclerotic (coronary) heart disease.

According to J. C. Groen, *et al.* (8), such people may also be characterized as:

. . . living in a rapidly changing society, with progressive industrialization, rapid communication, high levels of prosperity, low total and infant mortality, everybody's possibility and almost necessity to ascend the social ladder, emancipation of women, loosening of family bonds, disappearing illiteracy and great moral and social value attached to responsibility for and achievement in the work.

On the other hand, in population groups which consume a diet which is poor in total and animal protein and in total fat, especially in saturated fatty acids (but with a relative preponderance of polyunsaturated fatty acids), with a high content of carbohydrates and fiber, the blood cholesterol level has been found low even in middle and older age groups, and the frequency of atherosclerotic (coronary) heart disease is much less.

These populations offer a contrasting picture in most of the "interhuman psychosocial relationships" described. They emphasize the complexity of analysis of nutrition findings in population studies and the necessity of further study with definitive segments and controlled conditions.

### **Lactation**

Lactation is another condition for which international studies offer promise of new understandings. Breast feeding of infants in the United States appears to be declining in frequency, whereas in many other countries it is the main way to nourish babies over a long period of time. W. O. Robertson (9) has presented data to show the incidence of breast feeding in the United States. Of the total sample, 24 per cent indicated that their infants were completely breast fed at one week of age. Another 6 per cent reported that their infants were breast fed, but received supplemental or complementary feedings. Thus 30 per cent of the infants were either completely or partially breast fed at 1 week of age, but by 8 weeks only 15 per cent of the infants continued to receive any breast feeding. At 14 weeks of age, the percentage had fallen to 10, and at 18 weeks, to 7.

In contrast, these reports have come from various parts of the world: Jelliffe (10) indicated in a large-scale investigation in Southern India that permissive breast feeding was usually carried on uneventfully and was continued for two to three years. There was a tendency to stop breast feeding earlier in urban regions. Gopalan (11) in India also found that lactation up to 2 years to be usual in lower socioeconomic groups, while among well-to-do mothers 80 per cent were unable to breast feed for six months.

In Afghanistan, breast feeding is universal and prolonged. In the city of Singapore, Malayan mothers may breast feed for two or three years, while Chinese women, especially the well-to-do, tend to follow the Caucasian pattern. Ninety-three per cent of rural Malayan women were able to breast feed their babies, but the observer commented on the increasingly fashionable use of the bottle for feeding babies, which is equated with modern progress of mothers.

A study in rural Haiti showed 90 per cent of mothers to be successful for the first six months, and 81 per cent for the second. In the wealthier and more sophisticated island of Trinidad, there was much less success in both Negro and East Indian mothers.

In many countries, employment of women was cited as an interfering factor. Jelliffe (10) has stated that the common factor to all tropical peasant groups is irregularity of feeding, usually termed "de-

mand" or "opportunity" feeding. He has noted a wide variety of practices with reference to posture and positioning during feeding, breast preparation during the antenatal state, and the absence of what may be a "bottle-induced Western cultural concept, 'wind', with the associated alleged need for 'burping.' "

Gopalan's studies on lactation among Indian women have led him to certain conclusions and caused him to raise certain questions (11):

1. Surveys indicate that there is almost an inverse relationship between the position of the mother on the socioeconomic scale and her lactation. The situation cannot be ascribed entirely to emotional and psychological factors.
2. While a great deal of attention has been focused on the possible effects of undernutrition on lactation, not much thought has been given to the possible role of overnutrition in inhibiting lactation.
3. Field studies suggest that the resumption of menstruation after delivery, takes place after a much longer interval in poor mothers than well-to-do mothers. The implications of this finding merit investigation.
4. The action of substances used by Indian women as galactogogues (stimulants for milk production), such as garlic, cotton seed, and tamarind, were studied. Although under the conditions of high milk production observed, they seemed to have no influence, the further study of their use in cases of lactation failure was thought possibly worthwhile, and the role of hormonal factors in lactation needs further study.

These international studies have focused attention on the fact that much further research is needed to elucidate the maternal nutritional requirements during lactation. Controlled experiments to discover the factors related to successful lactation are needed.

### **Dental Caries**

A fourth public health nutrition problem for which understanding has been greatly increased through international study is dental caries and other forms of dental disease. In some parts of the world, dental caries is almost unknown. In other parts—again these seem to be in the more highly developed countries—they are rampant. Studies have been made of the Alaskan Eskimos who, in the more remote settlements, had unusually good teeth. Even though filed close to the gums, their teeth were free from cavities (12).

But in the less remote areas becoming touched by civilization, dental disease is increasing. The increase appears to be related to the cultural transition and to be more serious in the more acculturated groups.

Again the observations suggest new opportunities to extend our knowledge (a) about the pathogenesis of dental disease, and (b) about "the ravages of a diet perhaps damaged by some dietary change."

Variations in the rate of dental decay were observed throughout Europe with changes in diet incidental to the privations of World

War II. In war-torn countries with restrictions on food consumption, decreases in caries rates were observed generally during the war. Extensive studies were made by Toverud (13) in Norway, where reduction in caries rates for children 3 to 6 years was very great from 1939 to 1947. During subsequent years the rates increased.

Children up to age 5 and pregnant and lactating women had priority for foods essential for mineralization. Except for preschool children the diet was very low in fat and probably somewhat low in carbohydrates, particularly for older children. Total calories also were insufficient for older children.

For all persons the sugar supply was less than one-half of previous consumption; all candy was practically eliminated. Bread was made of a 95 per cent extraction flour. Consumption of fish, potatoes, and root vegetables increased.

The change in mouth environment brought about by the drastic reduction in consumption of sugar and sugar products during the war years was considered by the investigators to be the main cause of the reduced caries rate. Cleansing effects of the coarser diet were thought to be beneficial, also. Furthermore, an increased tooth resistance due to favorable conditions in the earliest postoperative maturation of the enamel surface may have been a factor.

Later in Vipeholm, Sweden, several researchers (14) investigated the effect of sucrose supplements in varying forms on the teeth of inmates of a state hospital. The conclusion was reached that sucrose did foster the development of caries, but that the form in which it was taken was a factor to be considered. Caries rates were highest with sticky sweets that adhered to the teeth. A small percentage of the subjects was remarkably resistant to caries, regardless of treatment.

In 1958, a study of Lin and Smith (15) of diet and dental health in Newfoundland children was reported. In a statistical comparison of the average caries figures and average nutrition scores, there was a reduction in dental caries with improved nutrition, significant at somewhat in excess of the 2 per cent level.

## **NEW WAYS TO MEET DIETARY NEEDS**

International nutrition gives rise to the development of new ways to meet dietary needs. The problem of meeting the need for an adequate supply of amino acids using little or no animal products and at a minimum cost has led to an intensive study of a number of foods and combinations of foods, as well as the use of supplementary amino acids.

Additional sources of high-protein foods for supplementing both the low-protein content in cereal foods and the limited supply of dry skim milk are now available. Outstanding sources of high-protein foods are flours derived from cotton seed, peanuts, sorghums, and soybeans.

One of the highly successful mixtures developed is called Incaparina. As indicated by the name, this originated at INCAP (Institute of Nutrition of Central America and Panama) in Guatemala to help combat the protein malnutrition of the children of that country. The mixture consists of:

Whole ground corn	29 per cent
Whole ground sorghum	29 per cent
Cottonseed flour	38 per cent
Torula yeast	3 per cent
Calcium carbonate	1 per cent
Vitamin A	4500 IU per 100 grams

Feeding tests with both animals and children have demonstrated the high nutritional value of this mixture. With suitable flavoring and when mixed with water, it is well accepted.

In India a multipurpose food (MPF) has been developed and is being distributed as indicated in the following news release, excerpted from Weekly India News, Vol. 1, No. 45 Phalguna 10, 1884 (Saka) March 1, 1963.

A Union Food Ministry mobile kitchen van will begin rounds of residential areas in the Capitol from the middle of next month to popularize the use of multi-purpose food in the family diet.

The three home science experts will go in the van to impress on housewives the desirability of departing from traditional food habits and using dietary supplements.

A high-protein multi-purpose food, made from groundnut flour and Bengal gram and fortified with vitamins, has been evolved by the Central Food Technology Institute.

The food has found favor with schools and hospital administrations, but housewives have still to be won over to its use in the home.

Nutro-biscuits and Chikki, made from the multi-purpose food, are being widely used in school lunch in many States.

Multi-purpose food is being produced in the country at the rate of four tons per day. Two ten-ton-capacity plants for processing groundnut flour will shortly be set up in Bombay and Coimbatore.

One-thousand kilograms of Nutro-biscuits and 16,000 pieces of Chikki in ready-food packets were presented by the Association to jawans (soldiers) in forward areas.

In Indonesia a product called Saridele has been developed from a dried extract of soybean, supplemented with minerals, vitamins, and sugar (16).

Considerable attention has been directed to the potential of fish flour as a source of concentrated protein of good quality. This presents technical problems in production, however, and will require special planning to teach people to use it or producers to incorporate it into other foods. The Central Regional Food Technological Institute of Mysore, India, has produced an odorless sardine fish flour. How

useful this will be to the people of this country may depend upon its continued identification with a food of animal origin.

The nutritive value of cereals supplemented with essential amino acids, such as lysine added to wheat flour, is another possibility for improving the quality of diets. Other cereal products would require the addition of two or more different amino acids, not now readily available at low cost. Much research is needed on the feasibility of this method of dietary improvement.

The general advantages of mixed diets in normal nutrition argue for solution of protein and other nutrition problems by recourse to combinations of foods. The more limited the mixture, the greater is the care needed to assess its adequacy and to prepare and package it carefully for distribution.

Dr. Esther Phipard (16) has quoted Dr. Scrimshaw as follows:

There are obviously a great many different useful sources of protein for the prevention of protein malnutrition in technically underdeveloped areas. Milk must still be considered of first importance, and, of course, increased production of cheese, eggs, and meat should be encouraged. For some regions, fish flour or meat meals may be practical new sources of animal protein. Oilseed meals such as those from sesame, peanut, sunflower; legumes such as soy, cow pea and chick pea, and concentrates of leaf protein may be of major value in one area or another.

### **PRACTICAL PROGRAMS FOR IMPROVING NUTRITION**

One of the most significant efforts in world nutrition has been the expansion of the school lunch program on a world-wide basis. On August 21, 1962, the White House reported that the number of children overseas receiving school lunches under the "Food for Peace" program had increased by 10 million over the previous year, reaching a new total of 35 million. In interpreting our foreign aid program to the public, diplomats on several occasions have cited the school lunch program as an example of positive and concrete benefits.

"India News," in September, 1962, included this following item:

The Education Minister, Dr. Shrimali, told the Lok Sabha that ten million children are likely to be covered by the Mid-Day Meals Program by the end of the current plan. The scheme now benefits 700,000 children. He said that the Government was anxious to speed up the program.

School lunches around the world present widely different pictures; in no two places will the menus be the same. In Japan a full meal of bread, milk, and a side dish of meat, soyabeans, potatoes, fat, and oil, thickened with wheat flour or starch, has been described by the Ministry of Education (17). In the quantity served, it provides a total of 647 calories and 27.7 grams of protein. In 1958 almost 10 million children participated in the school lunch program. Effects on the children are shown in Figures 10.6A and 10.6B.



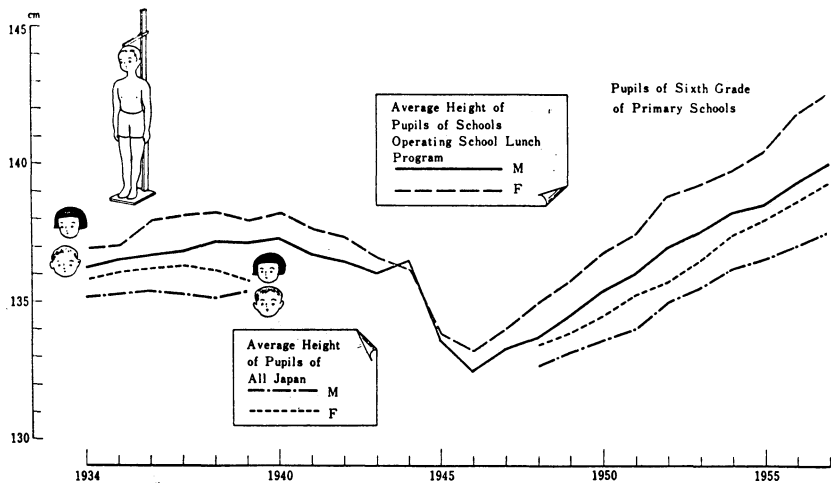


Fig. 10.6A — Physical effect of school lunch program in changes of average height of pupils in sixth grade of Sendai City, Japan, public schools. Measurements were begun in 1934 with approximately 4,000 pupils, and by 1955 the number of pupils had increased to 6,000. Effects of the war years are clearly shown, as is the tendency of the girls to respond more rapidly than the boys to improved nutrition. (Source: Statistics compiled by Tohoku University as published by the Ministry of Education, Government of Japan, MEJ6218, "School Lunch Program in Japan, With Statistics.")

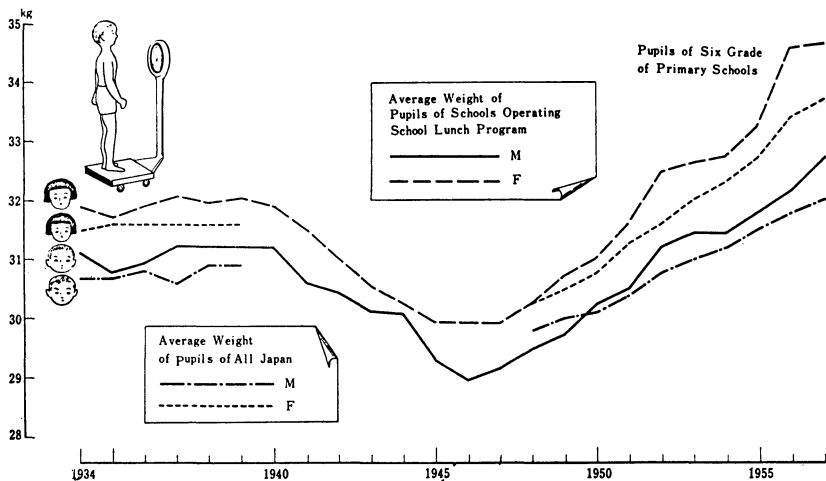


Fig. 10.6B — Physical effect of school lunch program in changes of average weight of the same Japanese pupils. (Source: same as Fig. 10.6A.)

In Iraq the school lunch scene differs greatly from the U. S. A. (see Fig. 10.7). In Figure 10.8, children are helping prepare the school lunch. The menu might include a hard-cooked egg, samoon (a native bread), an orange, okra, an onion or a cucumber, plus reconstituted milk furnished by UNICEF.

Figure 10.9 shows boys in Morocco consuming a nutritious meal served in a school lunch as part of an educational program emphasizing use of fish as a means of improving protein consumption. Concurrently, children in classrooms are learning about the production and use of this commodity (see Fig. 10.10). Note that this lecture is being recorded on tape for use in an expanded teaching program. Lessons also include trips to the fish market where pupils learn about different fish available (see Fig. 10.11).

Thus the school feeding programs around the world are serving the nutritional needs of children while exploring new ways of meeting those needs. Other programs in practical nutrition are helping to raise the standards of living, to reduce suffering and misery, and to improve the productivity of the population.

Milk distribution schemes throughout the world are helping to improve the health of mothers and babies. Figure 10.12 shows such a station in Iraq.

In many nations, children and adults are thus being helped toward better diets while they are learning the importance of nutrition. Pro-



Fig. 10.7 — Boys eating good school lunches in a village school in Iraq — minus the comforts American children have come to expect. (Source: AID photo.)



Fig. 10.8 — School children in Iraq help prepare and serve a good lunch. (Source: AID photo.)

grams in some countries, notably India, are including efforts to make sure that good meals are served in the canteens in the rapidly growing industries.

In Iraq there is much too little milk to go around. Facilities for sanitary handling and easy distribution are lacking (see Fig. 10.13).

### TEAMWORK IN IMPROVING NUTRITION

International nutrition efforts have demonstrated the importance of teamwork in improving the nutrition of the people. Thus, as a Home Economist with a mission of the FAO in Iraq, one of the authors of this book found herself working with a specialist in well digging from England, a dairy expert from Sweden, a poultry specialist from Germany, a rice agriculturalist from China, an extension worker from Greece, a dietitian from France, and a soil scientist from the United States. Under working conditions of this sort, one becomes acutely aware of the breadth of nutrition problems.

The value of teamwork in ascertaining an over-all view of the nutrition problems of a country is well illustrated by the program of investigation followed by the Interdepartmental Committee on Nutrition for National Defense (ICNND). The purpose of this group has been described as "to assess, to assist, and to learn" about the food and nutrition in countries in which we are giving military support. (See Appendix H, p. 325.)



Fig. 10.9 — Moroccan children enjoying school lunch planned to promote greater use of fish, a food in abundance, to improve protein consumption. (Source: Public Information Service, United Nations, **FAO Bulletin**, 9/60, p. 4.)

Originally the primary subjects of investigation were people in the armed forces, but it is pointed out that these people come from the civilian homes of the country. The studies when possible are also extended to include civilian groups; in fact some of the studies now are focused on the civilian population.

A team of workers such as those engaged in the nutrition survey may include clinicians, dentists, nutritionists and dietitians, food technologists, biochemists, statisticians, and nurses. By 1962 teams of this type had visited the following countries: Korea, Formosa, Iran, Turkey, Libya, the Philippines, Pakistan, Spain, Peru, and Viet Nam.

The ICNND team working in Viet Nam, a country of high current interest, made a film showing their activities. The following excerpts from their report (18) show clearly how the cooperative efforts of the





**"If you give a man a fish  
you feed him for one day.  
If you teach him to fish  
you feed him for many  
days."**

*An old Chinese proverb*

Source: *FAO News*,  
August 1962, p. 5.



Fig. 10.11 — Elementary Moroccan school children visit a fish market where they learn about different kinds of fish available. (Source: same as Fig. 10.9.)



Fig. 10.12 — In a village school in Iraq a home economist distributes dried milk to mothers of small children while giving them information on improving nutrition. (Source: AID photo.)

iciency when present are by no means as clear as those for thiamine, riboflavin is an essential nutrient necessary in adequate amounts. Fortunately, means of combating these two deficiencies are available. The means, which are relatively inexpensive although admittedly not easily initiated, are discussed in detail.

Endemic goiter is common in at least two areas — Kontum Province in the Highlands and the Central Delta around Can Tho.

Vitamin A malnutrition is moderately prevalent in many areas as measured by dietary intake and determinations of serum levels. No clinical evidence of vitamin A deficiency was seen.

Borderline intakes and serum levels of vitamin C were encountered in many regions.

On the other hand, there are few if any indications of problems relating to total calories, protein, calcium, or niacin. The people of Viet Nam are small. However, the results of the survey provide little insight into the presence or absence of growth retardation. In the general sense, the nutritional status of the military is superior to that of the civilian population, without appreciable differences between the Army, Navy, and Air Force. Among the



Fig. 10.13 — The limited amount of native milk in Iraq is distributed in the form of leban (soured milk) carried in wooden containers. (Source: AID photo.)

civilians, the Highlanders of Kontum Province present the most serious problems, and the urban children in schools the least.

The survey opens up many areas requiring further work both fundamental and applied in nature. Among the specific applied areas, degrees of urgency exist for several, particularly initiation of thiamine and riboflavin supplementation programs and investigation into the susceptibility of the military man to precipitation of clinical beriberi under conditions of stress. The etiology of goiter in Viet Nam required further study, primarily to rule in or out the possible role of goitrogens. The anemia problem is complex, with a need for determining the role of intestinal parasitic infestation, malaria and iron deficiency (relative or absolute), as well as the interrelationships of the intakes of the water-soluble vitamins.

## **INTERNATIONAL NUTRITION EDUCATION CONFERENCE**

Among the many efforts to help peoples around the world improve their nutrition was an International Seminar on Education in Health and Nutrition held in Baguio, the Philippines, October 13 to November 3, 1955. Sponsored jointly by the FAO and WHO (19), the conference included 48 participants from 22 countries and territories. The 24 main points emerging from the seminar are worthy of study by nutrition educators. Of special importance are the sections dealing with objectives and evaluation.

### **Cultural Factors**

The significance to nutrition education of observations on many cultural groups has been previously mentioned. Burgess (20) has outlined conditions which seem to militate against the success of health or nutrition improvement programs as follows:

1. Lack of appreciation at the outset of the full implications of certain educational procedures.
2. Lack of knowledge of the economic and practical limitations of the village household — coupled with too rigid adherence to and insistence on textbook practices.
3. Lack of sympathy with the beliefs, practices, and people on which the villager had hitherto relied for guidance in health matters.
4. Lack of knowledge of the resistances inevitably aroused by advice and instructions that appeared contrary to the local beliefs about child rearing and the causes of ill health.
5. Lack of adequate explanation of the purpose and methods of functioning of the available health and nutrition services.
6. Lack of cooperation, at administrative and community levels, among the personnel of the various services.
7. Lack of scrutiny and testing of educational materials to make sure they conveyed the message intended and were easily understood by those to whom they were addressed.
8. Lack of appreciation of the relative uselessness of a scheme imposed from above as compared with the effectiveness of beginning with something in which the villager was interested and prepared to cooperate — even if it was not directly connected with nutrition.





Fig. 10.14 — Daily food plans of five areas — Japan, Peru, South Pacific, the Philippines, and Iraq — offer interesting contrasts in detail and give valuable insight into different ways people can meet their nutritional needs.

## SUMMARY

Every individual has a responsibility to work toward better conditions for mankind. Nutrition educators have additional responsibilities unique to the knowledge and skills they possess. For some, there are opportunities to aid in educating peoples throughout the world to make the best possible use of their food supplies. For all, there is the opportunity to create a better understanding on the part of the citizenry of the scope and meaning of malnutrition on an international scale (see Fig. 10.14).

The nutrition educators have an obligation of providing people with the information they need to adapt a rational attitude toward our foreign aid policies as they involve food. Lastly, nutrition educators can greatly enrich their teaching by expanding their knowledge with the ever increasing flow of information that is coming from international study and experience.

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