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It is a tragic but widely recognized fact that malnutrition is undermining the health and sapping the strength of millions of persons in the world today and that hundreds of thousands are dying outright because they do not get enough of the right kind of food to eat. Although there is nothing new in this fact, there is something new and very heartening in the progress which the international agencies are making in the fight against malnutrition. WHO in particular, despite limited personnel and budget for the purpose, has made contributions of tremendous importance toward the solution of a number of major nutritional problems.

For the purposes of this brief talk I wish that I could transport you to a high-land village in Guatemala where 95% of the persons are suffering from endemic goiter or to a children's ward in almost any rural hospital in Central America, where a half to three-quarters or more of the children have been admitted with the severe protein malnutrition of kwashiorkor. I wish that you could accompany a nutrition survey team and see with your own eyes that the majority of children in poor urban and rural areas are markedly retarded in their physical development because of malnutrition. I would like to take you to the waiting room in a typical children's clinic in Central America in order to show you the large proportion of children with endema, changes in the color and texture of the hair or other signs of protein deficiency. Instead, I can only speak to you from my own experiences with these problems and with the role of WHO in solving them.

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Endemic goiter is the enlargement of the thyroid gland which occurs in people who live in areas in which the soil and water and food they eat are deficient in iodine. Endemic goiter was not recognized to be a serious public health problem in Latin America until after the visit of a WHO Consultant in 1950. This Consultant, Dr. O. P. Kimball, trained workers in a number of Latin American countries in the technique of endemic goiter surveys and it soon became apparent that endemic goiter was of major public health importance in every one of the Latin American countries. For example, in Peru goiter has since been reported to affect 36% of the men and 64% of the women, in Colombia, 83% of school children in one department and 57% in the country as a whole, in Panama 47% of adults in certain provinces, in Guatemala an average of 38% for the entire country and in El Salvador, Honduras and Nicaragua nearly 30%.

In many of these countries, cretinism, the most serious consequence of iodine deficiency has been reported along with an increased incidence of deaf-mutism and feeble-mindedness, conditions which seem to be more prevalent in goitrous areas. Theoretically, endemic goiter is the easiest of public health conditions to prevent, since the necessary iodine can be added in suitable quantities to salt. However, the iodization process employed in the United States requires that the salt be re-fined and dry. Stabilizing chemicals must be added and it must be packaged and distributed in moisture-proof containers; if not, the added iodine soon disappears. However, in many of the countries of Latin America as well as other areas of the world, much of the salt is consumed in the crude, moist form in which it is crystallized from sea water. Dr. Frederick Clements, the former Chief of the Nutrition Section of WHO, foresaw this problem and arranged for the development of procedures for adding iodine to crude salt. It was discovered that the compound, potassium iodate, was stable when added to such salt and trials of its effectiveness were carried out in school children in El Salvador and Guatemala. With the administration of this stable compound of iodine, the average incidence of goiter decreased 42% in

15 weeks in the El Salvador trial and 65% in 25 weeks in the group in Guatemala.

In 1955, WHO sent two Consultants to visit all of the countries of Latin America to assist them in writing laws and regulations for the iodization of salt and in obtaining the machinery and supplies needed for the purpose. In rapid succession, country after country has either adopted the necessary legislation or is in the process of doing so. There is every reason to believe that endemic goiter will be eliminated as a public health problem in the next few years from most of the countries in which it is now a serious menace.

Kwashiorkor is a severe nutritional disease which develops most commonly when the mother is no longer supplying sufficient protein of good quality to the child through her own milk and is making no other provision for the child's protein needs. As kwashiorkor develops, the child begins to swell with edema. His skin becomes pigmented and may break out in open sores. His hair grows discoloured and thin. He loses all interest in his surroundings and even in food and becomes so weak as to lie prostrate. Internal changes take place also, for the liver becomes filled with fat, digestive enzymes are no longer secreted and all of the organs of the body begin to waste away. If a child in this condition is given protein of good quality soon enough he can still be saved, but if he does not receive the needed protein he is doomed to die.

A heart-wringing aspect of the history of most cases of kwashiorkor is the failure of the parents to recognize the true nature of the condition. They usually believe it to be due to worms and treat it by withdrawing the small amounts of solid food which the child may have been receiving and by giving instead starch gruels which are almost entirely free of protein. The child may even be given a strong purgative to get rid of the worms which the mother mistakenly believes to be the cause of the symptoms. Because of this type of treatment in the home, the child with kwashiorkor frequently never reaches the hospital. Instead, he dies as surely as if

he had been intentionally murdered; yet in the tragedy of their ignorance the parents lovingly gave the child the best treatment that they knew.

Even the child who escapes death from kwashiorkor may not get off lightly. Survey after survey has shown that soon after weaning the great majority of children in poor urban and rural areas in countries like those of Central America fail to get enough food for normal growth and maturation. We hear the rationalization that the children of under-developed areas are short because their parents are short, but this is false. Central American children grow as well as U.S. children until the latter part of the first year. During their school years they also tend to gain in height and weight and bone maturation at a rate comparable to U.S. school children. However, by this time they are several years retarded in these measurements since they remained almost stationary during the pre-school years. It is from this great reservoir of malnourished pre-school children that most cases of kwashiorkor come, frequently associated with the added stress or disease of the economic and social disruption of the family.

Kwashiorkor has today become a common word, but until WHO sent Dr. John Brock from Cape Town to join with Dr. Marcel Autret of FAO in a visit to the countries of Africa in 1950, the precise nature and widespread occurrence of kwashiorkor was unrecognized even in Africa, where the name originated. Not until WHO Consultant, Dr. Moisés Bénar and Dr. Autret studied the disease in the countries of Central America in 1951, was it realized that the kwashiorkor of Africa was the same as the multiple deficiency syndrome of Central America. A report on kwashiorkor in Brazil by WHO Consultant Dr. John Waterlow and FAO staff member Dr. Arturo Vergara followed in 1953. These reports and several brilliant studies by Latin American workers demonstrated that Kwashiorkor was at least as widespread and serious in Mexico, Central and South America as in Africa. The published reports of these Consultants also stimulated investigations of the disease in other parts of the world, and reports showing the prevalence of severe protein deficiency have now been published from almost every one of the so-called under-developed countries of the world.

10 to 30% of the children admitted to the hospital with kwashiorkor are reported to die despite the best of treatment, and the evidence is overwhelming that kwashiorkor is a leading cause of death in young children, both in and outside of hospitals. Despite this, the mortality statistics for Latin America show diarrheal diseases to be the principal cause and malnutrition is far down the list. How is this possible when everywhere children's wards are filled with critical cases of kwashiorkor or the chronic semi-starvation known as marasmus?

To understand it, we must realize that deaths in most of the Latin American countries are not medically certified, but are written down by an untrained town clerk on the basis of information given him by the parents or some other member or some other member or friend of the family. INCAP is a cooperative Institute for the study of human nutrition problems organized by the six countries of Central America and Panama and administered by the Pan American Sanitary Bureau, which is the Regional Office for the Americas of the World Health Organization. With the assistance of WHO Consultants, INCAP has sought to determine as nearly as possible the true cause of death of children in rural Guatemala by visiting the family immediately after the death is reported.

The results of this study, carried out in four representative highland villages of Guatemala, show that two-thirds of all children between the ages of one and five, reported as dying due to diarrhea or parasites, actually died of kwashiorkor or other severe malnutrition. Only one-third actually died with infectious diarrhea as a primary cause. In the nine-month study period not one single death was reported in the Civil Register as due to malnutrition, despite the fact that the town clerks admitted the presence of edema, skin lesions, hair changes and all the rest of the kwashiorkor syndrome in many of the children whose deaths they recorded as due to diarrhea or to parasites.

With this knowledge of the causative factors in the disease, prevention now becomes the major problem. In Princeton, New Jersey, in 1955, the second of two Conferences on Protein Malnutrition, was sponsored jointly by WHO, FAO and the Josiah

Macy Jr. Foundation to discuss ways of meeting the need for increased protein in under-developed areas. It was apparent that for both agricultural and economic reasons the problem could not be solved by milk and other animal proteins alone, and that a reasonable development of vegetable protein mixtures of good quality would be necessary.

WHO had already begun to sponsor pilot efforts in Africa, India and Central America directed toward this end. It is gratifying that the work in all three localities is meeting with conspicuous success. In Central America a mixture has been shown by trials in animals and humans to have protein of such good quality that is not improved by the addition of milk. It tastes good and children recovering from malnutrition have thrived on it as the sole source of protein for as long as three months. It is intended as a food supplement and not as a substitute for either mother or cow's milk. Yet, as a sole food it is more complete nutritionally than milk itself and less than half the price.

I need not mention that WHO is also actively supporting educational efforts directed toward the elimination of those food practices responsible for kwashiorkor and that improved environmental sanitation is one of the major fields of WHO activity. FAO by important contributions to improve production of animal protein, and UNICEF through milk distribution and conservation and through its willingness to support the development of vegetable protein combinations for supplementary feeding, share in a common effort to overcome the protein malnutrition which is so widespread among the world's underprivileged children.

There are many other aspects of the work of WHO in nutrition which I would like to discuss, such as the large number of fellowship and travel grants, the short and long-term Consultants in Nutrition sent to many different countries, the stimulus given to work on nutritional anemia, pellagra, beri-beri, diabetes and nutritional disorders of the eye and the promotion of anthropometric and biochemical measures for the evaluation of nutritional status, but I will mention only one relatively new WHO nutrition activity.

In Central America, in Southern Italy, Spain, Japan, parts of South Africa and a number of other countries in the world, the lower income groups, at least, are almost free of coronary heart disease, while in the United States and Western Europe, and in the upper income groups in most other countries, this condition is a leading cause of death. At first these differences were attributed to poor statistics, but it is now apparent that they are real. The direct comparison of nearly one thousand aortas from Guatemala and New Orleans has recently shown that the complications of atherosclerosis begin to develop 20 to 30 years of age earlier in the New Orleans group than in persons represented by the Guatemalan material. These differences parallel differences in diet and in the way of life and are not explained by racial factors.

Only an organization such as WHO, with representatives in all areas of the world, can stimulate the collection and comparison of data from many different countries needed to facilitate the identification of the factor or factors responsible for this vital difference in the incidence of ischaemic heart disease. Progress was made by the WHO Study Group convened for this purpose in Geneva last November and a second meeting on the same subject is planned for 1958. In the meantime, investigators all over the world are striving to provide the links in the chain of evidence which will lead to preventive measures to reverse the present trend.

As public health efforts to control infectious and insect-borne disease succeed, nutritional deficiencies constitute a growing proportion of the total public health problem. With a staff of only one or two professional persons and a few thousand dollars a year for meetings and consultants WHO has still made an effective contribution toward the solution of a number of the world's nutrition problems. It is urgent, however, that much more support be given to public health work in nutrition, for in this field the rewards in vigorous, intelligent and useful living are nothing short of tremendous for the funds and effort invested.