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NUTRITIONAL PROBLEMS OF TANGANYIKA

M. C. LATHAM
Dares Salaam, Tanganyika

I HAVE been asked to talk on Nutritional Problems in Tanganyika. In the context of this symposium Tanganyika was perhaps to have been taken as typical of the under-developed countries, typical of that half of the world which is poorly nourished. Certainly, Tanganyika falls into that part of this classification. But I believe that when seeking solutions to nutritional problems on a broad global level the developing countries require further subdivision. Firstly, there are the countries where death occurs from actual starvation and where over-population is such a vast problem that a solution to food shortage within the resources of the country itself are almost inconceivable. Secondly, there are the countries which are not grossly over-populated, where starvation is rare in normal years and where potentially there is enough good land or other resources to feed the population even if it continues to expand for another decade or two.

The former group of countries pose the major problem for the world because there is little doubt that the terrifying rate of growth of the population mitigates and in many cases out-balances socio-economic advancement. This demographic problem is, next to nuclear war, the greatest present threat to us all. Over-population cannot be confined within national boundaries for ever and in any case the developed world is for the first time in its history conscious and, I think, even has a conscience about problems in less developed areas.

Tanganyika, however, fits into the second half of this classification for in theory it would not be difficult for her to produce enough food and the right variety of food to satisfy the needs of all her people. The population increase that is taking place there is only a threat, firstly as part of a world problem, and secondly, because the economy and social services have to expand not only to catch up with those of developed nations but also to keep up with her own population increase. So often theoreticians work out a school or hospital expansion programme reckoning to increase the number of schools or hospital beds by say 5 % per year, so that in 20 years the schools will have doubled in number and illiteracy be correspondingly reduced. It is sometimes forgotten that the population may be increasing at the same rate so that in fact in 1983 the same percentage of children will be attending school as in 1963. Population increase in countries like Tanganyika is therefore an added load to bear but it is not the crushing burden which makes advancement so much more difficult in the grossly over-populated countries of Asia.

Tanganyika is a very large country the size of France, Belgium, Holland, West Germany and England put together. It is situated on the east coast of Africa immediately south of the equator. Her population of 10 million people is mainly Bantu. However, there are Hamites and Nilo-Hamites, there are small islands of click speakers and, in fact, Tanganyika appears to have been an ethnological dumping ground. It is, therefore, not inappropriate that Dr Leakey should have discovered in the Olduwai Gorge of Tanganyika his Zinjanthropus skull, the oldest known remnants of primitive man.

These assorted peoples, because of their diverse backgrounds and origins, often have strikingly different ways of life and therefore very different food habits. Tanganyika also has a varied ecology ranging from the tropical coast through the arid plateaux to the well-watered temperate highland areas. The

people themselves may be pastoralists like the Masai or subsistence farmers like the Wanyamwezi and the Wangoni or, on the other hand, be adapting themselves to a cash economy like the Wachagga who grow coffee on the slopes of Kilimanjaro and the Wasukuma with their cotton near Lake Victoria. Other people have moved to the large towns attracted by the bright lights, and nearly half a million are dependent on estates or mines. All these variables of background, of racial origin, locale and of work, have their effects on the diets, and therefore the nutrition, of the people involved. This variation is probably greater in Tanganyika than in any other tropical country in Africa and for this reason any generalizations that I make will have many exceptions.

During recent months with the ring of Freedom From Hunger in all our ears we have heard that half the world population is without sufficient food. Except for the short hungry season at the end of the agricultural year before the new crop is ready and also in years of crop failure due to drought or insect damage, hunger in its normal connotation is rare and deaths due to starvation are now almost unknown in Tanganyika. This does not mean, however, that Tanganyika has forged her papers to gain the benefits from Freedom From Hunger funds. A large proportion of her population suffer from what has now been conveniently called " hidden hunger," the hunger of certain parts of the body for certain substances in the diet. Thousands of people suffer every year from malnutrition and many children die.

What then is the problem and why does it occur ? The cause is, I believe, mainly ignorance—ignorance of the fact that a variety of foods are necessary for health. By far the major part of the population believe that all that is necessary from food is for it to alleviate hunger, to provide a comfortably " full belly." It is quite inconceivable to most people that a physical disease can be caused by a lack of something in the diet in a person who eats to satiety. It is this " full belly " concept, this ignorance, that causes the multiplicity of nutritional diseases that occur in Tanganyika. It is exactly similar to another problem which faces the Health Educator, that is the complete lack of understanding of the germ concept of disease.

Ignorance in the context I have used here is not a rude or insulting word. The people cannot in most cases help their ignorance. In exactly the same way when Vasco da Gama first sailed to India half his crew died because of his ignorance. He did not know that scurvy was due to a dietary deficiency and he was an educated and supposedly intelligent man. Similarly the Tanganyikan mother whose children die of kwashiorkor does not understand why or know what to do about it.

The problem, therefore, is basically to get people to comprehend what foods are necessary for health and then to get all members of the family to eat these foods. As this knowledge becomes more widespread it is then necessary to make sure that the right variety of foods are available in the right quantity.

This two-sentence panacea for the solution to our nutritional problems sounds easy. However, it involves nutrition education of large sections of the population and this must inevitably go hand in hand with basic academic education. The solution also requires improved preventive medicine, sanitation and housing. It requires many changes in agriculture and parallel with all this economic advancement must take place.

These problems can only be solved by a team approach at all levels, right from a team of national planners in the capital city to a team approach by local workers at field level in the village. A co-ordination of effort by educationists, health staff, agriculturists and community development workers, to mention just the key interests, is essential. In order to facilitate this it is highly desirable that people live together in communities and not as at present in widely scattered homesteads. For this reason Tanganyika is launching a very ambitious scheme

f village settlement. This will be based on the Israeli system and will entail he moving of people to newly created villages where agriculture is run on co-operative lines with direction given to each farmer regarding what to plant and also when and where to do so.

Having defined the broad solutions let us consider some of the actual human problems we are facing.

The main nutritional disease in Tanganyika is without doubt Protein-Calorie Deficiency Disease which manifests itself most commonly and severely in young children. Infants in Tanganyika are nearly all breast rather than bottle fed. The Tanganyikan mother like most African mothers is the world's expert breast feeder. To her it is a natural normal practice. The presumption of aliens, usually spinsters, who barely know the facts of life, trying to teach African mothers how to breast feed is, in my opinion, a scandal. All that it does is to produce a complex, and it may lead these African women to the appalling state of affairs which exists in the developed countries where the percentage of successful breast feeders is so low.

Breast feeding in Tanganyika commonly lasts for a year and not infrequently for two years or more. During this time the child will usually be getting adequate protein from breast milk. Weaning is often an abrupt affair. Not uncommonly this takes place when the mother discovers that she is pregnant again. It is a common belief that the new foetus will poison the mother's milk. This is perhaps a desirable belief because the strain of lactation on a poorly-nourished mother is severe, the strain of lactation *and* pregnancy together might prove too much. In any event a sudden weaning takes place, and often in order to simplify this process the child is sent away to live with a relative. This is therefore a time of great psychological stress for the child. A Tanganyikan child prior to weaning has a very intimate relationship with its mother. He does not spend half his life in a cot or a play-pen or being looked after by a baby-sitter. Instead he rides on his mother's back when she walks to draw water or till the field; he sleeps in the same bed as her, he is constantly with her. You therefore have an infant 1 to 2 years of age suddenly divorced from this intimacy and dependence. At the same time the child may have a radical change of diet for he may now be put on to a gruel of whatever the local staple happens to be. In Tanganyika, this may be maize, cassava, banana or less commonly rice, millet, wheat or sorghum. The child's appetite might well be impaired by the severe psychological trauma he has suffered. This miserable child is a definite candidate for kwashiorkor, a disease whose aetiology is believed to be a lack of protein and calories but which often has a psychological basis. There is no doubt that common infectious diseases such as measles and also the very prevalent gastro-intestinal infections often tip the balance in a child with no obvious signs but who is teetering on the brink of disease.

We believe that this disease is more common where the staple diet is banana, cassava or some starchy root than where it consists of one of the cereals, for these latter contain considerably more protein. It is interesting to note that except for the banana-eating peoples (where this food has special prestige) the change of staple diet tends to go from millet or cassava, to maize then rice and lastly wheat bread. In West Africa wheat is now an important food; in Tanganyika the end of this chain of changing food preferences is just beginning to become apparent.

For those of you who are unfamiliar with the disease kwashiorkor, it manifests itself usually in children 1 to 4 years of age. The child fails to grow, different parts of the body become swollen with oedema fluid, mental changes occur, the hair of the African child often loses its lustre and its tight curl, and diarrhoea and anaemia may develop. A typical skin condition is sometimes found.

If a child with this condition continues on the same protein-poor diet he will

die. We have, I regret, no accurate figures of how many deaths occur each year due to this condition in Tanganyika, but there are certainly many.

At the other end of the spectrum of Protein-Calorie Deficiency Disease is the condition known as Nutritional Marasmus. Whereas in kwashiorkor the main deficiency is believed to be a lack of protein, in marasmus there is a gross deficiency also of calories. The disease occurs often in younger children, frequently under 1 year of age. You get here the picture of a starving infant with wrinkled loose skin around the body skeleton, the skin of the face being drawn in like that of a monkey. This condition, although frequently seen, is less common in Tanganyika than kwashiorkor. There are, however, many cases which do not fit conveniently into either category and it must also be stressed that for every case of frank disease there are probably 20 cases who have failure of growth due to a deficiency of calories and protein. How can this disease be prevented? Well, obviously by adding a protein-rich food and more calories to the diet. Animal protein is scarce in some parts of the country and so in these areas it is necessary while increasing production of this to encourage the greater use of protein-rich vegetable products such as beans and groundnuts as foods for young children.

Our protein standby in clinic practice is dried skimmed milk, which is supplied by U.N.I.C.E.F. We have recently introduced a new system for its issue and this will make it more easily available, free of charge, to 95 % of pregnant mothers and young children. When the new system is fully operational, practically all mothers will in theory have at their disposal a means of preventing protein deficiency in their children. Dried skimmed milk and other manufactured foods suitable for children are extremely important. They are, however, not in my view the final long-term answer in a country where non-manufactured products can eventually alleviate malnutrition. Dried skimmed milk fills the role in our clinics that cod-liver oil did in the last generation to prevent rickets in Britain. But the actual elimination of rickets required major social and economic changes. Rickets could be prevented by the action of ultra-violet rays of sunlight on the skin which then synthesises vitamin D. Rickets led to parks and playgrounds; it led to the perambulator to give the infant an outing; it led to mid-day milk at schools; it led to regular clinic attendance ostensibly to collect cod-liver oil, but during which, attention could be given to other health problems; it led to slum clearance, smoke abatement and suburbia; but above all it led to changed attitudes and practices in nearly the whole population. It became a natural part of life that children should get milk and sunshine. These same kinds of changes are needed in Africa to go hand in hand with the free issue of dried skimmed milk, in order to rid the continent of kwashiorkor. Dried skimmed milk, a manufactured soya product, or other factory-made protein foods are all the excellent artificial means to this end, and they can usefully continue to be used for decades after the other solutions become adopted, just as cod-liver oil is still used in Britain. We must foster changed attitudes and practices so that it becomes natural, normal practice to feed young children milk, eggs, beans, meat, groundnuts, fish or whatever is the usual protein food of the community. This must go hand in hand with an improved economy, better public health and greater education.

The problem of introducing a new food to a people is often difficult. I think that too often we have told people to do something because it is " good for you." Except in the case of Guiness this appeal seldom appears to have worked. We need when introducing a new food to say instead that it increases virility or potency or fertility. People don't like to do what they are told is good for them.

We need perhaps to get advice from successful commercial firms who seem to be able to get people to eat and use and pay heavily for the most unusual and unlikely products. It surprises me that W.H.O. or U.N.I.C.E.F. have not as an experiment in one area, hired a market research organisation to make a survey and then given a contract to a large commercial firm to market as they think fit

protein-rich food for children. Half-a-million dollars used in this way, might be money very well spent.

I have talked at length about Protein-Calorie Deficiency Disease and problems allied to it. This is because this is the major nutritional problem of Tanganyika. Other deficiency states exist, but they are either less prevalent or less serious.

Mineral deficiencies, except iron deficiency, have not been proved to be important causes of morbidity in Tanganyika. Anaemia is extremely common and this is often an iron deficiency anaemia. However, most Tanganyikan diets in theory at least provide adequate iron for normal human needs. The anaemia is often secondary to parasitic infestation or occurs in women during pregnancy or lactation when iron needs are raised. Goitre due to iodine deficiency appears to be especially prevalent in two districts, but goitre surveys to corroborate this are only now being planned. Calcium is low in nearly all Tanganyikan diets with the exception of those who eat large quantities of small fish or those pastoral tribes who frequently consume milk. But apart from the possibility of this deficiency being a factor in the smaller stature of the people, it has not been proved that the deficiency does much harm. Certainly rickets and osteomalacia are rare. With regard to fluorine we are more often concerned with excess than deficiency.

Among the vitamins vitamin A deficiency probably constitutes the most serious problem, for in its worst form this causes keratomalacia and blindness. Pellagra, associated with a deficiency of niacin and tryptophane, occurs sporadically in the predominantly maize-eating areas and in 1962 a sharp outbreak occurred in a district which was subsisting on famine relief American maize. Signs of riboflavin deficiency are extremely common and though beriberi, the scourge of the Far East, is rare, we have recently encountered neuropathies due probably to multiple vitamin B deficiencies in those who are consuming a diet consisting mainly of highly refined maize flour.

Most Tanganyikan diets lack sufficient fresh vegetables and fruit to provide the quantities of vitamin C so often quoted as being optional or desirable. Scurvy itself is certainly rare, but it seems possible that the slow healing of wounds and ulcers may in some instances be due to a lack of vitamin C in the diet.

I have already mentioned ignorance as the main cause for protein-calorie malnutrition; it is also an important factor in many of the other deficiency states. Allied to this is the fatalistic outlook that most people have about life and death itself. From work we have done it seems likely that 50 % of children born alive in Tanganyika never reach adulthood. This is an appalling loss of life, but because of it, most mothers become accustomed to the odd child dying and they shrug it off as being just " shauri ya mungu," the will of God and so, when the child starts to get swollen legs or brownish hair, the mother might feel that the inevitable is about to happen, yet she may take no logical action to prevent it.

Medical science is, I believe, changing this attitude, and if the mother can be convinced that the child with kwashiorkor is cured by diet alone, this may educate her sufficiently to prevent the disease occurring in her subsequent children.

Another problem besides ignorance and fatalism is that of bad food habits and beliefs. There are many tribal taboos, and these unfortunately often relate to foods which are rich in animal protein, and these desirable foods are frequently forbidden to the more vulnerable groups such as pregnant women and young children. One of the commonest of these beliefs is that eggs cause sterility in women and young girls. These undesirable food habits are in many cases being dropped. In Tanganyika we are fortunate in having a very enlightened and intelligent President, Dr Julius Nyerere, who frequently talks in public about nutrition. One influential speech by a figure of his calibre and popularity can have more effect on nutrition than thousands of pounds spent on conventional nutrition education.

Another aspect of local food habits and beliefs is the problem of misinformed

people, usually expatriates, trying to discourage the consumption of nutritionally valuable foods such as locusts and lake flies, apes and ants, cats and canines. Yet these same people will eat snails in Paris, or even haggis in Scotland.

One of the other problems that so-called civilization has brought to Tanganyika is the increasing desire for a pure highly refined white cereal product. During the last five years there has been a vast increase in the use of highly milled maize meal, a product markedly deficient in B vitamins. I believe that this could face Tanganyika with a problem not unlike that which faced many countries in the Far East when highly milled polished rice was introduced there. We have therefore decided to nip this problem in the bud by drafting legislation to assure an adequate level of thiamine, riboflavin and niacin in milled cereal products.

A new problem which faces us, and one which I feel has received inadequate attention at this Congress, is that of the question of the possible toxic effects of Aspergillus flavus in groundnuts. This fungus was found to be responsible for producing a toxin, now known as aflatoxin, which caused the deaths of poultry fed on infected groundnut meal in 1960. Since then extensive research has been carried out by agriculturists and chemists. Groundnuts from most tropical countries, including Tanganyika, have been found to be toxic. In poultry and experimental animals, including calves and pigs, rather small quantities of aflatoxin cause severe liver damage and sometimes primary liver carcinoma. Because we, like many others, have been encouraging the increased consumption of groundnuts by young children as a preventive measure against kwashiorkor, it seemed important to us to try to find out if this toxin caused ill-effects in man. It seemed not impossible that the common fibrosis of the liver we see in Tanganyika, and indeed primary carcinoma, should be caused by this toxin. We attempted to see in 1962, if there was any correlation between areas of high groundnut consumption and the incidence of primary carcinoma of the liver in man. However, the available figures were not large enough to be statistically significant. It seems surprising that so little interest is being taken in the possible toxic effects of this fungus on man.

A new and serious problem which has been introduced into Tanganyika from the civilized world is that of pernicious advertising. This has been frequently criticized by Professor Jelliffe in Uganda. The worst example of this advertising is the picture of a contented well-dressed mother bottle feeding her plump healthy baby, using some proprietary milk preparation. The implication is of course that it is simpler and more sophisticated and in some ways better to bottle feed than to breast feed. This has no truth in it in any society.

Among the majority of people in Tanganyika, the commencement of bottle feeding in an infant under six months of age in lieu of breast feeding is tantamount to signing the death certificate of the infant. The reasons for this are many. Firstly, the cost of the milk product is too high in relation to the income of 98 % of the population. The milk for this reason is then overdiluted. Secondly, the simple hygienic precautions necessary for safe bottle feeding are almost impossible in a household where water is a precious commodity that has to be carried. The child therefore dies of marasmus or a gastro-intestinal infection.

I would, therefore, reiterate that anything that can be done to support breast feeding is desirable. Human breast milk is a most important protein-rich food. We must not in any respect be a party to seeing its disappearance, be it through advertising, through the creation of an aura that breast feeding is a complicated, difficult procedure, or through the fostering of the sort of breast culture that our society has developed. It is highly desirable that breast feeding remains a natural normal procedure, and this may, I believe, be easier in places where the breast has not become a source of mystery, shame or pride.

Let me conclude by saying that there are many, many nutritional problems in Tanganyika that I have not dealt with here. There is the hungry school child whom we are now planning to feed—a school meal not only improves the health of the child, but also is a good way of introducing new desirable foods at an impressionable age, and should go hand in hand with nutrition education. There are the many nutritional problems that are less directly the concern of the medical nutritionist. There is the question of food storage. Perhaps one-third of the food grown in Tanganyika is never eaten by man, but is consumed by rats, insects, baboons, porcupines or birds. There is the necessity for improved animal husbandry and poultry, there is the possibility of a ten-fold increase in fish production, there are the problems of food preservation and food distribution, to mention but a few. All these must be the constant concern of a National Team.

Finally then, outstandingly, the main nutritional problem in Tanganyika is one of ignorance, the complete lack of understanding that a variety of different foods are necessary for health. There are many lesser factors, but on the whole it can be said that Tanganyika is in the fortunate position of having the land which, with the assistance of the people, could produce both sufficient quantity and variety of foods necessary to fulfil the nutritional needs of all her people.