THE subject of Malnutrition in Zambia is one receiving an increasing amount of attention and publicity. Work is being undertaken to assess the incidence and severity of this condition as well as its causation and to plan the best approach to its elimination. This has led me to reflect on my own ideas on this subject and my experience in dealing with malnutrition over the last 22 years and is the excuse for this paper.

To me, malnutrition in this country exists essentially in two main forms. One is found most frequently in the very young and is largely due to protein deficiency and the other is found in all age groups and is caused by multiple food deficiencies. It is with the former, known as Kwashiorkor, that I have been most concerned and it is some aspects of this serious condition that are the subject of these reflections.

INCIDENCE

Twenty-one years ago, when I first became interested in this subject, I read a description of the signs and symptoms of Kwashiorkor to my colleagues, many of whom had worked in this country for a number of years. None recalled having seen a child so affected.

Over the next 24 months I succeeded in finding only 24 children showing the classical signs of Kwashiorkor in an estimated population of 35,000 men, women and children, and all of these were between 9 and 36 months of age. Eight years later my records show that I had no difficulty in finding some 400 new cases of Kwashiorkor in 12 months while still working in exactly the same locality. All but a very small proportion of these were again children between 9 and 36 months of age.

How common is Kwashiorkor today? The answer to this question depends entirely on the experience of the individual making the diagnosis. If, as I did originally, one awaits the classical picture of the lethargic child, with pale, thin and relatively straight hair, hepatomegaly, oedema and skin changes consisting of "crazy paving" dermatosis with patchy exfoliation before recognising the condition as Kwashiorkor, then over a year, I expect that between 10 and 15 per cent of all children seen in the course of normal hospital practice are so affected and of these, depending on the facilities available, anything from 10 to 50 per cent will die.

If instead one has learnt to recognise the slight but definite changes in hair and skin found early on in Kwashiorkor, the incidence of this condition rises to over 80% in children between the ages of 9 to 36 months.

That this is no exaggeration is shown by recent experience when visiting Children's Wards in this area. Of 124 children in these Wards who were between 9 and 36 months of age, 10 showed obvious signs of late Kwashiorkor while in 102 the skin and hair changes of the early stage was readily recognisable, making a total of 91% suffering from this condition.

At the same time, of 100 young children who seemed to be in the same age group and who were seen on their mothers' backs at markets, bus stations and in the streets of Kitwe, 85% showed the skin and hair changes of early Kwashiorkor.

The high incidence is readily understandable and would in fact be expected by anyone conversant with the locally accepted methods of infant feeding and weaning and a knowledge of the aetiology of Kwashiorkor.

AETIOLOGY

Kwashiorkor is caused by protein deficiency. This deficiency can be due to an inadequate intake of protein, an excessive loss of protein, or to malabsorption and, in my experience, primary malabsorption syndromes, while they can lead to clinical Kwashiorkor, contribute little to the incidence of this condition, whereas an inadequate intake of protein is almost always the causative factor, assisted very often by an excessive protein loss due to diarrhoea.

For the first six months of life, protein and calorie requirements are normally met by the amount of breast milk available. Thereafter however, increasing amounts of supplementary food are necessary if nutrition is to be adequate. It is customary in most Western countries for supplementary feeds to be given from the third or fourth month of life and for these to be steadily increased until by the ninth month the child receives no breast milk at all and is being maintained on a balanced diet of cow's milk, meat, vegetables, cereals and egg.

In this country, however, supplementary feeding usually starts at a much later age and consists mainly of a thin porridge made from maize meal, millet or casava, foods which, while they provide some calories, contain very little protein. Breast feeding may well continue for 18 to 24 months, the child not being completely weaned until after the next one is born.

As a result, children are malnourished from an early age both as regards their protein requirements as well as in calories; the former deficit being the most obvious as well as the most serious, and this state of affairs is well illustrated by the following figures.

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As can be seen, in the first six months of life progress was normal but thereafter, it was far inferior to that found in European children.

In addition to an inadequate intake of protein foods, the Bantu child, mainly owing to poor hygiene and living conditions, is far more prone to such debilitating conditions as gastroenteritis—which leads to the loss from the body of what little protein is consumed—and other illnesses which, by inducing pyrexia, raise the metabolic rate so that both protein and calorie deficiencies are accentuated.

This state of affairs is probably at its worst between the 18th and the 30th months of life, and thereafter, the child can not only help itself to some of the food available to its parents, but its stomach can also hold more—a factor of some importance where millet or maize is the staple cereal since a useful amount of protein is available if enough of either can be ingested. Casava, however, contains such minute amounts of protein that for all practical purposes it can be regarded as a pure carbohydrate food.

It is these factors which account for the high incidence of recognisable Kwashiorkor in African children in this country.

TREATMENT

I do not propose to go into the details of the treatment of severe Kwashiorkor, but would stress that to be effective such treatment requires a well-equipped hospital, a devoted, highly trained, conscientious staff and the exercise of far more medical knowledge and ingenuity than the average text book of medicine would lead one to expect; and yet, even when given all of things a mortality rate as low as 10% is infrequently achieved. When instead treatment is carried out in crowded wards with inadequate facilities for ventilation and heating, not enough bed linen or napkins and insufficient fully trained staff so that most of the nursing and feeding is carried out by well intentioned but semi-trained nurses, who cannot be expected to appreciate the necessity for strict and meticulous attention to detail, then the mortality rate may well be as high as 50%.

But for every one child so severely affected, our wards are likely to contain ten others in an earlier and far more easily treated stage of Kwashiorkor whose condition is all too frequently unrecognised and therefore untreated.

This failure to recognise Kwashiorkor in its early stages is to me as reprehensible as would be an inability to diagnose cancer of the breast before metastatic deposits are present throughout the body. It can also be very nearly as fatal. It would be better to consider that every child in the 9 to 36 months age group seen at our hospitals and clinics is suffering from Kwashiorkor—whatever else may be present—and to treat accordingly.

This treatment should consist of:

1. Measures to detect and to deal promptly and energetically with any infection or disorder that may be present.
2. The institution of a high protein diet.
3. Instruction given to the child's mother regarding diet and hygiene.
4. Subsequent “follow up” attention.

It is obviously impossible to deal here with every aspect of the first of these points since it would require a text book of medicine to do so, but in this connection diarrhoea and vomiting deserve special mention since this debilitating, and all too common, complaint can produce the classical picture of severe and late Kwashiorkor within a matter of days in children who had previously shown only the early signs of this condition. It is, therefore, of special importance that vomiting and diarrhoea be brought under control as rapidly as possible. Long, and often bitter experience has taught me that in addition to the standard treatment for this complaint, the intra muscular injection of 10 to 15 mgms. of chlorpromazine will rapidly stop vomiting and at the same time sedate the child so that a tube may be passed into the stomach and that 6 mgms. of Codeine phosphate given hourly down this tube will effectively stop the diarrhoea and allow for an early resumption of feeding. Control can subsequently be continued by maintenance doses of both preparations given as may be needed.

The next step is the institution of a high protein diet and while this may sound a simple procedure, it seldom is. In the first place sick children, whether they are suffering from gastro-enteritis, bronchopneumonia or meningitis, are not particularly interested in food and secondly, comparatively few doctors appear to have remembered what little they were taught regarding food values and calorie requirements so that all too often, both the choice of foods and their quantities, is left entirely to Ward Sisters and it is to their credit that results are as good as they are.

A child of 2 years of age needs a minimum of 30 g. of protein a day in a diet yielding at least 1,100 calories. A sick child with a high temperature and a debilitating disease may well require much more in the way of both protein and calories if weight is to be maintained. It will also almost certainly need to be fed by gastric tube for the first few days if an adequate amount of nourishment is to be given.

To assist in the preparation of a suitable dietetic regime Table 2 gives approximate values for some of the foods commonly employed at this stage.

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Striking advances have recently been made into the knowledge of sleep with the aid of the electroencephalogram, and it is now recognised that sleep does not consist of a quantitative reduction in cortical activity but of a qualitative change. Hypnotics, by their generalised depressant action on all the brain structures, greatly reduce cortical activity and sleep takes on an abnormal pattern. The development of Mogadon, however, has now made the treatment of insomnia possible without any significant lessening of cortical activity. The sleep induced closely resembles natural sleep; there is no disturbance of the normal rhythmical balance that exists between the sleep and wake processes and the patient will awake refreshed, without hangover and without mental confusion.
TABLE 2

<table>
<thead>
<tr>
<th>Food</th>
<th>Quantity</th>
<th>Protein</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skimmed milk</td>
<td>30 ozs.</td>
<td>30 g.</td>
<td>580</td>
</tr>
<tr>
<td>Whole cows milk</td>
<td>30 ozs.</td>
<td>30 g.</td>
<td>700</td>
</tr>
<tr>
<td>Complan</td>
<td>1 oz.</td>
<td>8.5 g.</td>
<td>125</td>
</tr>
<tr>
<td>Casilam</td>
<td>1 oz.</td>
<td>25 g.</td>
<td>110</td>
</tr>
<tr>
<td>Farex</td>
<td>1 oz.</td>
<td>14 g.</td>
<td>110</td>
</tr>
<tr>
<td>Egg</td>
<td>1</td>
<td>7 g.</td>
<td>70</td>
</tr>
<tr>
<td>Glucose</td>
<td>1 oz.</td>
<td>10 g.</td>
<td>120</td>
</tr>
</tbody>
</table>

Now, if we only give a child of two some 30 ozs. of skimmed milk in one day, we may have met its fluid requirements but we have only given it about half of the calories it needs. As a result, much of the 30 g. of protein present in the milk will be used as a source of energy and will thus not be available for body building. Furthermore, the child’s store of fat will be depleted to make up for this calorie deficiency and the child will lose weight and the degree of malnutrition present will be accentuated. It is essential that both calorie and protein requirements be met if malnutrition is to be overcome.

In the case of a seriously ill child, we may well have to be content with supplying less than its full nutritional requirements in the first 24 to 48 hours but every effort must be made to increase the amount of food given as rapidly as we can without upsetting digestion, and this is best done by using increasing amounts of easily digested foods. As an example I recommend the following:-

A “milk shake” consisting of 30 ozs. of whole milk with one raw egg and 1 oz. of Complan given over 24 hours, either by tube or orally if the child is well enough and Farex 1 1/4 ozs. with milk 2 ozs. and Glucose 5.0 g. (a heaped teaspoonful). This will supply about 1,120 calories and contains over 50 g. of protein in an easily digestible form.

As soon as recovery permits, the amount of the “Milk shake” can be gradually reduced to one pint, while meat, vegetables and cereal are added to produce a more normal diet.

Treatment along the lines indicated ought to be continued until all evidence of Kwashiorkor has disappeared but, unfortunately, the demands on Hospital accommodation are such that this is scarcely ever possible and our patients, of necessity, are discharged long before their state of malnutrition has been overcome.

Two things are essential for their continued progress. Firstly, their parents must receive instruction in the elements of hygiene and nutrition, for our work has been of little use if these children are returned to the same environmental factors which led to their original state, and secondly, we ought to be able to refer such children to suitable Clinics for further attention.

PREVENTION

Undoubtedly the best treatment for Kwashiorkor is to prevent its appearance. A more sophisticated weaning process, as employed by mothers in most Western countries, combined with improvements in hygiene and child care could result in the virtual elimination of this condition, but this solution, in Zambia, poses such enormous educational and socio-economic problems that its achievement is unlikely for years to come. This need not, however, deter us from making a start in the right direction for there is much that can and ought to be done.

Reduced to its essentials, we need a method of child feeding consistent with present day factors, a general improvement in hygiene and a mass education programme regarding both of these concepts.

With regard to the first of these requirements, it is, at present, about as pointless to tell the average Zambian mother that she should give her child exactly the same type and amount of food that is given to children of more fortunate parents, as it would be to prescribe an ocean cruise in a luxury liner for a debilitated unemployed labourer. We must recommend types of food which are readily available, comparatively inexpensive, well known to, and acceptable by our people, which have a high protein content and which are easily digested. Two common Zambian products fill these requirements; dried beans and groundnuts, and a third, which could be obtained without a great deal of difficulty is powdered skimmed milk.

As far as beans are concerned, they are easily and widely grown and there can scarcely be a woman in Zambia who does not know how to pound and cook these to form an appetising “relish”, highly appreciated by both the young and the older members of our population. They contain, in their dried form, approximately 20% of protein so that 100 g.—a little more than 3 ozs.—will provide about 20 g. of protein and yield 300 calories. Groundnuts are equally rich in protein and, owing to their fat content, have a higher calorific value so that 100 g. contain 20 g. of protein and give 550 calories.

The provision, therefore, of sufficient of either of these foods should do much to relieve the chronic protein shortage to which Zambian children are subject.

If, in addition, the child can receive milk protein and an occasional egg, then virtually every amino-acid the body requires is available and Kwashiorkor could become a thing of the past. It follows then that rather than discouraging breast feeding beyond the age of nine months, we must either recommend it or else make milk protein readily available in another form such as, for example, dried skimmed milk powder which has a protein content of at least 35% and provides 360 calories per 100 g. Furthermore, doctors and nursing sisters should make provision for mothers to continue breast feeding children under the age of 24 months while they are in Hospital so that this valuable source of protein is still available when they leave.

Until comparatively recently, it was generally considered deplorable for a Zambian woman to have children at intervals of less than 2 years. This old practice has much to commend it since it allows some breast feeding to continue for almost two years, but I would go further and suggest that until such time as parents can more easily afford the foods so essential for the adequate nutrition of their children, we might encourage the prolongation of this interval to three years.

I would like to see a greatly increased production

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of beans and groundnuts. I would like to have the purchase price rigidly controlled and, if necessary, the crops subsidised so that both foods were not only readily available, but cheap. I would like to see children being given both in increasing amounts from the age of six months onwards and, as a necessary supplement, I would like to see skimmed milk powder readily available to mothers of children of all ages, preferably packaged in waterproof containers holding not more than 4 ozs. so that home storage problems could be reduced to a minimum.

Given these things and providing that some breast milk was available, a child of 18 months of age could have its total daily protein, calorie and vitamin requirements fully met by as little as 2 ozs. of dried beans, 1 oz. of groundnuts, 2 ozs. of skimmed milk powder, 4 ozs. of maize meal, two teaspoons full of sugar and a moderate portion of mixed vegetables. This may not sound very palatable, but it is cheap, it could be made readily available, little ingenuity is needed to substitute other foods if they can be afforded and it would go a long way towards greatly reducing the incidence of Kwashiorkor.

A further step towards this goal would be achieved by a general improvement in hygiene.

We all know of the morbidity amongst Zambian children attributable to a lack of hygiene and we realise that this takes its toll of children whose reserves are already depleted by malnourishment and is also responsible for a marked accentuation in the degree of malnutrition present.

We would all agree that careful attention to such fundamental issues as:-

a) Cleanliness in the handling, preparation and storage of food;

b) Adequate purification of water;

c) Measures for the safe disposal of rubbish, human and animal excreta and waste material in general;

d) Steps to control the breeding of flies;

e) Methods of ensuring cleanliness of houses, clothing and bodies;

f) The necessity for adequate ventilation, light and warmth; would result in a tremendous improvement in child health and help to do away with Kwashiorkor.

Is there no one in Zambia capable of drawing up a set of simple lessons on these important topics applicable to both rural and urban communities? Could these not be translated into every one of the languages commonly used in this country and form the basis of a mass education programme in the important fields of nutrition and hygiene? Would it not be worthwhile recording them on magnetic tapes, distributing them widely throughout Zambia and replaying them again and again on simple machines in schools, centres of adult education, at Clinics, Hospitals, Welfare Centres, political and public rallies and wherever people are gathered together?

Surely if we are really interested in improving the nutrition of our children something along these lines is badly needed.

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LUSAKA
THERE are five large urban clinics in Lusaka (urban and peri-urban population 150,000 in 1966). These clinics are open from 8 a.m. to 4 p.m. on weekdays and from 8 a.m. to 10 a.m. on Sundays. They are extremely overworked as is the outpatient department of Lusaka Central Hospital to which clinic patients are referred.

SURVEY

For six weeks during December 1965 and January 1966 a survey was conducted to see exactly what work the clinics and outpatient department were doing, with a view to planning future work.

The survey was necessary because the official clinic returns are based on the patient’s complaint and not on the diagnosis.

METHOD

A team of one doctor and one university student worked at each clinic in turn. One patient in ten was examined until all five clinics and outpatients had been covered on every day of the week except Sunday. Although each clinic was visited on every day of the week, the visits were not on consecutive days.

The patients were completely unselected, every tenth one being taken at the registry, interviewed and sent to the Doctor for examination.

The patient was examined by the Doctor and a record made of the diagnosis, and if necessary of a second diagnosis (e.g. a child with an upper respiratory infection needing treatment for conjunctivitis was noted as suffering from both diseases).

The diagnosis was made on one clinical examination alone, i.e. if a patient with upper abdominal pain was found to be suffering from a lower lobe pneumonia he was recorded as a case of pneumonia. The diagnosis of “abdominal pain” was only made when no likely cause was suggested.

All possible precautions were taken to ensure that every tenth patient was in fact examined.

On three occasions the total number of patients entering the clinic was counted, and it was twice found that one in ten patients had been examined. The third time a mistake in the system of giving forms was discovered; one in twelve had been examined and the numbers were corrected for that clinic (clinic 4).

In all, 1,302 patients were examined at the clinics and 286 at the outpatients department.

The survey took place in the rainy season. In the dry season the relative frequencies of the different diseases would not have been the same, and the total numbers would probably have been considerably larger.

The following picture emerged in the clinics:

1. Numbers: During four weeks of the survey, 52,300 attendances were made at clinics plus those made at twenty Sunday sessions of two hours each.

This means that on an average every man, woman and child in the Lusaka area attended clinic four times a year.

Of these 1,920 were first attendances (3.7%).

The figures also show that if of 53,000 attendances only 1,920 were first attendances, then many people visited clinics very often.

2. Age and sex: of the 1,302 patients examined, 720 (55%) were over the age of six years and 579 (45%) were under this age.

Fifty per cent of the patients were males and 49% were females (1% unrecorded). In the 1963 census, the population of Lusaka area was 56,150 males (56%) and 44,100 females (44%).

3. Travelling distances and transport: The distance a patient had to travel was measured as the round trip “as the crow flies”.

Sixty one per cent travelled less than one mile to visit the clinic, 5% between one and two miles, and 28% up to six miles. Only 2% travelled more than nine miles, i.e. lived outside a radius of 41 miles of the clinic. These figures are substantially different from those of Fendall who found at a health centre in Kenya that only 40% of patients travelled less than 10 miles.

Most of these patients (90%) walked to and from clinic, 4.5% cycled and 4% paid for some kind of transport, e.g. hitch-hike, bus or taxi (1.5% unrecorded).

4. Income: In an attempt to find out what kind of a home they came from, the patient was asked what was the work of the man of the house. (No attempt was made to assess accurately the family income or the number of dependants).

As can be seen from Table 1, 42% came from families where the man was either unemployed or a labourer or a domestic servant or a farmer, i.e. there might be thought to be chronic shortage of money, (less than 250/- per month) 37% were traders, artisans (e.g. painters) or drivers, and less than 1% could by any stretch of the imagination be called professional.

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