Nutrition in the Bechuanaland Protectorate

BY

BERNARD T. SQUIRES, O.B.E., M.A., D.M.

INTRODUCTION

For proper appreciation of the nutritional picture obtaining in the Bechuanaland Protectorate, consideration must be given to various governing factors such as geography, territorial organisation, effects of the change in African life resulting from prolonged contact with Europeans, and variety and amount of natural food resources, for these influences form the background against which the nutritional picture is portrayed. No apology is made, therefore, for dealing with such factors in some detail.

 GEOGRAPHY

The Bechuanaland Protectorate lies between 18° and 27° S. latitude and between 21° and 28° E. longitude; it is bounded on the south and east by the Cape and Transvaal provinces respectively of the Union of S. Africa, on the north-east by S. Rhodesia, on the north for a short distance by the Zambesi, and on the north-west and west by the mandated territory of S.W. Africa.

The territory, of which the area is some 275,000 square miles (about the size of France), occupies a number of broad hollows in the plateau surfaces that extend over most of southern Africa; well-marked natural features divide the territory into three tracts. The water-parting between the Molopo and the Notwani Rivers (see map) is a plateau with a mean elevation of 4,000 ft. above sea level, which runs generally parallel with the railway, at a distance of 20-50 miles to the west. East of this plateau there is a general fall towards the valley of the Limpopo, through undulating country broken by groups of rocky hills. To the west of the parting the ground falls away to the vast expanse of the Kalahari desert, a level or slightly undulating sandy tract more or less closely covered with thorn-bush or grass. This tract extends for some 300 miles to the west and north-west; west of the Kalahari the land rises again towards the S. Rhodesian border, whence the Nata River and its tributaries flow into the Makarikari from the north-east.

WATER

Water, the most important of all nutrients, is proverbially scarce in the territory. With regard to surface water, the eastern side of the parting drains, by a multitude of torrent river beds, into the Limpopo, via its tributaries, the Shashi, Macloutsi, Lotsani, Mahalapye and Notwani Rivers. These tributaries flow only in the rainy season, and then only for short periods; for the rest of the year they are dry, although standing pools here and there hold water for a few months after the rain has ceased.

To the west the greater part of the central and southern Kalahari formerly drained into the Orange through the channels of the Molopo, Auob and Nossop. These rivers no longer flow and are permanently dry, save towards their heads. No surface water, therefore, now leaves the Kalahari save by evaporation or percolation. To the north the Okavango drains into the swamps, whence some water emerges to flow southwards into Lake Ngami and eastwards via the Botelle to the Makarikari. To quote the Pim Commission (1933), “The fact that the whole run-off of water from every side, but more especially of the Nata from the east and the Okavango from the north-west, either flows on the surface or percolates underground, towards a central depression having no exit, is the most remarkable feature of the territory and is of great importance in connection with the outstanding problem of water supplies.” Indeed, except in the north-west and along the Chobe and Zambesi, the scarcity of surface water is the greatest natural difficulty with which the people of the protectorate have to contend. The number of small dams has greatly increased of late years and the position has been improved by the help given by the Administration in sinking boreholes in various parts of the country, but in late winter and spring the principal sources of supply in many areas are the wells dug in river beds or in low-lying valleys.

RAINFALL

The mean annual rainfall for the entire territory is from 15 to 20 inches. In general, the eastern and north-eastern districts receive much more rain than does the Kalahari. The rainfall is exceedingly variable from one year to another and from one locality to another. Practically
all the rain falls between October and April, mostly in short sharp storms which are exceedingly localised, thereby affecting agriculture adversely. Generally the rainfall and its distribution are so irregular and undependable that really good harvests occur only once in four or five years.

As soon as the first rains fall in October, sufficient to soften the ground, ploughing begins. There is usually a hiatus of several weeks between the cessation of the “little” rains and the beginning of the main rainy season. The main rains should start not later than January, in order that the cereal crops may mature before
the first frosts, which occur towards the end of April in the south and the end of May in the north. Besides affecting the crops, lack of rain means that the little surface water available soon disappears, cattle have to be moved to areas where water is still available, and the game disappears from its usual haunts.

**Soil**

The soils consist of sandy loams interspersed with black clays; the distribution amongst the widespread sand is very irregular, and outcrops of rock occur frequently.

**Vegetation**

In spite of the meagre rainfall, the vegetation is by no means insignificant, for the territory is rich in grasses which provide excellent grazing, shrubs and trees; even the Kalahari produces a variety of shrubs and grasses. In the south dense growths of thorn bush are typical, with large trees more widely spaced. In the north forests occur and good timber is available, but much of the country is covered with "mopani" trees, which grow in shallow soil. Leguminous and bulbous plants grow everywhere and contribute considerably to the food supply of the people, especially in the outlying areas. One of the most remarkable of these plants is the *tsama* melon (*Citrullus vulgaris*), which is the mainstay of subsistence for man and beast of the Kalahari during the dry season.

**Ethnography**

The population is about 294,000 (1946 census); the distribution is very uneven, for the majority live in the eastern districts, the favourable areas along the Botletle River and in the Okavango basin. The waterless wastes of the Kalahari are inhabited by only a few thousand people living in scattered communities.

The original inhabitants of Bechuanaland seem to have been the Sarwa, a primitive people of Bushman stock, who were essentially hunters and who lived in small independent communities. At an unknown date they were followed by the Kgalagadi, who are of Tswana stock, but more primitive than the other Tswana tribes, who entered Bechuanaland later and who were primarily pastoralists and agriculturists.

It is the custom of the larger Tswana tribes to live in communities of comparatively large size, amounting in the case of large towns such as Serowe and Kanye to 25,000 and more. The original reasons for this concentration probably had to do with facilities for defence and administration. This custom, together with difficulties due to widespread dispersion of arable land, pasture and water, has compelled the Tswana to evolve a form of territorial organisation which differs from that of almost every other Bantu people in Southern Africa.

Only a favoured few are able to have their arable lands near the main settlements; most of the lands are dispersed in more or less continuous blocks far across the country, so that families of the larger reserves may have to travel up to 50 miles and more to their lands.

The cattle, which used to be entirely, and still are mainly, the source of Tswana wealth, cannot be kept at the lands, so are sent out to far distant cattle posts, whose location depends upon the amount of pasture and water available. Very few of these posts are near the main settlements, and some may be 100 miles and more away.

The people live in the main settlements for a few months only of each year, between the conclusion of the harvest in June or July and the commencement of the rainy season in October, when the vast majority leave for the lands, whence, in an ordinary year of fair rainfall, they do not return until after the harvest. The Tswana can thus be classed as semi-nomadic. Even between July and October many families are absent from home, for the custom of visiting far-off relations and friends is well established and common (Schapera, 1940).

We must now examine shortly the effects of European influence upon the nutritional picture. From this aspect the most important changes are those concerned with hunting, agriculture, labour migration and education.

Hunting has been made easier by the introduction of firearms, the modern steel trap and, to a lesser degree, by the use of the horse. The game has, however, been driven further afield and is more difficult to obtain, so that for the majority of the population the supply of meat from this source has been greatly reduced.

In agriculture the substitution of the plough for the primitive hoe has tended to improve agricultural yields, although simultaneously the area available for cultivation has been reduced. The reason for this apparent paradox is that for ploughing, since tractors are not in general use, oxen must be introduced into the arable areas, and such areas must therefore be within
reasonable distance of watering facilities, which is not the case in all arable areas. Further, if a man has not enough animals of his own for ploughing, he must borrow or hire, and if he cannot get extra oxen at the right time his sowing may be delayed and his harvest suffer.

Labour migration has become an increasing practice for those seeking new sources of income. This export of labour, chiefly to the Rand and Free State mines, has become an established feature of Tswana life, and the additional income thus made available to the protectorate is considerable. On the other hand, through the continual absence of so many able-bodied men, agriculture is affected, for although many return to their homes for the ploughing, the cultivation is left to the women, who are in many cases unable or unwilling to perform this labour properly. Indeed, it is easy to understand that under such circumstances correct and efficient land utilisation is difficult.

Finally, the introduction of education has influenced the pattern of Tswana child life to the extent that whereas formerly children who were not at the cattle posts accompanied their parents to the lands during the season, they now stay in the settlements during the school terms. These children either stay under the charge of a relative who for some reason or other (usually age) has not taken part in the annual migration, or else club together with other children to fend for themselves in a communal group.

Food

The staple food of the majority of the population consists of kaffir corn (sorghum spp.), and to a lesser extent mealies (zea mays), supplemented as opportunity occurs by meat, vegetables—of which beans are the most important—fruit, milk and last, but by no means least, kaffir beer (bojalwa). A minority, which consists of the desert dwellers, the communities living in the Lehututu area (see map) and the riparian tribes of the Chobe and Okavango, enjoy a diet in which animal protein plays a larger part, as the desert populace are able to get game and the riparian tribes are fish-eaters.

Cereals are used in a variety of dishes; porridge is consumed fresh or sour, with or without milk, melon, melon seeds, etc. There are at least 20 varieties of porridge alone, beside other dishes made with a base of beans, groundnuts, etc. (dikgobe).

Meat is stewed, roasted or grilled, and eaten with porridge or dikgobe.

Vegetables consist, besides beans, chiefly of varieties of wild spinach (morogo).

Fruit.—A variety of wild fruit is available, but the season is a very short one of a few weeks only. The chief edible fruits are obtained from the following plants: Grewia spp., Vangueria infausta, Rhus lanca, Euclea spp., Mimusops spp., Ximenia caffra, Ximenia americana, Chrysiphyllyum magalisontanum, Zizyphus mucronata, Boscia albitrunca, Anona senegalensis, Sclerocarya caffra and Opuntia spp.

Milk is obtained not only from cattle, but less commonly from goats. Since there are but few households that own neither cattle nor goats, milk should form an important part of the diet. In practice, owing to the necessity for keeping the cattle at distant posts, it is there that the greater part of the milk is consumed, since very few families can graze cattle near the large settlements. A certain amount of sour milk is sent from the posts in skin bags to people at home or in the lands, but the supply is irregular. The great difficulty of obtaining fresh milk at the large Tswana settlements is nothing new. Anderson (1888), who travelled through Bechuanaland in the “sixties,” commented upon the fact. It is, however, the custom to send women and children, especially if they are ailing, to the cattle posts that they may have the opportunity of consuming fresh milk.

Beer is regarded as an essential foodstuff. In times of plenty it is freely consumed and is the principal or sole food for many men for days on end; it is the first essential in all social activities, a prime incentive to labour and the first thought in dispensing hospitality. The proper brewing of beer from kaffir corn is an exacting craft; the process is too long and detailed to be described here, but it should be mentioned that the brewing of 40 gallons of beer requires about 100 lbs. of corn, and that the vitamin content is far from negligible. Fox and Golberg (1944) give the following figures in mgs. per pint: thiamin, 0.28; riboflavin, 0.32; nicotinic acid, 2.6; ascorbic acid, 4.8. The amount of beer consumed per person on social occasions is measured in gallons rather than in pints, so that its claim to be an essential foodstuff seems to have some justification.

Preservation of Food

Since the main food supplies are essentially of seasonal occurrence, the question of storage and preservation becomes of importance.
Cereals are stored in large baskets and can be kept for some months without appreciable deterioration. Meat is cut into strips and dried; beans are preserved in the same way as cereals. Melon, pumpkin and sweet reed are cut into strips and dried; the seeds of melon being removed; the strips when dry are packed in bundles and will keep for about a year.

Fruit is not preserved, and milk can only be preserved by curdling and storage in skin bags.

COMPOSITION OF DIET
The diet varies in composition according to the season both quantitatively and qualitatively, although seasonal variations in the case of the staple cereals have become less of late years owing to the possibility of buying corn and mealies in times of shortage. The way in which available foodstuffs vary during the course of a year with good rainfall and how scarcity of one article is made up by prevalence of another has been shown elsewhere (Squires, 1949).

AVAILABILITY OF FOODSTUFFS
Except in a really good year of sufficient rainfall, a variable amount of mealies and mealie products is imported; on the other hand, in some years there is a surplus of beans and sorghum which are available for export.

INTAKE OF SPECIFIC NUTRIENTS
It is naturally very difficult to give an accurate computation of the daily intake of nutrients, but a broad average is given in Table 1, using the tables of Fox and Golberg (1944) for the food values.

<table>
<thead>
<tr>
<th>Table 1</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>65 gm.</td>
</tr>
<tr>
<td>Fat (ether ext.)</td>
<td>24 &quot;</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>470 &quot;</td>
</tr>
<tr>
<td>Calories</td>
<td>2,340</td>
</tr>
<tr>
<td>Ca.</td>
<td>210 mg.</td>
</tr>
<tr>
<td>Fe.</td>
<td>32 &quot;</td>
</tr>
<tr>
<td>P.</td>
<td>1,380 &quot;</td>
</tr>
<tr>
<td>Vit. A (I.U. per 100 gm.)</td>
<td>8</td>
</tr>
<tr>
<td>Thiamin</td>
<td>1.7 &quot;</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.6 &quot;</td>
</tr>
<tr>
<td>Nicotinic acid</td>
<td>16 &quot;</td>
</tr>
<tr>
<td>Ascorbic acid</td>
<td>3 &quot;</td>
</tr>
</tbody>
</table>

The amount of protein is not far off that recommended for Europeans, although very little is of animal origin; fats fall far below the minimum standard. Calories, although some what below standard, are probably sufficient for people living in a tropical climate (at least during the hot months) and who are in general only moderately active. Calcium intake is very deficient according to European standards, although it must be admitted that the people seem none the worse. The iron intake is theoretically more than sufficient for daily needs if the figure 11-17 mg. given by Wintrobe (1946) is accepted, quite apart from what gets into the food from the inside of the cocking pot (Walker and Arvidsson, 1950).

The phosphorus intake, as is usual with diets containing a preponderant proportion of cereals, is excessive.

As regards vitamins, the intake of vitamin A is low, although the irregular consumption of milk and green plants may raise it. The thiamin intake is adequate according to the standard laid down by the S. African Nutrition Council (Fox & Golberg, loc. cit.), which recommends 0.5-2.0 mgs. daily; the riboflavin intake is markedly deficient according to the same authority, which recommends 2.0 mgs. daily. The nicotinic acid intake is sufficient, but the ascorbic acid intake is negligible.

In the latter case, however, no account has been taken of the incidental intake from wild fruit and plants, and in any case the adequate intake for Africans has not yet been accurately assessed. It may be pointed out in this connection that a series of African breast-fed babies, whose mothers’ milk showed a mean content of 2.4 mgs./100 mls. ascorbic acid, which is far below European and American findings and theory, exhibited no signs of ascorbic acid deficiency over many months of observation (Squires, 1952).

In general, however, it may be said that the above intakes amount to very little more than a subsistence diet.

INCIDENCE OF MALNUTRITION
The existence of malnutrition in the territory has been known for many years; Livingstone (1857) hinted at the seasonal occurrence of disorders now known as likely to be due to malnutrition, whilst Jagdowski (1886) mentioned definite signs and symptoms which he attributed to seasonal food shortages.

The incidence varies greatly, as would be expected from a consideration of the responsible factors, not only from one year to another, but
also from one locality to another. Field survey results, using criteria described elsewhere and employing as subjects school children within the approximate age range 8-15, who are very sensitive to changes in nutritional status (Squires, 1949), have shown the incidence to be greatest in the large settlements, where examination of school children indicated that 20 to 30 per cent. exhibited stigmata of malnutrition, rising in one locality during the drought year of 1944-45 to 90 per cent. In the smaller communities, where it is easier to augment the basic diet with milk, fruit, game, etc., the incidence is much less, falling in the case of one Sarwa community to 3 per cent. (Squires, 1943). The desert dwellers of the Lechutu area, who are fortunate in their diet (Walker and Squires, 1952), also exhibit a good nutritional status; the very low incidence of dental caries among these people (Clement, 1953) is also worthy of note.

**FINDINGS IN MALNUTRITION**

Severe cases of undernutrition due to prolonged lack of nutrients are rarely seen, but milder cases are commonly encountered.

Examples of the classical deficiency diseases are rare compared with those of mixed deficiencies. The manifestations and symptoms include dyspnoea on exertion, palpitations, vague pains in joints and musculature, gingival bleeding, varying degrees of nystagmus, corneal ulceration, xerophthalmia, conjunctival furrowing, angular stomatitis, glossitis, koilonychia, hypochromic microcytic anaemia and skin affections such as "crazy pavement," phrynoderma, dyssebacia and a scaly dermatitis which has been described elsewhere (Squires, 1941). In adults the commonest symptom is vague muscular pain, with "crazy pavement" markings of the face, but there is also a multitude of ill-defined signs. For example, in the winter it is common to find delayed healing in wounds and that abortions and miscarriages tend to be prolonged and to require intervention more frequently than at other seasons.

No case of "kwashiorkor" has yet been reported, although some of its constituent characteristics, e.g., oedema, hair changes, have been encountered singly.

**MALNUTRITION IN RELATION TO HLMINTHIC AND PARASITIC DISEASE**

Apart from schistosomiasis, which is prevalent along the Limpopo, helminthic infestation is not common, the incidence according to recent reports being 1 to 2 per cent. of all patients. In an unselected sample of 381 apparently healthy school children, 7 per cent. only were found to be infected, and so far as investigation has been made there seems to be little connection between helminthic infestation and malnutrition.

Malaria is the most important parasitic disease; it is endemic throughout the northern half of the territory. Even so, out of a sample of 200 children from northern settlements in the Chobe district, of whom 42 per cent. exhibited varying degrees of splenic enlargement, 5 per cent. only were diagnosed as being malnourished.

**CONCLUSION**

The picture then is one of intermittent malnutrition rather than undernutrition, varying in severity from year to year and from one region to another, and not due primarily to any one factor.

Although the effects of malnutrition may not be severe in any one year, the cumulative effects may be severe. It has been noted by personal observation of the same groups of subjects over several years that the average Tswana child can weather one bad season or even two with no obvious ill effect, but that a further shortage of food causes a proportion of them to appear chronically ill-nourished, as shown by serial tongue prints (Squires, 1953); and that judging by the results of periodical school medical examinations, many of these cases later become easy victims of infection.

**SUMMARY**

The nutritional picture in the Bechuanaland Protectorate is described and the contributory factors examined.

Geographical, ethnographical and sociological factors are described.

Malnutrition is intermittent, varying greatly in severity from one year to the next and from one locality to another.

Available data show the incidence of malnutrition to be very variable; surveys showed that amongst children of school age 20 to 30 per cent. of all subjects examined in the larger communities were diagnosed as being malnourished. In smaller communities the figure was as low as 3 per cent. During one drought year the proportion of children in one large settlement who showed signs of malnutrition rose to 90 per cent.
REFERENCES


Acknowledgment

I am indebted to Dr. M. L. Freedman, O.B.E., Director of Medical Services, Bechuanaland Protectorate, for permission to publish this paper.