

10:

NU 60118

104

ask 4

REGISTERED

101

FOOD SUPPLIES AND
CONSUMPTION IN AFRICA

By

Bruce F. Johnston
Consultant

Food Consumption and Planning Branch
Nutrition Division

UNITED NATION
CENTER
ITALY

F.A.O.

Rome, 1961

III. EAST AND SOUTHERN AFRICA

Owing to the great variation in elevation as well as other influences on rainfall and temperature, it is impossible to define large climatic and food crop zones within this heterogeneous sub-region. In a matter of 200 miles the climate in East Africa changes from the steaming rain forest of the narrow coastal strip of Kenya and Tanganyika, to the perpetual snow that caps Mt. Kilimanjaro, the highest mountain of the continent with its elevation of 19,590 ft. Within a single small country, Ruanda Urundi, no less than 22 agricultural zones are identified, and even the highly generalized description given below distinguishes four zones that differ greatly with respect to their physical environment and in the major crops that are grown.

There are also great variations in the social and economic conditions that prevail in different countries and territories of the sub-region. Ethiopia, a constitutional monarchy under Emperor Haile Selassie I, has the oldest and longest line of royalty in recorded history. Its population is made up of many different and sometimes hostile ethnic groups, and over 50 local dialects and languages are used in Ethiopia and Eritrea. The great extent and rugged topography of the country have posed special problems in developing a road and rail network to link the various regions of the country, and many areas can be reached only on foot, on horseback, or by helicopter. In recent years, major efforts have been made to expand the educational system, but probably only about 3 to 5% of the population of school age are attending school. A population census has yet to be taken in Ethiopia, and estimates of the country's population vary from 12 to 20 million. The development of a manufacturing industry is only just beginning, and the per capita national income has been estimated at only \$30 per year.

At the southern tip of the continent, the Union of South Africa presents drastically different social and economic conditions. Industrialization has proceeded there much farther than elsewhere in Africa. The economic development of the country has been favoured by the exploitation of rich mineral deposits, ample supplies of foreign capital, and a large European population well supplied with professional, technical and entrepreneurial skills. The average per capita income is estimated at nearly \$350 per year, by far the highest in Africa. Along with these favourable features, the country has specially difficult social and political problems associated with the official policy of "apartheid" which is rejected by the majority of the population which has no voice in the Government. Skilled and professional jobs are largely reserved to the population of European origin. Virtually all of the African workers are in unskilled jobs with average per capita income equal to only one-seventh the average income received by the European and Asian minorities. Kenya, Angola, Northern Rhodesia and especially Southern Rhodesia also have fairly sizeable though much smaller populations of European origin. The

European minority in Southern Rhodesia is less than 10% of the total whereas in the Union of South Africa the 2½ million persons of European origin account for approximately one-fifth of the total population. Mineral wealth, especially the rich Copper Belt of Northern Rhodesia, has contributed to rapid economic growth in the Rhodesias, including considerable development of secondary industry. The estimated per capita income of the Federation - about \$130 per annum - is relatively high among the countries of tropical Africa. Uganda, Tanganyika, Ruanda Urundi, and Madagascar, have exceedingly small European populations comparable to the situation in West and Central Africa. Sizeable exports of cotton and coffee have contributed a good deal to the growth of incomes in Uganda, but at an estimated \$57 per person per year income is still extremely low, although a little above the estimated per capita income in neighbouring Tanganyika.

A. Food Production and Consumption Patterns

In addition to the greater and more intricate variation in climatic zones, there are other noteworthy differences between the agricultural economies of this sub-region and the conditions that prevail in Western and Central Africa. First of all is the greater and more widespread importance of livestock. Many centuries ago intrusive cattle-keeping peoples from the north embarked on a series of forays which carried them ever farther to the south, eventually penetrating into the area which is now the Union of South Africa. A very large part of East and Southern Africa is savannah grassland suited to cattle grazing, and these areas are inter-mingled with the humid forest zone and tsetse-infested savannah woodland to a much greater extent than in Western and Central Africa. For example, the Buganda province of southern Uganda is mainly a high rainfall zone with a food economy very similar to the root crop and plantain zone of West and Central Africa where large animals are not found; but throughout much of Buganda cattle are of substantial importance.

The greater inter-mingling of cattle-keeping and sedentary agriculture is also more important insofar as the population is concerned. Some of the cattle-keeping tribes, such as the Masai of Kenya and northern Tanganyika, have retained their separate identity as nomadic pastoralists, but more commonly the keeping of cattle has been merged with agricultural pursuits. In Buganda and Bunyoro in Uganda, the invading pastoralists were merged with the local Bantu agricultural population. The Watutsi, the nomadic cattle-keeping tribes that established the Kingdoms of Ruanda and Urundi, became a ruling class, exacting tribute from the agricultural Wahutu.

Meat production, estimated at about 1.5 million tons for an average per capita consumption of perhaps 16 to 17 kgs per annum, appears to be about three times as high in this sub-region as in West and Central Africa. There are, however, a few countries in East and Southern Africa where per capita meat consumption is at low levels of 3 to 6 or 7 kgs, comparable to the exceedingly low levels typical of

West and Central Africa. These include Mozambique, Nyasaland, Ruanda Urundi, Angola and Northern Rhodesia. On the other hand, Kenya, Southern Rhodesia, Basutoland, Bechuanaland and Swaziland appear to have relatively high levels of meat consumption ranging from 22 to 28 kgs annually. ^{1/} The average per capita consumption in the Union of South Africa is placed at the exceptionally high figure of 39 kgs, a level which approaches that of a number of countries of western Europe. In general, meat production is low in relation to the number of cattle kept because most of the stock are raised under traditional systems of management which emphasize cattle as a store of wealth, a symbol of status, and a means of acquiring wives rather than as a source of meat and income. Consequently, interest is in the number of cattle owned, and little attention is given to the quality of herds, provision for supplementary feeding during the dry season when pasture is grossly inadequate, or to selling or slaughtering stock in such a way as to obtain maximum production. In the case of Ruanda Urundi, the low per capita consumption must also be attributed in part to the density of the population, about 80 persons per sq. km. compared to an average of less than 10 for all of tropical Africa. In many countries, the increase of livestock population resulting from the improved control of rinderpest and other diseases and the cessation of cattle raiding, has led to overstocking and over-grazing that has aggravated the serious problems of soil erosion in the sub-region.

Although livestock are relatively a good deal more important than in West and Central Africa, and they have a social importance which transcends their economic value, the fact remains that the starchy staple foods are almost as important in East and Southern Africa as they are in West and Central Africa. Cereals, root crops and plantains account for between 70 and 80% of total food calories for all the countries of this sub-region, except the Union of South Africa where it appears that the starchy staples provide only about 60% of the total. Sugar consumption is exceptionally high in the Union, providing another 13% of total calories, so that the percentage of calories from the starchy staples plus sugar is much the same as in the countries of tropical Africa.

^{1/} It must be emphasized again that both crop and livestock estimates for the countries of tropical Africa are only rough approximations. A special study of livestock in Africa prepared for the FAO/ECA African Livestock and Meat Marketing Centre gives estimates of annual per capita meat consumption in Kenya and Tanganyika of 25 and 10 kgs respectively. But in the Food Balance Sheets for these countries prepared by Mr. C.J. Martin, Director of the East African Statistical Department, per capita meat consumption is estimated at 11 kgs for Kenya and 17 kgs for Tanganyika, suggesting that consumption is more than half again as high in Tanganyika, whereas the FAO report indicates that per capita meat consumption is 2½ times higher in Kenya than in Tanganyika.

Within the category of staple foods, the principal contrast with the East and Central African sub-region is the much greater relative importance of cereals in East and Southern Africa. 1/

In this sub-region the total out-turn of cereals appears to be on the order of 14 million tons compared to production of root crops amounting to something over 3 million tons in terms of grain equivalent. It will be recalled that in West and Central Africa the output of root crops in grain equivalent was of the same order of magnitude as the production of cereals. Moreover, there are notable differences in the relative importance of the individual crops. Thus maize is very much more important in East and Southern Africa, the total estimated production for the sub-region of about 6½ million tons being fairly close to half of the total output of all cereals. Millets and sorghums rank next in importance, with production totalling somewhat over 4 million tons. Within the millet-sorghum group, finger millet (Eleusine coracana) is of very considerable importance in this sub-region. Finger millet is especially important in northern Uganda where it provides important quantities of calcium as well as calories and protein; this is a distinctive characteristic of eleusine which contains some 350 mgs of calcium per 100 grams as compared with 20 to 40 mgs for other cereals. Rice production for the sub-region appears to be about 1½ million tons, or a little less than the output of rice in West and Central Africa. There are also significant differences in the position of individual root crops. Cassava is by far the most important root crop in this sub-region, although the highly approximate estimates available indicate that production is only a little over one quarter as much as in West and Central Africa. Moreover, a large part of the cassava grown in East and Southern Africa is grown as a famine reserve crop.

The problems of irregular rainfall and periodic shortages during periods of "pre-harvest hunger", that were seen to be a feature of the savannah zone of West Africa, appear to be even more characteristic of a large part of East and Southern Africa. Average rainfall in the savannah areas of East and Southern Africa is probably somewhat higher than in the savannah zone of West Africa, but year-to-year variations in rainfall appear to be even more of a problem. Locust attacks have also been a common cause of crop failure, although locust control measures have substantially reduced the seriousness of this menace. Periodic famines have been an especially serious problem in Ruanda Urundi. In the years since a disastrous famine in 1928/29, the Belgian authorities in Ruanda Urundi have actively encouraged the planting of cassava and other roots and tubers, crops which had been little used by the local populations. These measures proved effective

1/ A summary account of the position of the various staple food crops in Uganda, Tanganyika, Ruanda Urundi, Zanzibar, Kenya, Mozambique and Nyasaland is given in W.O. Jones' Manioc in Africa (Stanford, 1959) pp. 220-250.

until 1943 when a serious famine occurred comparable to the grave famine of 1928/29; it has been estimated that as many as 35 to 50 thousand persons died as a result of the 1943 famine. The famine of 1943 was associated, as usual, with inadequate rainfall and poor cereal crops. But on top of that, potato blight, the fungus disease which was so largely responsible for the famine which devastated Ireland in the mid-nineteenth century, resulted in the failure of that crop which had been counted on as an important element in the defence against famine. Following this disaster, the planting of cassava as a food reserve was emphasized even more, and each farmer was obliged to plant a minimum of 15 ares of cassava out of a total of 25 ares of "non-seasonal" food reserve crops. (On land lying above 1,900 m. potatoes or sweet potatoes can be substituted for cassava which is vulnerable to frost damage). Periodic famines were also of considerable importance in other parts of East and Southern Africa, and the British authorities in East Africa have encouraged and sometimes required the planting of a certain minimum acreage to cassava as a food reserve crop.

Another notable difference that characterizes the production of root crops is the much greater importance of sweet potatoes and the negligible importance of yams in East and Southern Africa. Reference should also be made to the exceptional importance of bananas and plantains in Uganda. Among the Baganda of southern Uganda, plantains and bananas are by far the chief food crop; even in terms of total national production, it appears that these crops account for perhaps one-third of the total food calories produced.

In contrast with West and Central Africa, a significant portion of this sub-region has a temperate climate. The most extensive of these temperate areas is in the Union of South Africa, which lies almost entirely south of the Tropic of Capricorn. In addition, huge plateau areas of Ethiopia lie above 2,000 m. and are characterized by a temperate climate. The highlands of central Kenya are also above 2,000 m. and have a temperate climate despite the fact that they lie almost exactly astride the Equator, and the same is true of much of Ruanda Urundi. Cropping patterns within these temperate zones of East and Southern Africa differ considerably from those found in other parts of tropical Africa.

In discussing the food crops of West and Central Africa, wheat was not even mentioned because it is of only trivial importance due to the unfavourable physical environment. But in the Union of South Africa, the wheat harvest now averages about three-quarters of a million tons annually, making it much more important than millets and sorghums. Maize production is nearly five times as large as the wheat crop, but wheat is about half as important as maize in domestic food use because some 50% of the output of maize is exported or used for feed. The Union, incidentally, is the only country south of the Sahara where sizeable quantities of grain are used for livestock feed. In Kenya, wheat production is on the order of 125,000 tons, which makes it about half as important as millets and sorghums, but this is only about 10% as large as the production of maize. The wheat crop in Ethiopia is believed to be about 150,000 tons annually.

Owing to the special features that characterize the food economies of Ethiopia and Ruanda Urundi, it is of interest to consider them separately. In the temperate zone of Ethiopia, which has been defined as the area with an elevation between 5,200 and 7,800 ft., the major crop is teff (Eragrostis Abyssinica), an indigenous cereal apparently grown only in Ethiopia. The edible grain of this cereal, which is about the size of a pin-head, is the preferred grain for making "injera", a sour dough product which is baked on a griddle and is somewhat similar to a pancake. The agricultural statistics available for Ethiopia are only very rough approximations; the production of teff has been variously estimated at $1\frac{1}{2}$ to more than $2\frac{1}{2}$ million tons. Sorghum and barley appear to rank next in importance, followed by maize and wheat. A so-called "tropical zone" of Ethiopia includes the areas lying below 5,200 ft. It includes much unproductive steppe land, savannahs and areas of humid rain forest. Millets and sorghums are the chief food crops, but much of the zone is only fit for extensive grazing. In the "cold zone" lying above 7,800 ft., wheat, barley, teff and beans are the principal food crops. In two provinces southwest of Addis Ababa, the false banana or "Ensete" (Musa enseta ediyila) is the principal food crop. The stalk and the root portion of this banana-like plant is fermented underground for several months. After removing the fibrous portions, the remaining part is cooked in a manner similar to the preparation of "injera". Alternatively, flour may be made from ensete, or the upper part of the root may be cut up and cooked, resulting in a dish somewhat like cooked potatoes.

Because of the marked changes in climate and in agriculture over short distances, the discussion of agriculture in the 10-year development plan for Ruanda Urundi distinguished 22 different "natural regions". W.O. Jones has prepared a map of the agricultural zones of the country on the basis of four zones. The first of these embraces the highlands that form the backbone of Ruanda Urundi. The second zone, a large area lying to the east of Zone I, includes most of the central plateau and savannahs extending to the Tanganyika border to the east. In both of these zones, peas and other legume crops are remarkably important, occupying a larger area than either cereals or root crops. Zone III rises from about 1,000 to 2,000 m. above sea level along the steep western slopes of the Ruanda Urundi highlands. In this area, nearly one-third of the land in food crops is planted to plantains or bananas, much of which is used for making beer. The areas planted to manioc and cereals are each only about half as large as the area devoted to plantains. The Ruzizi valley and the eastern shore of Lake Tanganyika comprise Zone IV, the only sizeable district of Ruanda Urundi with a truly tropical climate. Here, cassava emerges as by far the most important crop, with legumes, cereals and plantains each claiming about one-third as much area as is devoted to cassava.

B. Food Imports and Exports

Imports and exports of food are of fairly limited importance in East and Southern Africa. Wheat and wheat flour shipments, the major import item, totalled a little over 200,000 tons in 1958. As recently as 1956, the Union of South Africa was importing close to 200,000 tons of wheat annually, but since that time domestic production has been substantially increased and no wheat was imported in 1957 or 1958. The Federation of the Rhodesias and Nyasaland, with imports topping 90,000 tons in 1958, is now the principal wheat-importing country, but smaller quantities are imported by most of the other countries. During the year 1948-52, Kenya exported an average of a little over 20,000 tons of wheat annually, but in recent years Kenya's shipments of wheat and flour have been confined almost entirely to Uganda and Tanganyika. Since 1956 Kenya has imported on the order of 15,000 tons of wheat each year, largely to reinforce the local soft wheat with hard wheat with better baking qualities.

The sub-region as a whole is on a net export basis with respect to sugar and rice. The Union of South Africa and Mozambique have expanded their sugar exports sharply in recent years. Shipments from the Union rose from an average of about 50,000 tons during the years 1948/52 to close on 250,000 tons in 1958. Mozambique's exports were somewhat more than doubled over the same period, exceeding 130,000 tons in 1958. The largest sugar exporter of the African region is Mauritius with shipments of more than half a million tons annually in recent years. Exports from Réunion have been close to 200,000 tons annually. Sugar imports of the net importing countries amounted to a little less than 100,000 tons in 1958, the Federation of Rhodesia and Nyasaland accounting for over half of the total. There are also small exports and imports of rice in the sub-region. The Malgasy Republic (Madagascar) has exported appreciable quantities of rice in the past few years; shipments in 1958 totalled nearly 60,000 tons, but in the previous year only about one-third that quantity was exported. The Union of South Africa is the main importer on the continent with imports in recent years fluctuating between 30 and 50 thousand tons. In Zanzibar, where rice is the principal food in the local diet, local production is supplemented by imports of 10 to 15 thousand tons annually, which account for a substantial fraction of the total supplies. The sugar-exporting islands of the Indian Ocean, Mauritius and Réunion, satisfy a large part of their local food requirements by imports of rice - some 60 to 70 thousand tons annually in the case of Mauritius and 30 to 35 thousand tons in Réunion.

Exports of miscellaneous food, beverage and feed crops make a significant contribution to the foreign exchange earnings of a number of countries of the sub-region. Coffee accounts for a large fraction of the foreign exchange proceeds of Angola, Ethiopia, Uganda and Kenya, and tea exports are of considerable importance for Kenya, Mozambique and the Federation of Rhodesia and Nyasaland. The Union of South Africa exports sizeable quantities of citrus fruit and wine, and the Union, Angola and Southwest Africa export substantial quantities of fish and

fish products. Exports of fish meal, used mainly in feed mixtures, have been especially important in recent years. Shipments of maize have long been an important export item for the Union of South Africa and Angola. In 1957/58, maize exports from the Union exceeded a million tons, much above the 1948/52 level of only about 130,000 tons. Shipments from Angola have fluctuated sharply in recent years, reaching almost 170,000 tons in 1958. Kenya, Tanganyika and the Federation of Rhodesia and Nyasaland have exported appreciable quantities of maize in certain years, but these have been subsidized shipments in years in which purchases by the Government maize control authority have exceeded local requirements.

C. Food Consumption Levels

Relatively little can be said about food consumption levels in East and Southern Africa owing to the lack of knowledge, as well as the enormous variation in food consumption patterns. For virtually all of the countries of the sub-region, the estimates of production are subject to such a large margin of error that they do not throw much light on levels of food consumption. According to food balance sheets recently published by the U.S. Department of Agriculture, per capita food supplies in 1958 were only sufficient to provide 2240 and 2175 calories respectively for Kenya and Tanganyika. But food balance sheets prepared by C.J. Martin, Director of the East African Statistical Department, indicate that the per capita availability of food was equal to 2900 calories for Kenya (1957) and 2825 calories for Tanganyika (1959). There is no basis for choosing between the two sets of estimates, although it seems likely that the U.S. Department of Agriculture estimates are too low and Martin's figures too high. The estimates of production that have been made for other countries of the sub-region are equally uncertain, with the exception of the Union of South Africa, where a fairly well-developed system of crop reporting covers a large fraction of the country's agricultural output.

Food balance sheets have been prepared annually in the Union of South Africa. These estimates indicate a rather satisfactory level of food supplies on a national basis - over 2600 calories and some 75 gr of protein per capita of which about one-third is of animal origin. In addition, a number of food consumption surveys have been carried out in the Union among African groups in rural and urban areas, and among various segments of the European population. These surveys illustrate the large variation in food consumption patterns between these three population groups and also the important differences in the diet patterns of various families within each of the major groups.

Food consumption surveys carried out by the Division of Nutrition of the Department of Health in four widely separated rural areas suggest that differences in purchasing power have a strong influence on diet patterns among African families in the communities studied. The

Africans included in these surveys consisted largely of children and women because most of the young adult men were away from home in temporary jobs as migratory workers. There are apparently marked differences in the extent to which the incomes of the family members in the village are supplemented by a share of the earnings of the family members working away from home in the mines or in urban employment. This difference is particularly striking in its influence on meat consumption. In one of the survey areas (the Keiskammahoe district of the Eastern Cape Province) the average consumption of animal protein per man unit ranged from 8 to 18 gr during different survey periods, but approximately 40% of the families had no protein of animal origin at all. The survey of food consumption by 93 families in the Transkei and East Griqualand shows similarly large variations in food consumption quite clearly associated with differences in purchasing power. Meat consumption in these villages is considerably higher than in the Eastern Cape Province area, the average daily intake of animal protein being 30 gr. The average consumption of beef, the principal source of animal protein, was 2.5 oz per person per day. But in only a quarter of the families did meat figure in the diet during the survey period, and for these families the average consumption was nearly 10 oz per day. Similarly, less than 10% of the families used chicken, and only 15% pork, although a little over half of the families consumed meat of some kind. About one-third of the families used cow's milk and another sixth consumed either sheep or goat's milk. Less than one quarter of the families purchase bread, and their consumption averaged only about 2 oz per person daily. A slightly larger percentage purchased wheat flour, but again in very small quantities. Virtually all of the African families in urban areas consume considerable quantities of bread as well as maize meal, whereas the families in rural areas rely almost entirely on maize meal and smaller quantities of sorghum or millet.

For the other countries of East and Southern Africa, it appears that only two major nutrition surveys have been carried out during the period since World War II. One of these, the Ethiopia Nutrition Survey, organized by the Inter-departmental Committee on Nutrition for National Defense of the U.S. Government, included clinical and biochemical examinations of the nutritional status of a large number of civilians in various districts of Ethiopia. The report of this survey provides much valuable general information concerning food consumption patterns in Ethiopia, but a sample survey of the quantities of food consumed was not undertaken. The WHO nutrition survey in Uganda by Gongora and Norris, which extended over a period of approximately two years between 1955 and 1957, included both clinical examination and measurement of food consumption of sample population groups selected from seven different tribes. Reference should also be made to a survey of nutrition in Somalia carried out by Dr. Ferro-Luzzi in June-August 1953. Although it was impossible for Dr. Ferro-Luzzi to undertake quantitative surveys of food consumption during this preliminary study, his report does provide a valuable description of food intake patterns of four major segments of the population, together with highly approximate indications of the quantity of various foods

consumed. In addition, he made clinical examinations of more than 3,000 individuals drawn from widely scattered communities within the country. A number of other studies of limited population groups are included in the list of references, but most of these are confined to fairly small groups and, except for the two surveys by Thompson, contain relatively little quantitative information.

The nutrition surveys in Uganda, Ethiopia, and Somalia, throw considerable light on food consumption levels in those countries, but it must be emphasized strongly that those three countries are far from representative of the sub-region. Admittedly, there is no country that could be considered typical of this heterogeneous sub-region, but conditions in a country such as Tanganyika would probably illustrate a range of food consumption patterns and nutrition conditions that would apply more broadly to East and Southern Africa than the rather special food economies of these three countries. Food consumption patterns in Uganda, in fact, approximate the root crop zone of West Africa much more closely than the diet patterns that prevail elsewhere in East and Southern Africa. In the nutrition survey carried out by Gongora and Norris, the diets and nutrition status of seven different tribal groups located in six districts of Uganda were studied. For three of the groups the food consumption surveys were repeated twice during the year, whereas for the other four groups food consumption was measured at only one period during the year. The results of the diet surveys show very marked differences in the relative importance of different foods in the diets of the seven groups studied, large seasonal differences in food consumption patterns and also considerable variation in the estimated intake of calories and other nutrients. The estimated value of the diet and the calculated intake of protein, Vitamin A and Vitamin B₂ are summarized in Table 6.

The nutrients selected for inclusion in Table 6 are those that are commonly in short supply in the diets of the groups studied. It will be noted that two groups, the Ruanda Urundi immigrants in Buganda and the Bagishu, appear to have very low levels of calorie intake. The significance of the Bagishu figures is doubtful because consumption of beer, which is not included in these figures, represents an appreciable addition to the calorie intake, especially for this Bagishu group. In addition, a few of the Bagishu families in the survey were Moslems who were fasting. The low level of calorie intake for Ruanda Urundi immigrants seems to be a genuine phenomenon related to the weak economic position of many of these migrant workers, and also the fact that many of the Ruanda Urundi families are endeavouring to save as much as possible out of their meagre earnings. The level of intake of protein is low for all of the groups except the Bakiga who consume large quantities of dry peas and beans. The level of protein intake is, of course, especially low where plantains and root crops dominate the diet. Thus the Paganda, who eat large quantities of plantains and sweet potatoes and no cereals, have an extremely low protein intake, estimated at 32 gr, despite the fact that they have the highest consumption of meat (25 gr per person per day) and of milk (42 gr per person per day) of any of the groups included in the survey. Similarly, the survey

Uganda: Estimated Intake of Calories and Selected Nutrients and Intake as a Percentage of Calculated Requirements (average per person per day)

Tribal Group (Area shown in parenthesis)	Calorie Intake		Protein Intake			Vitamin A		Riboflavin	
	calories	% of Req.	Total gms.	% Req.	Animal gms.	I.U.	% Req.	mg.	% Req.
Batoro (Toro):									
1) Feb. - Mar.	2320	112	53	90	2	1285	32	.54	36
2) June - July	2130	101	47	80	3	3720	96	.72	48
Baganda (Buganda)	1945	93	32	58	9	4725	120	.76	54
Banyaruanda (Buganda)	1610	79	39	69	.7	2720	70	.68	49
Jopadhola (Bukedi)	1795	91	41	74	5	4275	110	.49	33
Bagishu (Bukishu):									
1) April	1500+	75	23	43	2	7830	195	.64	46
2) December	1550+	77	49	88	2	4400	113	.68	52
Bakiga (Kigezi):									
1) September	2070	99	105	186	.3	1265	31	1.00	68
2) April	2033	98	99	173	0	1355	33	.93	65
Acholi (Acholi)	1945	93	54	90	3	2610	66	.59	39

Table 6

estimates show an exceedingly low figure of only 23 gr for the Bagishu during April, when their consumption of plantains averaged more than a kilogram per person per day, and plantains, sweet potatoes and cassava together, accounted for 90% of the total calorie intake. But in the December survey period, the protein intake of the Bagishu was doubled, bringing it to about 90% of the estimated requirements; this mainly reflected the substantial consumption of dry beans at that time of the year. The low protein intake of the Ruanda Urundi immigrants was associated with a diet in which plantains and sweet potatoes provided 70% of the calorie intake, and their dietary protein would have been even more inadequate in quantity and quality if starchy staples had not been supplemented by large quantities of fresh beans and some 20 gr of groundnuts daily. The average per capita protein intake of the Batoro, Jopadhola and Acholi came close to covering the estimated requirement. For these groups, millets and sorghums accounted for 60 to 70% of the calorie intake, except for the Batoro during the June/July survey period when plantains, sweet potatoes and cassava supplied half of the calorie intake, and millets and sorghums only about one-third. In both periods, substantial consumption of dry and fresh beans made a significant contribution to the protein intake of the Batoro - 33% in February and nearly 40% in the June/July period.

Intake of riboflavin was in short supply for nearly all the survey groups, and several of the surveys indicated very low intake of Vitamin A. The Buganda had relatively satisfactory intake of Vitamin A, more than half of the intake being provided by the large quantities of plantains and sweet potatoes consumed, and the same was true of the Batoro during the second survey period. During the first survey in February the Vitamin A intake for the Batoro was only equal to about one-third of the computed requirement, and it was similarly low for the Bakiga during both of the survey periods. For both groups this reflected the low level of consumption of vegetables and the virtual absence of fruit from the diet. A noteworthy difference between Uganda and the countries of West and Central Africa is the negligible importance of red palm oil which, it will be recalled, provided abundant quantities of Vitamin A throughout most of the root crop zone of that sub-region. Oil palms grow semi-wild in a small district in western Uganda, but apparently most of the country is a little too high and cool to favour the spread of the oil palm. The estimated intake of riboflavin ranged from about 40 to not quite 70% of the computed requirement. Unlike some of the West African communities, green leaves do not appear to have made a significant contribution to the riboflavin intake.

The patterns and levels of food consumption reported by Dr. Ferro-Luzzi for Somalia differ enormously from the typical African diet based on starchy roots or cereals. Somalia is an arid region in which an estimated 70% of the population are pastoral nomads and only about 15% of the people are engaged in settled agriculture. As mentioned earlier, Dr. Ferro-Luzzi was not able to make quantitative surveys of food consumption during this preliminary study of nutrition in Somalia. On the basis of his own observations and information obtained during

his investigation, he has made rough approximations of the pattern of food consumption by nomadic pastoralists and other population groups. In the case of the pastoralists he presents an approximate diet pattern for the 8 months March through October, when pasture is adequate, and cattle, camels, and other stock are yielding substantial quantities of milk, and during the November-February dry season when the milk yields fall off sharply. The preferred diet for these pastoral peoples, is apparently one characterized by almost complete dependence upon milk. Thus, Ferro-Luzzi suggests that during the season of ample supplies of milk, the pastoral population consumes something like 4 litres of milk daily, perhaps 5 gr of meat per person and very little else. During the other four months of the year, Ferro-Luzzi indicates that milk consumption falls off to perhaps half a litre per day, whereas meat consumption rises to an estimated 50 gr daily and the diet is filled with perhaps 300 gr of cereals, and small amounts of peas, butter (ghee), dates, sugar and vegetables.

The intake of protein is, of course, very abundant during the months that large quantities of milk are being consumed, and pretty satisfactory in the dry season as well. Requirements of all of the essential nutrients except Vitamin C are amply supplied by the large consumption of milk, and even the intake of Vitamin C is fairly satisfactory under those conditions. But during the period of curtailed milk supplies, there is a considerable reduction in calorie intake and very sharp declines in the availability of Vitamins A and C to levels that appear to be substantially below requirements - 1620 I.U.s of Vitamin A, and only 11 mgs of Vitamin C according to Ferro-Luzzi's rough approximations.

A drastic modification of diet patterns and curtailment of food intake during the dry season is an annual occurrence, but in certain years when the rains fail this seasonal curtailment is prolonged, leading to severe famine conditions. Ferro-Luzzi reports that 5 major famines have ravaged the country during the past half century, the most recent being an extremely serious famine in 1950/55 in the district known as Midjurtein, which resulted in widespread scurvy and beriberi and many deaths. Local officials and chiefs estimate that one quarter of the human population and 80% of the livestock died of hunger and thirst.

Similar efforts were made by the nutrition survey team in Ethiopia to make a rough approximation of the pattern and level of food intake and the availability of the essential nutrients, and a large number of interviews provided considerable information concerning diet patterns and the frequency of consumption of different foods. In view of the great uncertainty concerning the level of food production or even the population in Ethiopia, the team's estimate that the average level of calorie intake is on the order of 2,500 calories must be regarded as a very rough approximation. On the basis of the information obtained concerning diet pattern and their approximation of calorie intake, the survey team has calculated the level of intake of the essential nutrients that would be provided by a "Typical Ethiopian Diet". According to these approximations, it would appear that Ethiopian diets are on the

average fairly satisfactory, except for deficiencies in the availability of riboflavin, Vitamin A and Vitamin C. The clinical evidence obtained by the survey team, to be considered below, also pointed to a deficiency of calories.

D. Nutrition Problems

It is possible to consider the nutrition problems of Uganda, Ethiopia and Somalia in some detail in the light of the findings of the nutrition surveys carried out in those countries. Although Uganda enjoys a favourable position with respect to the availability of calories, malnutrition appears to be more severe there than in any other African country with the exception of Basutoland. This is related particularly to the very low protein content of the diet which is especially pronounced in the localities that rely heavily on plantains, starchy roots and tubers. The incidence of kwashiorkor appears to be considerably higher than in any other area for which estimates are available. The WHO nutrition team has given separate figures concerning the incidence of kwashiorkor based on three different investigations of children under 6 years of age. Within a random sample of 232 Bagishu children in rural areas, it was found that 7% of the total was suffering from kwashiorkor. Examination of more than 14,000 children under 6 years of age in 46 rural dispensaries revealed an incidence of kwashiorkor of 6%. Not quite one-fifth of these children were examined by medical officers during the survey, the remainder being examined by medical assistants in charge of the dispensaries who had been given training in the diagnosis of kwashiorkor. The examinations were tested for reliability and found to be satisfactory. Finally, not quite 400 children under 6 were examined in connection with the village studies of the tribal groups referred to above. These examinations revealed an incidence of kwashiorkor of 11%, this higher figure being attributed to the fact that mild cases of kwashiorkor were included.

The WHO report suggests that kwashiorkor is one of the main factors responsible for the high rate of mortality amongst small children in Uganda, although the main killers are probably malaria and respiratory infections. Mortality data collected suggest that from 24 to 48% of all children born, died during the first 14 years of life. The lowest figure is for the Bakiga of Kigezi, the highest for the Jopadhola of Bukedi. As would be expected, the deaths are heavily concentrated in the first year of life, but it is pertinent to note that in two of the groups with an especially poor protein intake, the Baganda and Bagishu, deaths among the toddlers (age group over 1 and under 4) slightly exceeded deaths during the first year. The influence of child feeding practices on the prevalence of kwashiorkor is stressed in the survey report. The Jopadhola, one of the poorest groups studied, have severe health problems associated particularly with the high rate of malaria and anaemia, but no kwashiorkor was found. Among the Jopadhola, weaning is late, at 2 years, and supplementation with cow's milk is begun at an early age. Moreover, grain crops are the major staple foods in the diet. Among the Baganda, on the other hand, weaning is early, at about 15 months, and the early supplementary feeding consists mainly of plantains and sweet potatoes, together with small quantities of milk

in tea. Moreover, among the Baganda and most of the other groups apart from the Jopadhola, the adult male members of the family receive priority in the distribution of available supplies of the animal protein foods. Kwashiorkor is also common among the Bakiga despite the high average level of protein intake. This seems to be due to the fact that children are given beans and peas only after they are 2 years old. In Kigezi and in other areas as well, kwashiorkor is often found in situations where the care of small children is neglected, either because the women are working long hours in the fields, the children are sent away to relatives, or some other reason.

Although kwashiorkor was not found among the Jopadhola, a great deal of marasmus - a severe calorie deficiency - was found among the children in that area. Marasmus was also found among children in several of the other village groups - the Ruanda Urundi immigrants, the Bagishu, the Acholi, and it is reported that among the last group, many women are also under-nourished.

The classical deficiency diseases, such as beriberi, pellagra, scurvy and rickets, were not seen in the groups examined. On the other hand, symptoms suggesting a deficiency of Vitamin A and riboflavin were frequently encountered. A few cases of severe manifestations of Vitamin A deficiencies were seen among the Batoro and many signs suggestive of Vitamin A deficiency were observed in nearly all of the groups studied.

Nutrition problems appear to be somewhat less serious in Ethiopia than in Uganda, reflecting mainly the more satisfactory situation with respect to the supply of protein in the diet owing to the reliance on cereals rather than plantains or roots as the basic staple food. In addition, the availability of meat and milk is somewhat more satisfactory in Ethiopia, the principal nutritional problems reported by the Ethiopia Nutrition Survey team are an inadequate intake of calories and deficiencies of Vitamins A and C, and a fairly high incidence of goitre.

Body weight data and measurements of skinfold thickness were cited by the survey team as indicating an inadequate intake of calories. This evidence is reinforced by the almost complete absence of obesity among all the population groups studied and also by the rapid appearance of "famine oedema" during periods of acute food shortage. As in so many of the grain-producing areas of Africa, famines are a periodic occurrence, and two were observed during the course of the survey. In one of these areas, the team observed many semi-starved individuals with oedema - a rather rapid change from the fair to good nutrition conditions more typically found among the groups examined, which seemed to testify to the lack of calorie reserves. The prevailing diet patterns in Ethiopia point to a probable deficiency of Vitamin A, and the population examined revealed an incidence of Bitot's spots of 1 $\frac{1}{2}$ % (2% among schoolchildren in the Addis Ababa area). Gross evidence of serious eye problems attributable to Vitamin A deficiency was not encountered. About 1% of the population examined exhibited bleeding gums, probably associated with the low intake of Vitamin C. The intake of Vitamin C is evidently high enough to prevent scurvy, which was not found, but is nevertheless

at too low a level to be judged satisfactory. In 3 of the 11 areas examined, goitre was found in some 5 - 11% of those examined, and in only 3 of the areas was the incidence less than 2%.

The nutritional problems that present themselves in Somalia have a very special character. The most serious health problems appear to be related to the child feeding practices. Ferro-Luzzi reports that more than 90% of the newborn children are given animal's milk (it may be cow's milk or milk from camels or goats), either to supplement or replace the mother's milk. In many cases, undiluted animal's milk will be given from the first day. Very little attention is given to sanitary precautions in this artificial feeding of infants, and the enteritis and other intestinal disorders that mainly result from this practice are among the principal causes of the extremely high rate of infant mortality. The principal nutritional problems as such, appear to be related to deficiency of Vitamin C; gum lesions were observed in 8% of the population examined, and in a few cases frank scurvy was detected. A considerable fraction of those examined presented skin conditions suggesting deficiency of either Vitamin A or of vitamins of the B complex. It is also emphasized that the calorie intake of urban workers - some 15% of the population - seems to be somewhat insufficient throughout the year; and the calorie intake of the pastoralists is inadequate during the dry season especially in relation to the active life in this period of the year when the herds must be driven long distances in search of water. Kwashiorkor is not found in Somalia, which is not surprising in view of the ample supply of protein, and especially animal protein in the local diets.

Relatively little can be said in concrete detail concerning the nutritional problems of the other countries of East and South Africa. Probably the most general nutritional problem is the relatively low level of protein. For most of the sub-region, however, protein deficiency problems are less severe than those considered in relation to Uganda, and the root crop zone of West and Central Africa, because of the greater importance of cereals. There are, however, sizeable population groups in Mozambique and Angola and smaller groups in Tanganyika and Northern Rhodesia that subsist largely on cassava and other root crops so that there is a presumption that the dietary protein of these groups is often highly unsatisfactory in quantity and quality.

In parts of East and Southern Africa, where there is heavy dependence on maize, pellagra is sometimes found. Maize is particularly deficient in niacin and the amino-acid tryptophan, and maize diets are often associated with a pellagra problem. It appears, however, that diets of the sub-region are generally sufficiently diversified, so that pellagra has not been a serious problem except in prisons or other institutions, or among groups of labourers where, for convenience or economy, the diet has contained excessive quantities of maize and inadequate supplementary foods. An important exception must be noted in the case of Basutoland where malnutrition is serious and extensive and pellagra exceeds kwashiorkor as the major nutritional deficiency disease. 1/

1/ See Dr. J.A. Munoz and Miss M.M. Anderson, Report and Recommendations on a Nutrition Survey conducted in Basutoland 1956-60. (Report of a WHO team, mimeographed, October 1960)