community, has been largely directed towards the creation of new wants and the production of cash crops; and this, desirable in itself, has confused the African. He has got the idea that we are only interested in more cash crops and, in imitation, declares himself uninterested in various supplementary food crops "because they have no price." He has failed to realize our underlying assumption—that of course food comes first, but we all know that and need not waste time labouring so obvious a point—and so in his muddle-headed way he has arrived at the conclusion that the pursuit of money and sundry "civilized" appurtenances, before better feeding (and better housing) and better health, are the mark of the up-to-date man. He has still to learn the proper use of money for the benefit of the whole family. And along with all this goes the idea which so easily takes root in the mind of the more sophisticated young man or woman, that the work of food production is only for savages and such as they are now too good for manual labour.

We have referred in an earlier article to the effect on nutrition of the current social value of the tribe, in causing the needs of the men to take precedence over those of the women and children. This links up with another great need, the need for progressive women. The women not only cook the food but play a very large part in its cultivation, and often men who are themselves open to conviction in matters of health and willing at least to try out new methods, feel helpless in face of the conservatism of their womenfolk.

Propaganda among the men and boys only is not enough in so domestic a matter as nutrition, but how are the women to be reached? The village schools in Ulanga contain very few girls. Individuals are as important here as among the men but work among individuals can only reach a handful. It is suggested in the first place that reading circles run by native leaders themselves might be an effective vehicle for the spread of social propaganda, not only among the women but among illiterates of any age and sex.* In the second place, the women can be reached through the medicine-men,† for every woman has her

---

† Not to be confused with the wizard.
A STUDY OF FACTORS GOVERNING THE FOOD SUPPLY IN ULANGA, TANGANYIKA TERRITORY.


1. Method ........................................... 43
2. Scene of the Work ................................. 44
3. Local Differences in Diet ....................... 45
4. Features Common to all Types .................. 46
5. Seasonality of Food Supply ..................... 48
6. The Diarists ...................................... 49
7. Range of Foods Obtainable ..................... 50
8. Preparation of Food ............................. 50
9. The Diarists: General Remarks ................. 50
10. Meals and Snacks ................................. 51
11. Protein ........................................... 53
12. Green Vegetables and Fruit .................... 56
13. Beer .............................................. 56
14. Calorific Values ................................ 57
15. Effect of Taboos and Superstitions .......... 57
16. The Problem ..................................... 57
17. Problem of Supply ................................ 58
18. Problem of Education ........................... 59
19. Conclusion ....................................... 61

1. Method.
Our approach to the subject of nutrition in the Ulanga Valley grew naturally out of our relations with its people. It was the result of nearly six years spent among the tribes of the valley, not primarily as investigators but as people with an immediate and practical interest in their well-being and in every aspect of their lives.

The basis of this work is two-fold. There is first our own knowledge of the district, and secondly a series of diaries kept for a year by clerks and dressers and other literate natives and covering about 21,500 feeding-times—meals, snacks, and beer drinks. The latter by themselves might be dangerously misleading: the former alone would lack the confirmation of first-hand records to support the conclusions reached, which might thus be open to dismissal as mere matters of possibly misguided opinion. The two taken together provide checks on one another and form the complementary parts of one whole.

From the nature of our sources of information we cannot produce records of exact quantities consumed by individuals or families. Our aim has been rather to lay
bare the seasonal fluctuations in the supply of foods of
different categories, and to discover if possible how far the
problem of balancing the diet is economic or technical—a
matter of improving methods of production and distribu-
tion—and how far it is psychological, involving the educa-
tion of the tastes and habits of the consumers. We tried to
discover whether the local peasant could be considered to
be getting a square meal at all seasons or indeed at any
season of the year, how nearly he succeeded in getting
something every day of each of the three main categories
of food, carbohydrates, proteins and fresh green foods, and
how far failure to do so arose out of his own tastes or from
his circumstances.

The following is a drastically abridged version of our
full report on the subject.

2. SCENE OF THE WORK.

The area in which these investigations were made is
exceptionally fertile and well watered, both by rain and
river. It is a place of exuberant vegetation and could
without doubt be a land of plenty for a far denser popula-
tion than it now supports—no more than eight to the square
mile. Even in a year of drought it has remarkable re-
cuperative powers, because its people do not have to
struggle through hopelessly until the next rainy season;
provided seed is available they can cultivate supplementary
crops of maize and roots and even rice on low-lying land
throughout the dry season. There is, also, always a reserve
of food in the form of cassava and bananas, and plentiful
fish in the rivers.

Yet notwithstanding its obvious productive possibili-
ties, the Ulanga Valley is the home of tribes with a miser-
ably low standard of living, reduced every year no matter
how good to bare subsistence level for a longer or shorter
period in the pre-harvest months, a prey to disease, sorely
wanting in energy as any employer of labour will testify,
and losing 37% of their children before weaning (2½ years)
and another 12½% before the age of seven years.*

The area covered by this study is half the Ulanga
District, the Kiberege Division of that district, about 7,000

* See A. T. and G. M. Culwick, A Study of Population in Ulanga,
Tanganyika Territory. Sociological Review, October, 1936, and
January, 1938.
square miles in extent. Kiberege itself is roughly 37°E. and 8°S. and the Division lies for the most part south and south-west of that. It is the broad valley of the Kilombero River, whose central flood area is practically uninhabited except for a few small islands of people and the temporary fishing camps of the dry season. The bulk of the population lives in clusters along the edges of the valley on the fertile alluvial fans and in the small valleys of the foothills. The plains are slightly under 1,000 feet above sea level with hills on either side rising several thousand feet higher.

Climatic conditions appear to vary but little throughout the valley, the rainfall being most irregular from year to year both in amount and distribution. The average total for five years is 1507.5 mm. with a range of 715.7 mm. Both temperature and relative humidity are high for a good part of the year.

Cattle can only be kept in one small corner of the district, owing to the presence elsewhere of the tsetse fly and the lack of suitable grasses. Milk is therefore almost unknown. Beasts for slaughter are, however, brought down from the neighbouring tribe (Mlehe) in small batches. A few sheep and goats may be seen in some of the larger villages of the valley.

The staple food is rice, with fish as the principal source of animal protein and maize, cassava, sweet potatoes, and bananas as the chief supplementary foods. In outlying places in the hills at the head of the valley, eleusine to a large extent replaces rice.

3. LOCAL DIFFERENCES IN DIET.

From the point of view of the food supply the district cannot, however, be treated as a single unit. It presents us with three types of environment each with its characteristic diet. We have first the large and comparatively prosperous permanent settlements, surrounded by fertile fields and producing a great variety of miscellaneous supplementary foods. Secondly we have the riverine settlements, small scattered fragments of villages on islands in the swamps or on the very fringe of the flood area, where the supply of miscellaneous foodstuffs is very limited both in quantity and range, where rice and fish—or failing fish, a wild vegetable relish—are the order of the day from one
week to another. Lastly, there are the outlying villages
in the foothills or round the edges of the valley, where the
food supply is relatively precarious and productive efforts
tend to be even more haphazard and unorganized than
elsewhere.

4. Features Common to all Types.

If their differences are evident, their similarities are
no less so, and the most striking is the fact that their inhabi-
tants all have the same dietary ideal. It may safely be
said that the dream of every man, woman, and child in the
district is unlimited rice and fish (or, of course, meat), and
to be absolutely blown out every day on enormous meals
so composed is their idea of life in a perfect world. Other
foods, whether cereals or roots, green vegetables or fruit,
are regarded as mere substitutes, to fill up what has un-
fortunately not been adequately filled by the available rice
and fish. The notion that green vegetable relishes or fruit
are desirable for their own sakes has yet to be implanted,
a fact which illustrates the need for well devised propa-
ganda. Leaving aside all question of what is or is not
available to his hand, the native, at least of the area under
investigation, is not even aiming at anything like a balanced
diet. Here we see plainly part of the educational problem
involved.

A second similarity between the three types of area
follows from this first one. It is the conception of a meal,
as opposed to the miscellaneous trifles consumed between-
whiles. A meal, however large and satisfying or however
meagre, is boiled rice or maize or stodgy porridge made of
flour (rice, maize, cassava, eleusine, or very occasionally
millet), with a relish except on those rare and unfortunate
days when no fish or meat is available and no member of
the household has bothered to gather or prepare a wild or
cultivated vegetable. Everything else, from a single mango
to an enormous bowlful of beans, is merely “a little
something” to carry one along to the next meal. In
analyzing the diaries we have therefore distinguished
between meals and what we have termed snacks, the latter
being all miscellaneous forms of nourishment including
beer.

A third and most important feature found in all
three types of area is the firmly-rooted idea that food is
grown an
grown and prepared primarily for the enjoyment of the men, and that women and children in general make do with what they can get. This does not mean that in times of scarcity the men grow fat while their families starve, but it does mean that the sharing out of what there is always favours the men. It also means that housewives are less likely to bother with preparing a proper meal if for any reason there are only themselves and the children at home. As a result, miscellaneous foods play a far larger part in the diet of women and children than in that of the men, and this explains why the children tend to be constantly scavenging for any kind of scraps. It admittedly also means that the greater part of the fruit available gets eaten by the women and (especially) children, a fact which would merit unqualified approval were it not a symptom of an insufficiency of other foods. In many households a number of by no means deliberately cruel mouths come between the children and the more highly prized foods. And young mothers in the season of scarcity, even following a year of good harvest, will be met living on odds and ends of sweet potatoes, cassava, fruit, and sugarcane, green relishes, and occasional small meals of rice and fish, and trying dispiritedly to suckle an infant and cultivate their fields on an all too empty stomach.

This socially disastrous policy regarding the division of food is no merely superficial feature of tribal life, but the outcome of a deeply rooted if inarticulate philosophy regarding the whole structure of society. There is no sense of any wrong committed on the one hand or endured on the other; everyone is behaving perfectly correctly according to the prevailing code of behaviour. The re-casting of social values for which this calls is an educational problem of the first magnitude.

Further similarities between the three types of area are, first, the broad lines of their agricultural cycles; secondly, methods of cooking; thirdly, methods of hospitality; and fourthly, the attitude towards poultry, which are kept in very small numbers, are little looked after and never fed, and, so far from being regarded as a valuable reserve of animal food for the family's own ordinary consumption, are kept almost exclusively for the entertainment of guests or for the sick.
5. Seasonality of Food Supply.

The annual agricultural cycle is summarized in the accompanying diagram which also shows the periods of food and cash shortages. The consumption of rice reaches its highest point nearly everywhere in the months of June, July, and August, when the harvest comes to relieve any whose rations have been low for weeks or possibly months. Its consumption then tends to fall off somewhat in most places, in favour of substitute foods such as sweet potatoes, cassava and the dry season maize, but nothing can really take its place in the estimation of most people in the district.

Dry season agricultural activities, with the exception of extensive cultivation of paddy rice in the basin of one of the rivers, are in general regarded as the penalty a man pays for a poor harvest, and their extent varies accordingly; but some people in the larger settlements regard them as a normal part of the year’s round and regularly get busy planting maize or sweet potatoes and plots of beans or cowpeas in suitably damp places, as the rice fields become available.

In the riverine areas the supplementary dry season crops usually take the form of sweet potatoes and/or a field of paddy rice in some convenient swamp. In other places people vary in their choice of dry season activities.

Some fruits are, of course, strictly seasonal, but bananas and pawpaws seldom fail altogether. Similarly a supply of cultivated fresh green vegetables, e.g. leaves of legumes, cassava, pumpkin, or sweet potatoes, is available, or should be and easily could be available, all the year round in one form or another. Wild greens are naturally most plentiful during the rains but they too are quite easily obtainable in the dry weather, for few people in Ulanga live very far from a swamp or river where they may still be found.

Seasonal fluctuations in the supply of fish may be most easily seen by reference to the diagram, where both it and the state of the rivers on which it depends are schematically depicted. It will be noticed that the grain, fish, and cash shortages all occur at the same season, and this is just at the time when climatic conditions are at their...
harshest and the heaviest physical demands are being made on the population—cultivation by day and cultivation-protection through the wet and often chilly nights.

Other animal food is a comparatively unimportant feature of the diet of the ordinary peasant, and the supply is erratic rather than markedly seasonal.

The amount of cooking fat or oil obtained at any season is negligible and the little there is, is usually the prerogative of the few. Fats are a real luxury and it is clear that the diet of any, high or low, contains little except those which are supplied in fish, groundnuts, and sesame seed (also coconuts for a few fortunes), so that the supply is seasonal to the same extent as these foods.

6. The Diarists.

Altogether some 35 men set out to keep diaries of their food and beer for a year. They were mostly dressers and clerks employed by the Native Authorities, with one teacher, one hut counter, one messenger, one peasant, and one man who was an ordinary peasant cultivator half the year and a market clerk the other half. Of the 35 starters, 25 stayed the course or only missed one month, and three ran long enough to produce something useful, while even the bits and pieces were not always to be despised.

For obvious reasons the honesty and reliability of these diaries received much thought, and for reasons given in our full report it seems they may be taken as honest in intent if sometimes slightly inaccurate in detail. Their principal defect, apart from the inevitable absence of any indication of quantities barring numbers of bananas, mangoes, etc., is the fact that they depict only the diet of the most fortunate, and we have no means of telling just how much better it is than that of the common man. Our diarists are nearly all men of standing in the village and if there is anything good going they will be sure to have some of it.

Closely connected with this is the mobility of the diarist as compared with that of the average peasant. The bulk of the population, including women and children, is virtually immobilized during the cultivation season and does not move very far afield in the dry weather either. The diarists, on the other hand, all for one reason or another
travel about within the district more than the ordinary man, both within their own zones and right through the valley. The general effect is that we have men from poor areas passing through the riverine areas and visiting rich ones, and men from the riverine villages also visiting rich ones. For both, this usually means an increase in their consumption of miscellaneous foods not much grown in their home areas, and it is fairly clear that travel in general for men of the social standing of the diarists may be expected to produce a rise in their consumption of animal protein. It probably has a mixed effect on the number of proper meals they get.

This brings us to a marked feature of the diaries—the hunt for animal protein. Visits to other villages in their own zones are obviously part of the work of both clerks and dressers, but it is most remarkable how often the urge to tour arises after a succession of days when animal protein has either been very short at home or has failed altogether. And it is further remarkable with what regularity such tours lead them straight to a buffalo shot by a game scout or some other supply of animal food.

On the whole, then, we see that the diaries tend to show a diet generally better, except in the use of green vegetables and fruit, than we should expect that of the average peasants to be, and still more so than that of the women and children.

7. **Range of Foods Obtainable.**

A list of foodstuffs appearing, however, infrequently, in the diaries, shows a most surprisingly wide range of foods which can be obtained in the district, in striking contrast with the monotonous and unbalanced diet on which, in most cases, any given individual is in fact subsisting.

8. **Preparation of Food.**

This section has been omitted owing to considerations of space.

9. **The Diaries: General Remarks.**

In considering the actual diaries we must bear in mind their limitations and also the fact that they cannot be treated as self-sufficient statistical evidence and made to carry an amplification.

In the area, a number of diaries were examined regarding a glance at meals and diet:

(3) a very fruit

<table>
<thead>
<tr>
<th>Meals</th>
<th>Snacks</th>
<th>Animal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>Beans, p</td>
<td></td>
</tr>
<tr>
<td>Green ve</td>
<td>Fruit</td>
<td></td>
</tr>
</tbody>
</table>

10. **Meals**

The number of meals per day is not a measure of adequacy, but a measure of the extent to which the diet is complete. The diaries show that the richness and variety of crops and the richness of the crop are factors that affect the variety of meals.
carry an edifice of deductions and arguments. Their function is to provide illustrative material supporting and amplifying the material obtained by observation.

In our full report the principal features of the diaries were summarized in cluster graphs for the three types of area, and graphs for individuals were also given. These showed numbers of meals and snacks per month and the number of days per month on which different kinds of foods were eaten. The following averages and ranges for the 28 diaries provide an illuminating summary, more especially regarding the phenomenal range of variation. We see at a glance (1) failure to secure an average of two proper meals a day; (2) failure to secure animal protein every day; (3) a very marked failure to eat green vegetables and/or fruit every day.

**Summary of Diaries.**

<table>
<thead>
<tr>
<th></th>
<th>Average No. per month.</th>
<th>Average No. of days per month.</th>
<th>Range.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meals</td>
<td>52</td>
<td>—</td>
<td>30-83</td>
</tr>
<tr>
<td>Snacks</td>
<td>14</td>
<td>—</td>
<td>0-92</td>
</tr>
<tr>
<td>Animal protein</td>
<td></td>
<td>22</td>
<td>7-30</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td>17</td>
<td>2-30</td>
</tr>
<tr>
<td>Beans, peas, etc.</td>
<td></td>
<td>5</td>
<td>0-17</td>
</tr>
<tr>
<td>Green vegetables</td>
<td></td>
<td>7)</td>
<td>0-28(10)</td>
</tr>
<tr>
<td>Fruit</td>
<td></td>
<td>4)</td>
<td>0-28(4)</td>
</tr>
</tbody>
</table>

10. **Meals and Snacks.**

The cluster graphs show a similarity of trend in the number of meals per month in both rich and poor areas, but a much greater degree of scatter in the former than the latter, a tendency to go to greater extremes. Not only is their total range of meals enormous as compared with the poor, but they also show a far greater spread in any given month. These features reflect the greater prodigality of the rich areas, where the presence of a great deal of miscellaneous supplementary food, which appears in the cluster graph of snacks, encourages extravagant use of the main crops.

Apart from improvidence and the resulting range of variation, the rich areas show a generally greater plentiful-
ness of food than the poor ones. For meals, the latter show 1 dot in 10 at or above the two-meals-a-day mark while the former give 1 in 5. Combining meals and snacks we find that roughly 2 dots in 3 in the cluster graph of the rich areas are on or above the twice-a-day line and only 1 in 2 in that of the poor.

Turning now to the riverine areas, we find that the cluster graph of meals gives a different type of curve and one which is on a relatively high level, 1 in 3 of the dots being at or over an average of two meals a day for the month. Moreover, the spread of the graph is comparatively small, reflecting the greater regularity of meals in the swamps, where the people depend more exclusively on rice than anywhere else and can easily grow extensive supplementary supplies of it in the dry season.

Their seasons of shortage and plenty differ somewhat from those of the other areas; they are shortest earlier and rise earlier but maintain the higher level longer. Snacks are far less prominent in the riverine areas than in either of the other types, and no diarist ever rises to an average of one a day in any month. Their number of meals being, however, relatively high, the swamp-dwelling diarists achieve a pretty creditable record for the total times of feeding, three out of four of the dots in this cluster graph being at or over the level of two feeding-times a day for the month.

It is perhaps noteworthy that only 100 man-days in all the diaries were without at least one proper meal and that somebody did once run to live in one day. Although there are certain diarists who will apparently eat anything at any time anywhere, the records show on the whole fairly regular feeding-habits from day to day. But since meals tend to be smaller as well as fewer in times of scarcity and bigger as well as more frequent in times of plenty, the fluctuations in consumption shown in these records are really more violent than the graphs suggest.

A striking feature of the diaries is the inverse correlation of meals and snacks, showing to what a large extent the snacks are substitutes for meals and not true extras.

There are at least three other factors which affect the numbers of meals and snacks entered by the diarists. The first is the mid-day absence of the wife in the fields at busy seasons, where a house. The snacks, incident on.

The family's period, the ananeous

A snack is a preparation for the next period.

We is foodstuffs, indeed whether of the elements

11. Pao

For fish curve of nature of total an.

The fish for curves of irregular ment.

There is quite a downwad mum in places, 1 dot in or surpa.

52
seasons, especially in the richer, i.e. larger, settlements where a man's fields may be as much as two miles from his house. This tends to decrease the meals and increase the snacks. As the husband will probably have himself some

11. Protein.

For various reasons discussed in the full report the fish curves of the diaries are a more useful guide to the nature of the animal protein supply than the curves for total animal protein.

The opportunities the riverine people have of getting fish for themselves show little seasonal variation. The curves of individuals reveal no common trend, merely irregularities owing to the varying opportunities of different men at different times to buy or catch the fish.

The cluster graphs of the rich and poor areas tell quite a different story. The curves for both show a marked downward trend, the consumption of fish reaching a minimum in March—the height of the rains, when the fish trade practically ceases for a number of reasons. The poor areas are the worst off of all. Their period of scarcity is longer than that of the rich because the traders go first to the big settlements and only later spread out into the outlying places, which they tend to leave again first. Rather under 1 dot in every 2 on the cluster graph for these areas reaches or surpasses 15 days (in the month, i.e. fish every other day),
as compared with 2 in every 3 for the rich and 7 in every 9 for the riverine.

The fish vary a great deal in size but the commonest variety weighs usually about ½ lb. or 225 grammes when well dried. This should yield about 112 grammes of protein* and one such fish normally makes a dish for a varying number of people, a household (or in a polygamous family, any given cooking-unit) and its guests, for it is regarded as merely a relish. The fish is boiled until it completely breaks down into a bowlful of gravy with small pieces of fish floating round in it, and it may have to last for more than one meal if the number of sharers permits, even for two or three days in times of scarcity, more water being added and the stew being reheated so long as there is still a smell of fish about it and a morsel or two of flesh hiding among the bones.

If this is borne in mind, a study of the curves shows that the daily consumption of fish at certain times of the year falls practically to zero in many cases.

Only occasionally does one really feast on fish (or meat). Even the fishing people themselves are none too lavish in their consumption and here as elsewhere it is regarded normally as a relish. But in all types of area, to judge from comments made in the diaries and from personal observation, the craving for animal food leads periodically to orgies of sheering guzzling when the chance comes along, especially when a good supply at last comes in after a time of scarcity. It is hardly to be wondered at that social and religious occasions centre round food and drink!

Although animal foods fall so short at times and are seldom eaten in anything approximating abundance, vegetable foods of high protein content such as beans, peas, ground-nuts, etc., are little used in their place. Indeed, by the majority of people they are not taken really seriously at all as valuable articles of diet. Those who do plant seldom make more than small garden plots of them to provide a stand-by in the way of relishes. The only variety widely grown is pigeon peas, of which a few straggling bushes

round the houses are a common sight, but the introduction of cotton and the practice followed by some of interplanting it with grain has to that extent increased the supply of vegetable protein. It remains, however, extremely low and for no reason except that the people have not learnt to prize it and want it, and so just do not plant it.

Our diarists may be taken as more advanced than the majority of their fellows where crops of this nature are concerned, and as their records show they do try to some extent to make use of these foods. In a fair proportion of cases their use of it bears a definite relation to their supply of animal protein. The cluster graph of the poor areas, which are worst supplied with animal foods, shows as much as 2 dots in 7 at or above 10 days in the month (or one day in three) as compared with 2 in 13 for the rich areas and only 2 in 23 for the riverine.

Rice and maize are, of course, further sources of protein whose importance increases the more we look into the matter and see the extent to which other sources are or are not used, while to judge from the protein figures given for various greens in other places*, it seems likely that the greens in use in Ulanga may also be a useful source of protein; but in view of the prevailing attitude to green vegetables and the comparatively small use made of them, this must rank as a potential rather than an actual source.

As things are at present in the Ulanga Valley, it appears that the sources of protein normally used all tend to be scarce at once, from January to April in the rich areas and from December to May in the poor, both shortages being somewhat mitigated by the maize harvest in March. Shortages in the riverine areas appear to be individual and erratic. At the best of times, however, from what we know of the feeding-habits of the people, it is doubtful whether individuals (especially women and children) ever get a really satisfactory quantity of animal protein except on rare occasions of feasting, and since so little use is made of beans, peas, etc., we are forced to the conclusion that rice and maize are for the very great majority the most regular and important sources of protein.

12. **Green Vegetables and Fruit.**

In contrast to animal protein, we now come to the category of food in which the diaries give us an unduly low curve, as compared with the diet of the ordinary peasant.

Wide individual variation is found in the diaries. There are slight seasonal trends, due more to the fruit than to the green vegetables. The general level is extremely low, as might be expected from what has already been said, and the individual curves well show the small esteem in which these foods are held. One man, living in a rich area, tasted fruit on only 11 days in the year; another, also in a rich area, on an average ate green vegetables only three days in every month; a riverine diarist, on only two.

Green vegetables, as we have seen, are merely a pis aller. That is the whole explanation of the low figures. They are there for the gathering, wild or cultivated, and the cultivated could be plentiful, especially if more legumes were being grown. But no one eats them for choice, only if reduced to such a course by necessity. As things are now, an improvement in the supply of animal protein means an immediate drop in the consumption of green vegetables, and the idea has to be inculcated that both are necessary and good and that there is no reason why they should not be eaten together.

The question of fruit is also primarily an educational problem, for many varieties of fruit will grow very easily in the district. Probably the greatest obstacle is the prevalence of small shifting villages with the consequent disinclination to plant trees owing to the time they take to mature and the difficulty of protecting them from the deprivations of game. There is also a superstition that a man who plants a tree will not live to see it bear, but this is declining.

13. **Beer.**

The beer consumption of the diarists varies enormously for reasons other than supply, religion being a prominent factor. The records of those who do drink it fairly regularly show how it is being brewed by those who can afford it during the early part of the cultivation period, when people try and save enough grain to brew for digging-parties and later for weeding-parties. They also show how

very little
very little beer is available in the latter part of the cultivation period, when not only supplies of grain are lower but the chief work of the season—bird-scaring—does not lend itself to communal labour. The supply of beer rises again with reaping-parties and the social gatherings of the post-harvest season.

While individuals vary greatly in their consumption of beer, it is probable that the custom of labour-for-beer does often provide nourishment from the storehouses of the more fortunate for really hungry men and women whose own supplies of food are at a low ebb, and so from the social point of view it is not to be despised.

14. CALORIFIC VALUES.

In the absence of detailed quantitative data, the section on these has been omitted.

15. EFFECT OF TABOOS AND SUPERSTITIONS.

Every native has a traditional inherited food taboo, but in the district under study these do not greatly affect the diet, being for the most part animals or birds or other foods rarely obtained in any case. There are also individual superstitions but again these do not seem to be of any great importance.

The effect of Islam is much more disconcerting. To turn Moslem is a step up the social ladder, so the keeping of Moslem food taboos comes to be the outward mark of a "gentleman," so much so that many non-Moslems, both Christians and others, will not eat wild pig, feeling that to do so would cause a loss of caste. These taboos mean the neglect of much available animal protein formerly in demand. More important than the considerable numbers of elephant which the game scouts shoot every year are the wild pig and baboons. These are the major curses of local agriculture and if they were still desired as food the cultivation protection problem would be a lot nearer solution. The diet thus suffers directly by loss of animal protein and indirectly by increased damage to crops.

16. THE PROBLEM.

The preceding pages have, it is hoped, made clear the two-fold character of the nutrition problem. There is a very large economic problem of supply, but there is an
even larger educational problem behind it. It must be remembered that the two interlock at every point, but it is convenient to consider them separately.

17. **Problem of Supply.**

The main points made under this head in the full report were:

1. No proposal can be considered practical which requires of the native an initial large increase in his output of energy—because that energy is not there. There is here a vicious circle whose effects are aggravated by ignorance of better conditions and the natural absence of any burning desire for the unknown and, to the majority, the unimaginable.

2. Better use has to be made, therefore, of existing acreages before any use of greater acreages. This means systematic and intelligent use, and brings us back to the educational problem.

3. Every crop planted means another crop to guard, and the only answer to that problem is closer settlement, which to be successful must mean better organization on the production side.

4. The possibilities of more extensive poultry-keeping.

5. The problem of green vegetables is almost entirely educational, for they are not at all difficult to produce in adequate quantities. The question of fruit is also largely an educational matter but linked with the question of closer and more permanent settlement.

18. **Problem of Education.**

The further one delves into the problem of nutrition the more obvious it becomes that the crux of the whole matter is education in the broadest sense, and that a much wider basis for all our agricultural propaganda is needed.

In the first place we have to realize the native's complete lack of understanding of the most elementary principles of nutrition. In theory we do, but in practice we often expect him to show what we call common sense where his food supply is concerned, when he lacks the knowledge and experience which are in fact the foundation of what we take for granted.

The peasant in Ulanga has a very definite idea of what he likes and, save in a handful of individuals, the idea that food and drink are little, etc., for rice, now (after a little extension of food I because an individual but also extensive to all)

Pro back. It it tackles not as desirable for him real reasons the individual peasant is from its being drawn in them and

In children children's and varieties of it practical this it is should gain advantage crop, but needed to place of all good
that foods other than rice and fish may be equally valuable and desirable from the point of view of health has not so much as dawned. When we realize this it becomes obvious why he is so hard to rouse out of his ordinary agricultural habits. When, perhaps, we are arguing about a leguminous cover-crop, "Here you have a fine extra food crop for very little extra work, and at the same time you are doing your land good and it will be much easier to clean next season for rice," he will be arguing, "Here I have some extra work now (after harvest) when I'm fed up with it, to get a type of food I don't want and to improve land I don't care about because I can always move to a new field." But where individuals have been persuaded that not only quantity but also variety counts for health, they have become responsive to all sorts of new ideas.

Propaganda must, therefore, start a stage further back. It must tackle men's ideas about themselves before it tackles their ideas about their methods of work. We cannot assume that a food crop will appear to the peasant desirable just because it is food. We have first to make him realize the body's need of a varied diet. For several reasons the seed must be sown in individuals, in the key individuals of native society if in no others, for native peasant society is still tribal and a village waits for a lead from its elders. Where one leader makes a start neighbouring leaders are likely to watch and presently to be drawn in, for the spirit of rivalry is often strong between them and can be turned to account.

In some such way the adults and through them the children of the villages may be reached. With those few children who go to school we have much greater opportunities of impressing the close relationship between health and varied food and agriculture, and of sending them out with practical ideas of the greatest value to their villages. In this it is most important that the school's agricultural efforts should give them the right perspective. It is obviously an advantage to a man to have a cash crop as well as a food crop, but it is equally obvious that the greatest care is needed to ensure that the native understands the proper place of each in his programme.

The trouble is that economic stimulation, applied in all good faith in the desire to bring prosperity to the whole
19. CONCLUSION.

Our study of the diet in Ulanga has shown the following points:

(1) Failure to secure an average of two proper meals a day;
(2) Failure to secure animal protein every day;
(3) The very small extent to which the major sources of vegetable protein are used by the general populace;
(4) A very marked disinclination to eat green vegetables except as a makeshift, and a pronounced and often really remarkable neglect of both these and fruit, although one (if not both) is nearly always obtainable and could easily be made so;
(5) The adverse effect of the customary division of food on the diet of women and children, and its probable close connection with the high infant and (young) child mortality;
(6) The fact that the native in Ulanga is not even aiming at a balanced diet, and therefore
(7) The crying need for educational work in nutrition.

We are left with the very strong impression that the educational problem is, in the end, far greater than the technical one. At every point throughout our examination of the diet in Ulanga we have found the twin factors of economics and psychology interlocking and interacting, in fact inseparable however much one might at first sight appear to dominate the scene. In consequence we are led to the conclusion that economic schemes and expedients do not touch the root of the matter and will be largely frustrated unless a simultaneous and determined attack is made on the far wider educational problem.