Economic Advisory Council

Committee on Nutrition in the Colonial Empire

FIRST REPORT—PART II

SUMMARY OF INFORMATION REGARDING NUTRITION IN THE COLONIAL EMPIRE

With Special Reference to the Replies received to the Circular Despatch from the Secretary of State for the Colonies, dated 18th April, 1936

Presented to Parliament by Command of His Majesty, July, 1939

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NOTE.—The prices given do not include postage.

Arrangements are also being made for the publication of the report from Somaliland. Copies will be obtainable from the Crown Agents for the Colonies, but the price is not yet fixed.

FOREWORD.

The following summary of information relating to nutrition in the Colonial Empire has been prepared chiefly from the replies received to the circular despatch from the Secretary of State for the Colonies of the 18th April, 1936. It also incorporates additional information available from other sources.

It should be emphasised that the statistics of birth and death rates and infant mortality cannot in the great majority of cases be regarded as accurate. The figures given often relate only to a small part of the territory in question which may be in no way a true sample of the whole. Moreover these figures may not be complete even in regard to the area to which they relate. There is, for instance, in most cases no compulsory registration of births or deaths, and it is quite possible that a larger proportion of births than of deaths go unrecorded. It has, however, been thought desirable to include these figures as furnishing the only information at present available on these subjects.

MEDITERRANEAN.

CYPRUS.

Area: 3,584 sq. miles.
Population. 367,216 (1936).

Birth Rate: 34·3 per 1,000 (1936).
Infant Mortality: 105·2 per 1,000 births (1936).
Death Rate: 12·4 per 1,000 (1936).

1. *General.*—The Cypriot is tenacious of his food habits and is suspicious of change. Attempts to induce voluntary improvements by propaganda are likely to be slowly rewarded.

2. *Composition and Nutritive Value of Dietary.*—The home-grown food of the Cypriots consists of bread, olives, legumes, green vegetables, fruit, cheese, milk, with eggs and meat occasionally. The well-equipped dairies in the chief town practise hygiene and furnish good supplies of cows' milk.

Country districts rely entirely on the milk of sheep and goats, most of which is converted into cheese, or into " yoghourt ", a sour milk preparation. Condensed milk is imported to the annual value of about £6,000.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Rickets, scurvy, beriberi and pellagra are non-existent. But quantitative deficiencies in the food of children of the poorer classes have long been recognised to exist. A considerable number of the rural population are, on account of poverty, definitely underfed and thus liable to tuberculosis, colds, infectious diseases and epidemic ophthalmia, the incidence of all of which is high, especially among the underfed. There is a rather heavy incidence of cancer, diabetes, anaemia, enteritis, nephritis, and gastric and duodenal ulcer.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The main cause of dietary deficiency, both in town and country, is poverty. The immediate problem is how to remedy the quantitative deficiencies.

5. *Researches and Surveys.*—No major investigations have hitherto been undertaken. A number of papers on the nutritive value of local foods have been published.

The study of diets, in relation to health and disease, in various social classes and racial groups is recommended as advisable.

6. *Practical Measures for Improvement of Nutrition.*—In the principal towns and a few of the larger villages free midday meals for the poorer elementary school children are provided by municipal grants and private charity with assistance from Government educational funds. Communal soup kitchens are

established in Limassol and are contemplated in Nicosia. Attempts to improve conditions are being made by a certain number of health clinics, child welfare centres, day nurseries, and by an Anti-Tuberculosis League. An important scheme for rural development with special reference to agriculture and health is now being inaugurated.

GIBRALTAR.

Area: 2 sq. miles.

Population (1935).

British subjects ...	16,875
Aliens	2,319
Total ...	19,194

Birth Rate: 19·3 per 1,000 (1936).

Infant Mortality: 62·09 per 1,000 births (1936).

Death Rate: 15·47 per 1,000 (1936).

1. *General.*—Since in this small and peculiarly situated Colony, the problems of nutrition do not arouse the same immediate concern as in other parts of the Empire, no local Nutrition Committee is, at present, thought necessary.

2. *Composition and Nutritive Value of Dietary.*—Gibraltar depends on imported foodstuffs, obtained in part by sea and in part from Spain. The food supply is good, varied and very largely fresh. Little evidence exists to the effect that the dietary is other than adequate. Grossly underfed children are seen only very occasionally, and these are invariably confined to the poorest class.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Rickets, scurvy, pellagra and goitre are practically unknown. The infant mortality rate has been falling steadily for the past 20 years and at present stands at 62 per 1,000 births. There is a high incidence of pulmonary tuberculosis.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Having virtually no agriculture, and producing locally only a fraction of the milk and fish consumed, Gibraltar depends on imported food substances, which come in freely and without tariff. There is no famine problem in the Colony and the few cases of undernourishment are attributed solely to poverty.

5. *Researches and Surveys.*—Whether the high incidence of pulmonary tuberculosis is connected with nutritional deficiency is at present being investigated.

6. *Practical Measures for Improvement of Nutrition.*—Necessitous cases are provided with free milk and meals through the agency of a pre-natal clinic, infant welfare centre and a soup kitchen. It is recorded that necessitous school children

(usually about 600) who are given a free midday meal during the winter months, work better after the meal than during the morning. The Governor hopes to establish a sanatorium for the treatment of tuberculosis.

MALTA.

Area: 121 sq. miles.
Population: 262,165 (1936).

Birth Rate: 33·86 per 1,000 (1936).
Infant Mortality: 190·30 per 1,000 births (1936).
Death Rate: 17·61 per 1,000 (1936).

1. *General.*—A Committee, consisting of representatives of the Departments of Health, Agriculture, Customs, and Education, has been appointed to survey the position. This Committee has submitted a locally printed report.

2. *Composition and Nutritive Value of Dietary.*—The staple articles of food belong to the energy giving groups, *i.e.*, carbohydrates and fats (bread, paste, margarine, oil) while the protective foods (milk, butter, eggs, meat, fruit, vegetables) enter but sparingly into the diet of average working-class families who have to rely on the cheaper articles of food to satisfy their hunger. Certain surveys, particulars of which are given in detail, show that the diet of a large section of the population is improperly balanced, containing excessive carbohydrate and lacking animal protein and fats, mineral salts and vitamins. It was found that 26 per cent. of school children drink no milk, while 54 per cent. drink less than 4 oz., and 20 per cent. little more than 4 oz. daily. Among working-class families examined, 76 per cent. consumed no butter and 60 per cent. no fruit. The Committee were much impressed by the inadequate consumption of milk especially by expectant and nursing mothers and young children. The chief source of supply of milk is the goat.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Despite the dietary imperfections referred to above, it would appear that gross malnutrition is not a common feature in Malta. Cases of starvation are rarely met with. Nevertheless, signs of undernourishment are not infrequent owing to casual employment and the low wages prevailing among a large section of the population. Malnutrition is also found among expectant and nursing mothers especially among those who bear offspring in quick succession, as is very common in these Islands. Cases of obvious malnutrition among school children are estimated at about 5 per cent. and occur mostly in town bred children. Insufficient feeding is one of the factors leading to impaired physical development. Deaths from rickets and anaemia during the past 10 years have fallen from 21 and 71 respectively in 1926 to 2 and 9 in 1936.

In some respects conditions are unique, inasmuch as Malta is one of the most densely populated of European countries, having a population of 2,434 (1935) per sq. mile as compared with 685 (1935) per sq. mile in England and Wales. The birth rate per 1,000 total population averaged 33·48 in the years 1921-31. In 1936 it rose slightly to 33·85. This rate is abnormally high in comparison with that of other European countries [*Cf.* England and Wales, 14·7 (1935); Italy, 23·3 (1935); Germany, 18·9 (1935)]. Malta's infant mortality rate is also abnormally high. In 1935 it was 285·71 per 1,000 births.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—As to the economic side of the question, there is no doubt that poverty has a direct influence on the dietary of the people. The main causes of such malnutrition as exists are the low wages earned by a large section of the population coupled with ignorance regarding diet which aggravates the ill consequences of low purchasing power. Family budget studies revealed that out of an average weekly family expenditure on food of 18s. 2½d. in a household of five persons, 8s. 3d. was spent on bread and potatoes, 7s. 9d. on milk, meat, eggs, fish, fruit, vegetables, butter and cheese, and 2s. 2½d. on wine, coffee and tea. As has been observed in other countries, these studies showed that improved dietary goes hand in hand with rising income. It has been impossible to calculate the *per caput* consumption of foodstuffs, but from data given on the total quantities of locally produced and imported foodstuffs available for consumption, it is evident that the total consumption of some of the more important health foods has shown a marked increase during the past 10 years.

5. *Researches and Surveys.*—Until the Committee reviewed the position, no nutrition studies had ever been undertaken. On their appointment, however, the Committee instigated certain inquiries the results of which form the basis of their report. These studies, which are recorded in considerable detail, include data on the composition of the diet of working-class families in various villages and towns, and particulars of 100 family budgets collected by the Labour Department and 18 others from H.M. Dockyard. The local Committee recommends that these surveys be extended in order to acquire data on the food consumption of families at different income levels and on the distribution of the population by family incomes. Surveys should also be undertaken in various districts to ascertain the extent of physical defects among school children attributable to faulty diet.

6. *Practical Measures for Improvement of Nutrition.*—With a view to improving nutrition Government support is already being given in the following directions:—Mother and child welfare organisations; district nursing; the feeding of necessitous

children; supervision of hospital and orphan asylum dietaries; and the administration of various regulations designed to safeguard the quality of food supplies. Further measures recommended as desirable are extension of the mother and child welfare services; extended supply of free milk to school children; intensified efforts to promote an increased consumption of fish by preventing inflation of prices by retailers; and the dissemination of information on nutrition by means of lectures, leaflets, posters and educational films. A Government Milk Centre has recently been started to provide pasteurised goats' milk for the general public and for Government charitable institutions and schools.

PALESTINE.

Area: 10,000 sq. miles.
Population (1937).

Moslems	...	809,394
Jews ...	...	386,084
Christians	...	109,769
Others ...	...	11,520
Total	...	1,316,767

Birth Rate: 41·58 per 1,000 (1937).
Infant Mortality: 152·84 per 1,000 births (1937).
Death Rate: 18·90 per 1,000 (1937).

[*Note.*—No separate report has been received from Transjordan, but such information as is available in regard to Transjordan is incorporated in this section. No specific study of the problem has been undertaken since MacLennan visited the country in 1935. In the opinion of the Director of Public Health, however, the nutrition of the rural population has, generally speaking, improved since that date.]

1. *General.*—No local Nutrition Committee has been formed. In the absence of even a preliminary survey of the position, it is considered that a Committee would not be in possession of adequate information to enable it to formulate a nutrition policy applicable to a fluctuating and diversified population such as exists in Palestine. The only relevant information which exists is that furnished by the limited surveys of Kligler in Palestine, and of MacLennan in Transjordan; which are summarised in paragraph 2.

2. *Composition and Nutritive Value of Dietary.*

JEWS.

Urban (Kligler): *European section (Ashkenazic; occidental).*—Live on a better scale than Oriental section. Eat more meat, milk and butter. Consume an average of 2,500 calories daily.

Urban (Kligler): *Oriental section.*—Eat more vegetables than European section. Consume an average of 2,300 calories daily.

Rural (Kligler): *Colonists.*—Consume more than the two Urban groups studied, *viz.* about 3,500 calories daily. Diet of children is richer in fat than that of adults, has an excessive energy value and a faulty Ca/P ratio.

ARABS.

Urban.—No data.

Rural (Kligler): *Fellahin* (*agricultural villagers*).—Two villages surveyed. Consume less milk and less meat, but more vegetables than Bedouins. Freely consume olive oil. The high fat and relative excess of phosphorus are unsatisfactory features of the diet.

Rural (Kligler): *Bedouins* (*semi-agricultural*).—Two camps surveyed. Consume more milk and more meat, but less vegetables than Fellahin. Use butter oil rather than olive oil.

Rural (MacLennan): *Bedouins* (*semi-agricultural*).—Four tribes examined MecLennan says Kligler's limited survey does not represent a true picture for the general Arab rural population. The tribes MacLennan examined were very poor, existing on a diet inadequate in both quantity and quality, and, during certain seasons, often consisting exclusively of unleavened bread (khabs) and olives. Milk was available only to those possessing goats or camels; meat was a luxury, and the only other supplementary foods were small quantities of grapes, figs, dates and melons, eaten mostly by richer families. In short, the value of the food supply is considerably less than as recorded by Kligler. Calcium is deficient and protein is almost solely of vegetable origin. The supply of vitamins A, B, and C is uncertain, and vitamin D, contained chiefly in Arab butter (semneh), is available only for about three to four months of the year.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—The rural Jewish, and a large part of the urban Jewish population, are very well nourished. The extent of undernourishment among the Bedouin and Fellahin is unknown, but it is held to be serious among the former class. Infant mortality is high. For the population as a whole the rate is 152·84, but it is particularly low in the Jewish section, 57·20. The highest rate is found in the Moslem group of the community, 179·31. Cases of scurvy and pellagra are occasionally encountered, but are not common. Rickets is uncommon, but marasmus and debility amongst infants in the Arab population is prevalent. Dental caries is not unduly high, and in the Arab rural population is low. In medical examination of 30,000 Arab school children in 1937, 306 were found with four or more teeth badly decayed, the incidence being higher in the town schools. From statistics published by the Straus Health Centre, of 2,000 Jewish school children in

Jerusalem examined at the school dental clinic for the first time, 19 per cent. had sound mouths. Xerophthalmia occurs in the Arab population, 12 cases being found in 21,000 patients examined at the Ophthalmic Hospital of the Order of St. John in 1935. Pneumonia is common. In statistics of deaths of which about one-third of the total notified can be classified as to cause, pneumonia accounts for about 18 per cent.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.)*.—As is the case in other countries, the economic status of the individual is the factor which determines good or bad nutrition in Palestine. Among the poorest class, 70 to 80 per cent. of the income is spent on food. The quantity and quality of diets in rural areas is inferior during the winter months.

All requirements for a normal and nutritious diet are capable of production in the country. Local production, however, has to be supplemented by considerable imports of butter, condensed milk, eggs, poultry, meat, fish, vegetables, flour, rice, etc.

The Government, through the department of Agriculture and Fisheries, has devoted much attention and labour to assisting the local agriculturist in improving the quantity and quality of his produce. There are two Government directed and nine non-official agricultural schools. Dairy farming, vegetable production, the home canning of vegetables and fruit are taught in addition to general agriculture and fruit production. The improvement of stock, both for milk production and the meat market, has engaged much attention and valuable results are being obtained by the loan of selected stock males for breeding purposes and the castration of scrub male stock. Modern poultry farming has made great strides, assisted by supplies of eggs and stock of suitable breeds from Government poultry stations. The cultivation of potatoes has been introduced and has developed very successfully. The Government assisted the establishment of the industry by importing seed-potatoes for sale to growers at cost price. The growing of forage crops has been stimulated and greatly extended. Citrus cultivation has made great strides and, in addition to a large and growing export trade, adequate supplies are available at low prices for local consumption in season. There is a growing production of bottled citrus juices. The local consumption of fruit and citrus juices is encouraged by propaganda conducted by the Government citrus fruit advertising committee. The veterinary services provide for the *ante* and *post mortem* examination of all animals slaughtered in municipal and local council areas for food. A fisheries protection and development service has been established with consequent improvement of quantities and size of fish caught locally for the market. An Agricultural Council composed of official and non-official members acts in an advisory

capacity to the Government. Committees deal with individual problems such as questions affecting the economics and marketing of agricultural produce.

Education and propaganda are conducted. An agricultural supplement to the Official Gazette is published monthly in which the results of local experiment and research are brought to the notice of the public. Talks in Arabic and Hebrew are a regular weekly feature of the local broadcast programmes.

The monthly expenditure of an average urban family of 4·2 man units on 20 staple food commodities (including fuel) is approximately £P.5. This estimate does not, however, apply to lower Arab labouring classes whose expenditure is probably much less as the total monthly earnings of an unskilled labourer approximate £P.3-£P.4. There has been a very considerable reduction in the retail cost of certain valuable food commodities in the last 18 years as gauged by published statistics, e.g. fresh milk, mutton, potatoes and rice 50 per cent., eggs and fish 40 per cent., butter 30 per cent., beef 25 per cent. A full third class Arab diet in Government hospitals, including extras, costs approximately 40 mils* per diem, and the very complete prison diet (hard labour), 3,200 available calories including all essentials, averages 22 mils per diem at present contract prices.

5. *Researches and Surveys.*—The only surveys hitherto undertaken are those of Kligler and of MacLennan summarised above. With regard to the improvement of nutrition, the local authorities conclude that little of importance can be achieved until a comprehensive scientific investigation has been made into the whole position.

6. *Practical Measures for Improvement of Nutrition.*—Reference has been made in paragraph 4 to the work undertaken by the Department of Agriculture and Fisheries for the improvement of local produce in quality and quantity, and of animal husbandry.

Instruction and education are necessary to produce a proper appreciation of the value and importance of diets. The infant welfare services of the country are performing valuable work in this direction. The Jewish community is particularly well served by Jewish organisations, but there is room for considerable expansion of this work amongst Arabs. There are 37 Jewish infant welfare centres for a population of 386,084; and 36 Government and three private centres which attend to the infants of the rest of the population numbering 930,683. At all centres attention is given to instruction of mothers in the diet of infants and children. In the education of elder girls and teachers the Department of Education lays stress on domestic science, and there is an annual competition open to Government schools for

* 1,000 mils = £P.1 = one pound sterling.

a Domestic Science Shield. The senior girls in Government schools are given instruction in mothercraft in infant welfare centres of the Department of Health. A rural training centre has been established by Government for women teachers from villages where they are given practical training in domestic subjects with special reference to the needs and environment of the village girl.

Jewish organizations maintain several schools for training girls in agriculture and domestic science, and two mothercraft training centres. The Nathan Straus Health Centre at Jerusalem carries on health education and propaganda amongst Jews. The subject of nutrition and economic diets receives adequate attention.

Radio talks in Arabic and Hebrew from the Government broadcasting station on health matters deal, from time to time, with the subject of diets and nutrition.

The public is protected from adulteration and falsification of foodstuffs by the service of inspection and sampling carried out by the Department of Health under the Public Health (Rules as to Food) Ordinance. Rules under the Ordinance deal with standards of foodstuffs, the use of preservatives, labelling, and the procedure of sampling.

AFRICA.

EAST AFRICA.

WORK OF THE STANDING MEDICAL RESEARCH COMMITTEE, COVERING EAST AFRICAN TERRITORIES.

There is general agreement amongst all the Nutrition Committees set up in East African territories that the opinions of technically untrained observers should be supplemented by scientific investigation.

With the exception of Aden and British Somaliland, which looks to the Anglo-Egyptian Sudan for co-operation in nutritional problems of a similar nature, all the East African dependencies look to the Standing Medical Research Committee for East Africa to prosecute inquiries, to direct and co-ordinate field studies into conditions of village life, food taboos, dietary prejudices, to initiate medical surveys of nutritionally poor districts and to make comparative dental studies regarding the incidence of carious teeth. The Uganda Committee wish the methods of native cookery best suited to the preservation of the nutritive value of food to be elicited. In Nyasaland a comprehensive dietary survey is now being undertaken in co-operation with the Medical Research Council and the International Institute of African Languages and Cultures. Details of the survey are given in Part I of this Report (paragraphs 403 to 405).

All are appreciative of the work done in investigating the basic metabolic rate and energy exchange of the native and are anxious that the laboratory work in this connection carried out in Nairobi should be extended, and that inquiries into the chemical composition and nutritive value of local foodstuffs, including adventitious dietary " extras," should be prosecuted.

BRITISH SOMALILAND.

Area: 68,000 sq. miles.
Population: 344,700 (1931).

Birth Rate: } No
Infant Mortality: } statistics
Death Rate: } available.

1. *General.*—The specially appointed local Committee has drawn up a 37 page report, in which it recommends, *inter alia,* that a Standing Committee on Nutrition be established.

2. *Composition and Nutritive Value of Dietary.*—The natural food of the nomad Somali is milk and meat with such additions as ghee, dates, rice, sugar, tea and salt as he can procure. The one essential to his health and happiness is milk—camel's milk for direct consumption and that of cow, sheep and goat for the preparation of ghee. The individual capacity for milk

among nomad tribes reaches 10 pints or more a day. It is not uncommon for a party of nomads to touch nothing but camel's milk over a period of several months.

In towns, rice, dates and ghee come first, with milk and meat as secondary foods. This is the standard ration of Government employees (Police and Camel Corps) who, as a result of the regularity and quantitative adequacy of the dietary provided, show great physical superiority over poorer town natives for whom uncertainty of supply is frequent and may occasionally result in individuals being without food for 24 hours or more at a time. A typical average dietary, quantitatively sufficient, does not appear to have any serious qualitative defects beyond lack of variety and imbalance due to fat excess resulting from the popularity of milk and ghee. Noteworthy is the almost complete neglect of green vegetables and a genuine contempt for fish and eggs. Dietary improvements indicated are the popularisation of fresh vegetables, an increased consumption of locally produced " jowari " (millet) and a diminished consumption of rice of low nutritive value.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—In considering the nutritional status of the Somalis prominence must be given to their distinctive racial characteristics in stature and physique. With lean, wiry bodies and light skeletal frames they are equipped by nature, not for manual labour which they dislike, but for a specialised type of nomadic existence requiring tremendous powers of endurance in times of privation and the ability to cover great distances daily, mounted or on foot. An adult male of six feet weighs between $8\frac{1}{2}$ and $9\frac{1}{2}$ stone. This racial characteristic of leanness can by no means be accepted as a positive and invariable indication of malnutrition. Interesting weight data show that although a Somali prisoner may at first gain in weight on the regulation prison diet, the improvement is difficult to maintain in long-term prisoners owing to the psychological effect of incarceration and the unaccustomed diet which, though adequate by usual standards, deprives him of his natural food which is undoubtedly milk. A further important point is that unlike his Bantu prototype in East or Central Africa the Somali does not have to compete with a massive infection of intestinal parasites. Round, hook and tapeworms are not indigenous, and a locally acquired infection is never found. Neither is malaria a force of any great influence on the physical standard of the Somali.

With a striking dietary deficiency of fresh fruit and vegetables, the negligible incidence of rickets, pellagra, scurvy, beriberi and xerophthalmia is especially noteworthy. As a result of investigations made during certain military operations during which scurvy caused considerable concern it was conclusively proved

that camel's milk is not only protective against the disease but a curative as potent as, if not more so than, lime juice or fresh vegetables. For native Somalis no remedy acts more rapidly than camel's milk. Xerophthalmia has not been reported, an indication that vitamin A supply is adequate. Clinical evidence points to a possible deficiency of iodine. Constipation is universal, as is only natural in a country where the fluid intake other than milk is minimal. The only disease closely allied in type to conditions arising from avitaminosis, mineral deficiency or both, is that described by Buchanan under its local name of " Chachaleh." The chief symptoms of the condition, which simulates beriberi and is commonly met with both in township and jungle, are aching muscles, bones and joints, epigastric pain, oedema, and " burning feet." It has been reported that in the Nogal Valley* there is no sign of undernutrition, deficiency diseases being unknown. It would be interesting to know more regarding the precise nutritional quality of the diet in this area.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—All rice, dates, flour, sugar and tea consumed in the Protectorate are imported. (*a*) *Milk.*—During certain seasons of the year there is an abundance of milk in the remoter areas which cannot be consumed and for which there is no market in the producing area, whereas the town dweller is often unable to obtain it at all. A tentative scheme is outlined whereby, with the increased use of motor transport, it is considered that this surplus milk could be effectively and economically transferred from country areas to towns. The Governor is prepared to give the scheme a trial if the necessary funds are forthcoming to subsidise it in its initial experimental stages. (*b*) *Fruit and Vegetables.*—These are scarce, although certain quantities are obtainable from Aden. In order to increase consumption, the reviewing Committee recommends that vegetables should be relieved of customs duties; and also that the existing market dues on such grains (e.g., jowari) as are likely to become popular food should be reduced or removed. The revenue from these duties amounts to about £800 per annum. (*c*) *Animal Husbandry.*—Somaliland depends for its livelihood on its livestock, not only as direct food supply, but as its main source of income. The extension of rotational grazing will be encouraged with a view to obtaining a better yield and quality of milk in the areas adjacent to townships. In pasture management and the breeding of livestock the outstanding difficulty is the shortage of water. Steps are being taken to increase the number of watering posts and to make additions to the sources of water supply by the sinking of deep bores. Experience has already shown that when water has been made available in, or near,

* *Nutrition Research in the British Colonial Empire.*—Imperial Bureau of Animal Nutrition, Tech. Communication No. 8, 1937, p. 16.

dry season grazing areas, camel's milk, ghee and mutton have become more plentiful and the physical condition of the tribes has correspondingly improved.

5. *Researches and Surveys.*—Hitherto very little has been done beyond the researches of Buchanan referred to above. At present there are small laboratories attached to the Medical and Veterinary Departments. The Committee recommend as highly advantageous a direct and intimate research co-operation with the Anglo-Egyptian Sudan which faces nutritional problems of a similar nature.

6. *Practical Measures for Improvement of Nutrition.*—The Committee strongly recommends the establishment of a Maternity and Child Welfare Centre. See also under paragraph 4 above.

KENYA.

Area: 224,960 sq. miles.

Population (1936).

Europeans	...	18,269
Asiatics	...	54,690
Natives	...	3,186,976
Others	...	1,587
Total	...	3,261,522

Birth Rate: } No reliable statistics available.
Infant Mortality: }
Death Rate: }

1. *General.*—No special Committee has been appointed. The opinion is expressed that the necessary co-operation in nutrition work between the Administration, Agricultural, Veterinary and Medical Departments can be secured without the appointment of a local Nutrition Committee. In the memorandum forwarded by the Kenya Government, it is emphasised that the knowledge already gained regarding the nutrition of Kenya natives is very considerable and that, indeed, research has tended in recent years to move ahead of agricultural practice and policy. The report submitted from Kenya deals chiefly with the necessity for reflecting in agricultural policy the knowledge of nutrition already available, second place being given to the medical and research outlook on the subject.

2. *Composition and Nutritive Value of Dietary.*—[For a summary of the numerous published papers on Kenya dietetics reference may be made to *Nutrition Research in the British Colonial Empire,* Imperial Bureau of Animal Nutrition, Tech. Communication No. 8, 1937, pp. 6-10. Price 1s.].

The diet of the native in the reserves is varied in quantity, although in some respects qualitatively deficient. Different tribes have entirely different dietary habits. For example, the diet of

the Masai consists chiefly of meat, blood and milk, whilst that of the Kikuyu, and, indeed, of most other tribes in Kenya, is mainly composed of cereals (maize), tubers and legumes. The chemical composition of local foodstuffs has been extensively studied, analytical data being available in a number of publications. On the whole it is true to say that the food supply available for the native population is adequate in total, and that any deficiency results from maldistribution, poverty and ignorance.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—In the well-known study by Orr and Gilks, medical examination proved beyond dispute the great superiority in weight, stature and fitness of the milk-nourished and carnivorous Masai to the vegetarian Kikuyu. The Kikuyu diet was as a whole found to be deficient in calcium and sodium, elements which, in the case of women, were made good by the eating of leaves rich in these minerals. Marked differences were also noticed in the incidence of disease in the two tribes. Common among Kikuyu were bony deformities, dental caries, anaemia, pulmonary conditions and tropical ulcer. The diseases of the Masai were of a different type, rheumatoid arthritis being common and possibly related to their high meat consumption.

Despite the improvements made in institutional diets, and the care taken to ensure that these are adequate, sporadic cases of deficiency diseases (*e.g.* Rand scurvy) occasionally occur. The incidence of night blindness and xerophthalmia among prisoners and of pneumonia, tuberculosis and ulcers in the free population suggests a general vitamin A deficiency. There is probably no deficiency of vitamin D. Other observations suggest a possible iron deficiency.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—An indicated in paragraph 1, local authority is concentrating on bringing native agricultural practice into harmony with the nutritional needs of the people. The opening up of markets and the organisation of trade between agricultural and pastoral tribes has led to a better distribution of foodstuffs than existed, say, 10 years ago, with a consequent improvement in the dietary of the people on the land. (See paragraph 6.) With the object of increasing the native consumption of local foodstuffs (meat, etc.) agricultural policy has a two-fold concern (*a*) to increase cultivation of food crops in the agricultural areas and to improve their variety and quality, and (*b*) to improve animal husbandry in all areas both agricultural and pastoral. In regard to the former some appropriate system of permanent rotation is aimed at, the greatest difficulty so far encountered being the unwillingness of the natives to grow a leguminous green manure crop for the purpose of turning under

to assist maintenance of fertility. The planting of Napier grass will be helpful for this purpose and a similar effect is claimed for the wattle tree in the case of worn-out cultivated lands in certain areas. As regards pastoral areas, the presence of disease and the lack of markets in the past for meat and livestock generally have hampered development, but it is hoped by intensifying sound grassland management and encouraging modern breeding methods to effect improvements which will provide greater returns from stock products and eventually result in a general raising of the standard of living among stock-owning natives.

5. *Researches and Surveys.*—[See also Note on the work of the Standing Medical Research Committee for East Africa, p. 10 above.] No recommendations are made for extension in the present research programme being carried out in the Medical Laboratory at Nairobi. This is mainly concerned with studies on the basal metabolic rate of and energy exchange in the East African native, which are locally regarded as of importance in order to find out whether or not the results of nutritional investigations under European conditions can be applied without modification in Africa. There has recently been completed a long term rat-feeding experiment to determine the rate of growth and reproduction of animals receiving a typical institutional dietary and to discover the effects of an addition of milk to that scale, and a survey of the milk consumption by Europeans in a number of households. Specialized investigations on calcium and phosphorus metabolism, analytical work on foodstuffs, and examination of the results of free issues of milk to native school children in Nairobi are also being continued.

6. *Practical Measures for Improvement of Nutrition.*—These cover two aspects, agriculture and health, and involve (*a*) instruction at veterinary training depots on the improvement of native cattle; the establishment of small holdings, demonstration gardens and plots; the improvement of food crops by the introduction of new varieties of cereals, pulses, vegetables and fruits (particularly the citrus and the avocado pear), as well as by local selection for high yields and resistance to disease; introduction of mixed arable and stock farming; instruction in pasture management and conservation of fodder; and (*b*) the provision of properly balanced diets in hospitals, schools and prisons; the establishment of child welfare centres; propaganda on the public health aspects of nutrition at exhibitions and shows; education on diet and nutrition in schools.

In an article* by the late Director of Education in Kenya, a description is given of measures undertaken by the Educational Department towards providing the West Suk tribe with

* "*Africa*", 1937. 10, 458–471.

the means of securing a greater variety of crops and so improving their dietary. A boarding school for 40 youths was opened in 1931, in which, in addition to the ordinary elementary school curriculum, training was given, in plots attached to the school, to enable the pupils to grow crops suitable for the country in which they live.

TANGANYIKA.

Area: 374,085 sq. miles.

Population (1931).

Europeans	...	8,200
Asiatics	...	32,000
Natives	...	5,022,640
Total	...	5,062,840

Birth Rate: } No reliable statistics available.
Infant Mortality: }
Death Rate: }

1. *General.*—A specially appointed local Committee has submitted a report of 16 pp., dealing chiefly with the practical measures towards securing improved nutrition and to a less extent with the scientific and medical research aspects. [For additional information reference may be made to "The Tribes of Tanganyika—Their Districts, usual Dietary and Pursuits," by R. C. Jerrard, and to Imperial Bureau of Animal Nutrition, Technical Communication No. 8, pp. 17-18.]

2. *Composition and Nutritive Value of Dietary.*—The report refers to the work of Jerrard in recording the customary foods of each tribe in the eight provinces (54 separate districts) of the Territory. These include millet, mtama, maize, rice, groundnuts, beans, cassava, sweet potatoes, native vegetables, fish, meat, mutton, goat flesh, milk, blood, etc., and are used in different proportions and with widely varying preferences by different tribes. For example, some tribes prefer root crops (cassava) while others do not; millet is the staple in some districts, rice in others; blood, meat and milk form the main food of certain nomadic pastoral tribes; and fish is commonly eaten by coast tribes and in the Lake Province but rarely elsewhere. Little is known about the various ingredients used as supplementary relishes ("kitoweo") which constitute a very important part of the dietary. It is generally agreed that the majority of the population does not get enough meat and milk and that there is an annual period of food shortage between harvests. This periodic shortage of food, involving a recurrent annual drain on native resources, is a question even more serious than the occasional outbreaks of famine which have occurred in nearly all provinces during the past ten years, and which cost considerable sums in relief measures. Taboos and tradition are also important factors and are sometimes the cause of protein and vitamin shortage. A taboo on eggs and milk, for example, may operate even during a shortage of staples.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Although deficiency diseases have been reported in many districts, particularly beriberi and rickets in the Tanga province and scurvy in the Lupa area of the Southern Highlands, information is not available to determine with any accuracy the extent and prevalence of malnutrition throughout the whole territory. While cases of malnutrition are common enough following serious shortage or failure of staple crops, it is impossible to say whether in a prosperous year any tribe suffers as a unit from food deficiency. Nor is there any exact information to indicate how far conditions of malnutrition are complicated by parasitic infection nor how far deficient nutrition causes or increases susceptibility to such infection. It is recognised that natives living in stock rearing areas are more energetic than those from districts where meat and milk are less plentiful. By improving dietary conditions on estates one large employer increased his average daily turn-out of labour to 98 per cent. as compared with a previous normal of 45 to 50 per cent.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—There is no doubt that improved distribution of available food supplies would lead to improved nutrition. Particularly is this needed in such an area as the Lupa goldfields where malnutrition exists through lack of fresh foodstuffs aggravated by economic difficulties. A major problem is the tsetse fly menace which prevents the people in two-thirds of the territory (one-sixth of the population) from keeping domestic animals for milk and meat production. In other areas, enzootic disease, density of population and seasonal starvation of animals limit the supply; and the fact that so many owners regard their stock as currency (for marriage dowries, etc.) also precludes the slaughter of cattle for ordinary consumption as meat.

Improvement in quality of food must be an ultimate aim, but the immediate need is greater quantity. The preharvest shortage is serious in some districts and is due to the inherent improvidence of the native who plans his agricultural output to allow only a bare sufficiency for himself and then overdraws on this minimum when the store is at its fullest after harvest. While the development of economic crops such as coffee and cotton is essential to the progress of the African and of the territory, the cultivation of food crops is equally essential. It should be a first consideration to ensure that each family in a tribal area cultivates major food crops sufficient for its needs.

5. *Researches and Surveys.*—[See also Note on the work of the Standing Medical Research Committee for East Africa, p. 10 above.] Existing knowledge is based on the opinions of many observers rather than on scientific enquiry. Little research has hitherto been undertaken. The report stresses the need for obtaining exact knowledge regarding the basal metabolism and energy exchange of the native to ascertain if and to what extent the European standard of nutrition deviates from that of the

African. Other studies which appear desirable include the chemical examination of foodstuffs; medical surveys of nutritionally poor districts; comparative dental studies regarding the relative immunity to caries found among primitive tribes and the higher incidence of dental disease among town dwellers influenced by alien civilisation; and the extent to which parasitic infection influences native nutrition.

6. *Practical Measures for Improvement of Nutrition.*—A lack of appreciation of the importance of nutrition is one of the most important barriers to progress. The lines along which it is suggested that action should be taken include: better distribution and utilisation of stock with a view to improving the supply of meat and milk; development of better stock routes from cattle areas; rotational grazing; improvement of pastures; improved production of milk and of good quality ghee by means of creameries; encouragement of the use of skimmed milk and cheese made from locally-produced skimmed milk; encouragement by propaganda and example of the use of palm oil; protection of the public from adulteration of foodstuffs by the introduction of appropriate legislation; encouragement of vegetable growing; extended maternity and child welfare services; establishment of school gardens for the cultivation of tomatoes and green vegetables; instruction in anti-tsetse measures; encouragement of the use of shark oil and cod liver oil at tribal dressing stations; improvement in methods of food storage; and the establishment of communal kitchens by the larger industrial concerns.

The reviewing Committee recommend that in order to bring them within the purchasing power of as many natives as possible, tinned milk, tinned and dried fish, salt and unmilled rice be exempt from Customs duties and that the licence fee imposed on sellers of dried fish be abolished. The Committee also invite attention to the unsatisfactory conditions under which labourers on certain industrial undertakings are fed, and they express the hope that such remedial measures as may be practicable will be progressively enforced.

UGANDA.

Area:

		sq. miles.
Land	...	80,371
Water	...	13,610
Total	...	93,981

Population (1935).

Europeans	...	1,994
Asiatics	...	14,860
Natives	...	3,644,245
Total	...	3,661,099

Birth Rate: 26·42 per 1,000 (1936).

Infant Mortality: 158·64 per 1,000 births (1936).

Death Rate: 19·60 per 1,000 (1936).

1. *General.*—No *ad hoc* Committee has been appointed, but a nutrition sub-committee of the permanent Agricultural Survey Committee has surveyed the position and submitted a report. In addition, a memorandum from the Director of Medical Services, and two reports dealing with health and agriculture in Teso have been submitted. These are (1) " An investigation into health and agriculture in Teso, Uganda," Agricultural Survey Committee, Nutrition Report No. 1—Teso, 1937, by De Courcy-Ireland, Hosking and Loewenthal, and (2) Report of an informal Committee appointed to consider certain questions relating to agricultural, forestry and stock conditions in Teso District.

2. *Composition and Nutritive Value of Dietary.*—The native dietary is primarily vegetarian and consists chiefly of bulky carbohydrate foods. Plantains form the staple food in the Buganda Province and in parts of the Eastern, Northern and Western Provinces. In the rest of the country grain is the staple, the small millet (eleusine) being the commonest. Beans and peas are the staples in Kigezi and Ankole. Groundnuts, a commercial crop in the Eastern Province, are eaten freely when available. Wheat and rice are grown in certain areas but maize is not grown to any extent. Sweet potatoes, great millet (sorghum), cassava, simsim, pumpkins, gourds and native spinach are secondary foods used in varying proportions.

All tribes eat meat occasionally but not regularly. In cattle districts milk is consumed, generally curdled and very often mixed with cattle blood. Fish, both fresh and dried, is popular whenever obtainable among tribes living adjacent to lakes and rivers. Locusts, grasshoppers and white ants are universally eaten as delicacies. Fruit does not ordinarily enter into the diet, but figs, tamarinds and the fruits of the shea butter tree and borassus palm are occasionally used to supplement the routine diet. The consumption of sugar is steadily increasing and tea and coffee drinking is gradually becoming habitual with natives. Food taboos are common, e.g., chicken and mutton are not eaten by Baganda women and milk is often barred to male adults.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The published investigations of Loewenthal, Mitchell, Owen, Hennessey and others indicate that there exists a very considerable amount of ill-health due to lack of first-class protein, fat, vitamins and possibly of minerals in the diets now consumed. Up to four or five years ago considerable trouble was experienced in Uganda prisons owing to multiple dietary deficiency the chief evidences of which were oedema, pellagra, xerophthalmia, night-blindness and other ocular disorganisations. This suggests that vitamin deficiency, particularly of the A-factor, must exist to a considerable extent among the free population. In recent years, however, prison diets have been so much improved that to-day deficiency diseases are rarely

seen in Protectorate prisons. Another important line of inquiry refers to tropical ulcer which is very prevalent and is considered to be of dietetic origin. Ulcers are of less common occurrence where the diet is richer in calcium and fat, and are scarcely ever met with among native chiefs and houseboys whose circumstances permit of their obtaining a regular and adequate diet including meat and milk. An important factor seems to be the quality of dietary protein. This is indicated by the prevalence of ulcers among vegetarian tribes and their absence in meat-eating tribes.

Observations by Loewenthal on vitamin A deficiency in the Teso area revealed that, of 1,112 individuals examined, both children and adults, almost 30 per cent. showed vitamin A deficiency. Other symptoms, such as neuritis, sore mouth, and skin infections suggest that the deficiencies were multiple in nature.

In the investigation into health and agriculture in Teso by De Courcy-Ireland *et al.* referred to in paragraph 1, two small administrative units were compared. In the one with a denser population and a negligible consumption of food of animal origin, the incidence of nutritional disease (eye troubles and ulcers) was markedly higher than in the other where there was less overcrowding and where fish was a regular constituent of the diet.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The methods of agriculture adopted by certain tribes are undoubtedly extravagant of land, and in many respects the present tribal system of land tenure is unsatisfactory. It is suggested that a proper appreciation of the value of land and of soil conservation can only follow if some method of land tenure ensuring continuity of ownership to the individual can be evolved. Teso is the agricultural district most affected by desiccation and soil deterioration. Here, natives normally cultivate land continuously until such time as, judging by reduced yields, it is becoming impoverished. To restore fertility this land is then allowed to rest, new plots being opened elsewhere. Owing to increased pressure of population, increased acreage of economic crops and increased cattle population, no adequate resting period is now being allowed, with the result that land fertility is not being maintained. A special Commission examining this problem in Teso in endeavouring to devise measures necessary to meet a situation which unless immediately dealt with may well become so serious that the natives will have difficulty in growing adequate supplies of food.

Water supply is a difficulty in certain areas. Undoubtedly Uganda could carry a very much larger population than at present if the sparsely watered areas could be provided with this necessity.

5. *Researches and Surveys.*—[See also Note on the work of the Standing Medical Research Committee for East Africa, p. 10 above.] Apart from the informative studies by Loewenthal and others referred to above, little research has been undertaken. Studies urgently required are the analyses of local foodstuffs (including the insects eaten), determination of native protein requirements, investigation of methods of cookery suited to native needs and best adapted to preserving the nutritive value of food, and anthropological research into the reasons for food taboos. Further surveys along the lines of that made in Teso (see paragraphs 1 and 3) are in progress and the Government is detailing a medical officer who will give his full time to this special work.

6. *Practical Measures for Improvement of Nutrition.*—On the agricultural side these include improved crop rotation, the introduction of new varieties of food crops and the improvement of cattle and milk supplies. The evolution of marketing systems and the establishment of recognised cattle routes has resulted in the price of meat being reduced to 25-30 cents per lb. as compared with 1s. (100 cents) per lb. 10 years ago. On the medical side, dietary scales have been laid down for prisons, schools, and hospitals. As an example to private employers of labour, Government has recently provided a well balanced diet to labourers employed on road construction. This has resulted in a very much lower incidence of sickness than is usual in such constructional works. Other measures include infant and child welfare work, health shows, and efforts to increase the consumption of milk. An increased consumption of fish is desirable and investigations are required with a view to better organisation of the fishing industry and the preparation and sale of fish.

ZANZIBAR

(AND PEMBA).

Area:

	Sq. miles.
Zanzibar	640
Pemba	380

Population: 242,770 (1936).

Distribution (1931).

Europeans ...	278
Arabs	33,401
Indians	15,246
Africans ...	186,466
Others	37
Total ...	235,428

Birth Rate: 16·3 per 1,000 (1936).

Infant Mortality: No reliable statistics available.

Death Rate: 16·8 per 1,000 (1936).

1. *General.*—The local Committee, consisting of the Directors of the Departments of Health, Education and Agriculture, the Provincial Commissioner, and the Curator of the Museum have published Sessional Paper No. 2 of 1937, under the title of " Nutritional Review of the Natives of Zanzibar ", which deals mainly with the dietary problems of the rural African and to a less extent with the urban African and the immigrant Indian. Sessional Paper No. 10 of 1937, published under the title, " Nutritional Problems of Zanzibar Protectorate ", is chiefly devoted to the progress which has been made in applying the practical measures for improvement suggested by the Committee.

2. *Composition and Nutritive Value of Dietary.—Staple foods.*—Rice, coconuts and cassava. *Secondary staples.*—Fish, plantains, sweet potatoes, yams. *Subsidiary foods.*—Maize, millet, Kaffir corn, legumes, vegetables and fruits. Rice, half of which is imported polished, cassava, sweet potatoes, plantains and various flours form the bulk of the dietary; coconut oil is universally eaten and provides almost all the fatty food; while fish, almost the sole food of animal origin, is commonly eaten fresh or dried, but in small quantities as a relish rather than an essential. Green vegetables and legumes are less commonly eaten, and the consumption of meat, eggs and milk is negligible. A list of typical native dishes, with their mode of preparation, is given. Excessive carbohydrate and deficiencies in protein (both animal and vegetable) and animal fat are the outstanding characteristics.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—In common with neighbouring East African territories, vitamin deficiency (leg-weakness, sore lips, visual defects and xerophthalmia) is frequently found among prisoners in Zanzibar and has necessitated the revision of institutional dietary scales. Following a medical survey of prisoners in 1935, the introduction of a new prison diet resulted in a decrease of avitaminosis from 53 to 18 per cent. among long-term prisoners, whereas, among subjects imprisoned for less than six months, the incidence rose from 25 to 36 per cent. The conclusion is inevitable that a marked degree of avitaminosis exists among the free population outside the gaol, which, in the case of short-term sentences, cannot be counteracted owing to the insufficient time on the more adequate prison diet. This conclusion is supported by the fact that, as revealed by medical survey, only one-third of the rural African and Arab children can be described as well nourished.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—To provide for clothes, house repairs, fishing tackle and other essential outgoings, the rural native trades all his most valuable foodstuffs in the towns, buying for himself

cheaper food. Eggs are sold not eaten; milk is bartered not drunk. Nearly the whole milk supply of the Island is absorbed into the township, the largest consumers being the Indian community. The only fish eaten is what cannot be absorbed into the available markets. Meat is not eaten owing to high cost, though it is well liked when obtainable. While the qualitative dietary defects considered in paragraphs 2 and 3 are common both to country and town districts, the quantitative factor is more pressing in the town where there is a great deal of poverty. Probably 80 per cent. of the poorer town dwellers spend not more than Shgs.6 per month on food, a sum considerably below the monthly food expenditure of Shgs.10·50 found in the lowest of four distinct groups of more prosperous town dwellers (examined by Smith and Smith) whose diet even at that level showed marked deficiency of vitamins, animal protein and fat. Annually some 330,000 cwts. of rice and 750,000 lb. of ghee are imported. It is, however, the importance and value of the two main export crops—cloves and coconuts—which has hitherto overshadowed food crop cultivation. Indeed, the whole economic status of the native is primarily determined by the degree of prosperity in these two industries.

5. *Researches and Surveys.*—[See also Note on the work of the Standing Medical Research Committee for East Africa, p. 10 above.] Very little laboratory research and only one or two minor dietary and health surveys of limited scope have been undertaken. The reviewing Committee considers it highly desirable that more data be obtained on the precise nutritional quality of local foods both in the raw state and in prepared dishes, and concurrently that metabolism experiments be carried out to determine whether the energy requirements of the native are comparable to those of the European. By these means alone is it possible to say whether a diet, optimal for native energy and health requirements, can be made up from the common and normally available local foodstuffs. If, however, an enquiry of this scope were to be undertaken in the Protectorate itself additional financial provision would have to be made.

6. *Practical Measures for Improvement of Nutrition.*—These come under two heads, agricultural and medical, and involve (*a*) encouragement of the cattle and dairy industry in order to foster meat eating and milk drinking; extended food crop cultivation including suitable crop rotation, green manuring and soil improvement; the inauguration of a limited and experimental policy to encourage the extension of rice growing in Pemba; the cultivation of yellow maize to replace the local white variety; gradual replacement of the poor local variety of oil palm by a new variety from the Far East having a good oil-yielding pericarp, with a view to providing an edible oil rich in vitamin A;

improvements to the inshore fishing industry by the introduction of motor boats, the development of crayfish capture, methods of fish preservation and a by-products industry; and (*b*) continued attention towards further improvement of institutional dietaries; the provision of extra meals for school children, the paramount importance of which is specially stressed; the establishment of girls' schools with a bias towards domestic science training; the provision by Government of ante-natal clinics and maternity and child welfare services.

Steps have already been taken to inaugurate some of the above improvements, but, if they are to be effectively expanded, additional financial aid will be required particularly in respect of maternity and child welfare, school meals, and the suggested encouragement of the fishing industry.

NORTHERN RHODESIA.

Area: 290,323 sq. miles.
Population (1934).

European	...	11,464
Native	...	1,366,425
Total	...	1,377,889

Birth Rate: } No reliable statistics available.
Infant Mortality: }
Death Rate: }

1. *General.*—A standing Committee has been appointed and has submitted a report, to which there are several appendices; among them, observations by Mrs. Gore-Brown and Dr. Audrey Richards, and also a note by Miss Ricardo and Miss Owen on the fish of Lake Bangweulu.

In expressing their appreciation of the very interesting records put forward by Miss Richards and Mrs. Gore-Brown, the Committee wish to emphasise the fact that their data must not be taken to apply to all or even to most of the Protectorate. The high north-eastern plateau where their work was done is agriculturally perhaps the most unpromising part of the Territory inhabited by some of the worst farmers of the many tribes of Northern Rhodesia. A less gloomy picture would probably result from similar studies in, for example, the Luangwa valley.

2. *Composition and Nutritive Value of Dietary.*—(a) *Observations by Richards and Gore-Brown.*—The dietary customs, food consumption and cooking practices of the Bemba, a millet-eating tribe are described in great detail. Compared with European standards, the energy value of the diet is little more than half; there is a marked deficiency of fat ($\frac{1}{8}$th European standard) and of animal protein, which may even be entirely absent. A noteworthy feature is the high calcium intake (double average European intake) provided by the type of millet used (finger millet). For each of 300 days of the year, it has been

calculated that the resources of the Bemba would provide 0·9 lb. millet, 0·001 lb. beans or groundnuts and 0·016 lb. meat per standard man.

Conditions in the Bemba villages were compared with those in a typical cassava and fish-eating village in the Bisa territory. Here, owing to the presence of fish, the diet is much richer in protein and fat than the Bemba diet; but the staple carbohydrate, cassava, is much inferior to millet. Millet contains five to six times as much protein, fat, calcium and phosphorus as cassava and twice as much iron. Hence, so far as their carbohydrate food is concerned, the millet eaters have a distinct advantage over cassava eaters. In respect of physique and stamina, the Bisa are smaller, stockier, fatter, more energetic and better able to concentrate than the Bemba who, though tall and muscular have, almost invariably, thin legs and knock knees.

(b) *Other available information.*—Throughout this report mention is made of the following local foods; their availability and the native preference for them varies widely in different parts, but all of them find some use in native dietaries:—millet (red variety is superior to white), cassava, maize, sweet potatoes, groundnuts, beans, grubs, wood-lice, caterpillars, flying ants, honey and dried fish. A considerable proportion of the grain supply is used for beer making. Tribes without cattle and who neither hunt nor fish may supplement their diet with mice, river rats and insects. The ecologist (Trapnell), who contributes a section to the report, alludes to the inferior food value of cassava as compared with cereals, a fact which might have some significance in view of the advice being given to substitute cassava for cereals as a staple crop on account of its being less vulnerable to the ravages of locusts. Wild and cultivated spinaches, relish plants and salt-containing sedges are used in varying quantities; and the need for obtaining more precise knowledge regarding the value of these indigenous dietary extras is emphasised.

Very little meat is eaten and of milk there is hardly any mention. Even pastoral tribes do not always use their cattle for meat and in certain areas wild game, which should and did at one time form the natural meat supply, has become so reduced as to be in danger of extinction. Nevertheless, there are welcome signs of increased inclination on the part of some tribes to eat more meat, and contact with the European has had considerable influence in this direction. There has been a growing interest in meat since native butcheries were started and the native is always ready to buy or, when money is short, to barter for meat. An integral part of the campaign against bovine pleuro-pneumonia, which involves the slaughter of thousands of animals in Barotseland, is the education of the Barotse people

to eat meat and so put to valuable use cattle which must be slaughtered. Eggs, too, are gradually becoming popular although formerly never eaten and still not eaten at all by certain tribes. Large rivers, lakes and swamps provide a great part of Northern Rhodesia with vast potential supplies of fish. Several reports* on the possibility of developing a fishing industry and extending the use of fish among natives are available.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—So far as Europeans are concerned the problem of malnutrition is confined to the poor South African farming class whose powers of resistance are obviously low on account of poor diet and bad general conditions of existence. In schools, day scholars of this class are markedly inferior in physique, energy and ability to boarders who receive a regular institutional diet.

In regard to natives the occurrence of deficiency disease is frequently reported. Scurvy and pellagra are not uncommon and it has been suggested that two local diseases " chiufa "† and " onyalai "† are of nutritional origin. Indications of vitamin deficiency, reported by Dry,‡ include hemeralopia, oedema, leg sores and pain in the limbs. The incidence of parasitic infection is high.

It will be convenient to refer here to conditions among mine labourers, and the scale of rations provided in mines about which much is written in the report submitted. The mining companies pass through their hands a continuous stream of natives from more than one area and general malnutrition is a common cause of rejection. In a group of 589 accepted adult male recruits the average weight was 9st. 2lb. (These recruits, however, included few, if any, from the Barotse valley where better physique prevails, probably associated with the inclusion of fish and milk, and often meat, in their regular diet.) Almost without exception increase in weight follows the full and regular diet provided at the mines. The Rhokana Corporation, who have given particular attention to this matter, are improving their existing dietary scales in the direction of reducing total calories by decreasing the supply of meal and beans but at the same time improving the health value of the diet by increasing the supply of meat and fat. On the basis of 6,000 employees this improvement will cost £7,526 a year more than the former diet, regarding which the Manager writes: " If an increased

* Moffat Thomson : Report on the Native Fishing Industry.
Pitman : Faunal Survey of Northern Rhodesia.
Worthington : Fishes (other than Cichlidea) of Lake Bangweulu and adjoining regions.

† Gilkes, H.A., Trans. Roy. Soc. Trop. Med. and Hyg., 1934, **27**, 491.

‡ Dry, T. J : Avitaminosis in natives of Rhodesia. *Arch. Int. Med.*, 1933, **51**, 679–691.

efficiency of so little as 5 per cent. could be guaranteed by the balanced dietary advocated, it would be a sound economic proposition ".

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The chief economic interest of the territory is mining, there being little general trade in food commodities. The awakened interest in nutrition, however, places a new emphasis on the importance of developing subsistence agriculture, a matter of especial importance in Northern Rhodesia where practically the whole of native food requirements are produced by primitive methods in village gardens. In spite of limited resources the Agricultural Department is doing much to assist in the creation of model native settlements in which a more liberal and varied diet will play its part.

5. *Researches and Surveys.*—(See also Note on the work of the Standing Medical Research Committee for East Africa, p. 10 above). With the exception of those by Dr. Richards and Mrs. Gore-Brown, no surveys have been undertaken; nor has any other type of nutritional research been carried out. The Committee recognise the need for the study of native metabolism under conditions of village life; of the relation between diet and physical condition; and of the nutritive value of local foodstuffs, especially those adventitious foods and dietary " extras " which are widely used. The Committee consider that the appropriate body to plan, organise and supervise future studies and researches in Northern Rhodesia is the Standing Medical Research Committee in East Africa.

6. *Practical Measures for Improvement of Nutrition.*—The Committee recommend the amendment of the Employment of Natives Regulations in two respects: first, so that the requirements regarding the feeding of agricultural, domestic and casual labour should be brought into line with the scales already in force for the feeding of labour on mines and should include a clear obligation to supply meat and fresh vegetable foods. At present the only obligation upon an employer of agricultural labour is to provide " good and sufficient rations " or money in lieu. This is usually interpreted as 2 lb. mealie meal per day with or without salt in addition. Secondly, if the new Rhokana scales (see paragraph 3) prove successful, they should be adopted by all employers of mine labour in the Protectorate. The Committee also recommend that the Department of Agriculture should be provided with adequate funds to enable it to attempt to adapt traditional methods of agriculture to changing conditions and to develop production for food and for sale wherever this is practicable. Other recommendations have reference to systems of land tenure; alterations in coinage; and the development of transport facilities at costs below present

rates. The transport question is regarded as of major importance, one of the fundamental problems in connection with improved nutrition being the movement of foodstuffs from areas where they are available or even surplus to areas where they are in demand but unobtainable. Dr. Richards contributes additional suggestions, namely, the greater encouragement of maize growing to obviate food shortage, since the maize crop ripens two or three months earlier than the staple millet crop; the encouragement of poultry keeping and fruit and vegetable growing; organisation of the fish trade; improvement in methods of storing and cooking food; education in agricultural and marketing methods; and research on infant feeding. The Committee give a general endorsement to all these suggestions as meriting serious consideration by the Native Development Board, a body which, the Committee note with satisfaction, it is proposed to set up with the object of furthering native interests and through which the Committee envisage the possibility of definite progress being made towards improved native nutrition.

The part which, for the present, the Medical Department will play in relation to the improvement of nutrition will be the increase so far as possible of maternity and child welfare work, and the collection and supply of information to guide the activities of the Administration and the Departments of Education, Agriculture and Veterinary Services.

NYASALAND.

Area: 47,949 *sq. miles.*

Population (1936).

European	...	1,836
Native	...	1,619,530
Asiatic	...	1,558
Total	...	1,622,924

Birth Rate: } No
Infant Mortality: } statistics
Death Rate: } available.

1. *General.*—No special *ad hoc* Committee has been set up but the question of nutrition has been referred to the Native Welfare Committee which has submitted a report.

2. *Composition and Nutritive Value of Dietary.*—Maize is the staple foodstuff except in areas where the soil is unsuitable for its cultivation, where cassava is relied upon. Rice is grown principally for sale. Unless the crop has been a heavy one only a small quantity is reserved for home consumption or special occasions. The basic foodstuff is not changed with the seasons. It only varies when there is a shortage of the popular foodstuff. The margin between sufficiency and shortage is fine. In cassava-producing areas there is rarely if ever any lack of food. In maize country some cassava is usually grown as a reserve

against scarcity. The staple food be it maize, cassava or millet, is always eaten in the form of a porridge prepared from a flour which in the case of maize is made from husked grain. Although meat is relatively cheap its price places it out of the reach of the average villager, who depends on game, small rodents, caterpillars, flying ants, locusts, etc., augmented by fish, for his intake of first-class protein. The amount of milk consumed varies from tribe to tribe and depends on custom, but on the whole it is not regarded favourably by adults. Goats' milk is never drunk. On the Lake shore there is a considerable industry in the smoking and drying of fish for sale but curing is done in a very indifferent manner. Fish is more generally used than meat, but both play a minor part in the native dietary. Chickens are reserved for ceremonial occasions or for sale to Europeans. Eggs are neglected on account of tribal taboos. Tea is being used more and more by the urbanised natives. Local vegetable relishes play a very important part in the native dietary. Relishes are cultivated and uncultivated and consist of the roots of plants or in many cases the young shoots, the leaves, the seeds or the flowers. Edible fungi are much sought after. Beans of many varieties, peas and groundnuts are also regarded as relishes. Beans are important as the main source of protein in the dietary, groundnuts are almost the sole source of vegetable fat. Such fruit trees as exist are almost invariably the result of chance germination. The native is not inclined to plant for posterity. Tomatoes are the most popular of all the European vegetables introduced in the country. Onions are next in popularity. In addition to a salt purchased from local stores or obtained from Europeans in exchange for eggs various locally prepared " salts " are in use, made by pouring water over the ash of burnt vegetables. The manufacture and consumption of beer varies according to the amount of material available. In some districts it is brewed and consumed the whole year round, often to the detriment of food supplies.

According to the standards accepted for non-tropical races the natives' intake of first class protein is inadequate, more especially during the important periods of childhood, pregnancy, and lactation. The consumption of fats is also too low when measured by the same standards. The fats are, moreover, mainly of vegetable origin. The intake of carbohydrate is adequate, if not excessive. Death from starvation is practically unknown. The intake of Vitamins A and C during certain months must be reduced to a dangerously low level, particularly of the latter, as it is not customary for vegetables to be eaten uncooked.

The tendency for natives to adopt European attire is to be regretted since it is bound to limit the synthesis of Vitamin D. It is probable that local diets are deficient in calcium and phosphorus, yet a valuable source of these minerals in the shape of maize bran is given to domestic animals.

3. *Diet and Health (deficiency diseases and other relevant considerations.)*—The grosser manifestations of deficiency disease are undoubtedly rare. There is a high incidence of catarrhal affections, conjunctivitis and tropical ulcers, which may be regarded as indicating a latent state of malnutrition in the population. Pellagra is not confined to the prison population but since the disease was first recognized in 1910 the majority of cases recorded have occurred among the inmates of the Central Prison, Zomba. Various measures have been tried including the introduction in 1922 of an improved dietary, but cases have continued to be reported. Treatment by means of dilute hydrochloric acid and thyroid extract has also been employed.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.)*.—There are wide fluctuations in the price of foodstuffs from year to year, maize for example varying in price from 1½d. to 7d. for 14 lbs. It has been estimated that to provide what is believed to be an improved diet for an adult native would cost approximately 3s. 5d. per week at current rates prevailing in Zomba. A real shortage of food almost amounting to famine occurs from time to time as a result of failure of the rains, of floods, of a poor harvest or of waste.

Nyasaland is not a food-exporting country; its main export cash crops being tobacco, tea and cotton. A certain amount of inter-district trading occurs but only the surplus is so disposed of. As a rule the cultivation of cash crops does not adversely affect the production of food crops. Low or falling prices have taught the native not to sacrifice his food supply in the hope of receiving a large return from cash crops.

The activities at the Lupa Gold Fields, Tanganyika Territory, have resulted in a demand for cattle and over 1,200 were exported from Karonga in 1936. About 95 per cent. of the cattle in the country are located in the Northern Province. A ghee industry has been established in the Mzimba district by private enterprise under European control. Although, however, cattle, sheep, goats and pigs are kept the people of Nyasaland are concerned mainly with agriculture. Land is owned by the community, though cultivation is, with few exceptions, individual. There is no system of crop rotation practised in connection with the cultivation of food crops. The benefits arising from the use of kraal manure or compost are appreciated in very few districts. It is generally agreed that the native family could produce more food without additional labour by adopting better methods of agriculture. In spite of constant propaganda and instruction the native is slow to alter his customs.

Prices obtainable for cash crops are low and the area that can be cultivated for food and cash crops under the family system is limited. The return is so small that there is little

incentive for the average native to produce more than is necessary to feed himself and his family according to custom and to earn sufficient to pay his liabilities to the Government in the form of hut tax.

5. *Researches and Surveys.*—No special investigations had hitherto been carried out on the subject of Nutrition in Nyasaland. The native Welfare Committee therefore recommended that a detailed survey of conditions of village life, tribal customs, taboos and racial prejudices together with a physical examination of the inhabitants in a selected district should be undertaken as soon as possible. Foodstuffs should also be collected for examination, tabulation, and analysis. They suggested that a skilled team consisting of a medical officer and an anthropologist and an analytical chemist should be chosen to do this. The objects in view will be secured by the survey at present being carried out with the co-operation of the International Institute of African Languages and Cultures and under the scientific direction of Dr. B. S. Platt, who, in accordance with the recommendation of the Economic Advisory Council's Committee on Nutrition in the Colonial Empire, has been appointed by the Medical Research Council to co-ordinate surveys on diet and health in colonial territories.

The Native Welfare Committee have also stated that investigations by a fishery expert are required in order that advice may be obtained on the potentialities of Lake Nyasa, and on measures to conserve fishery resources. These are also being undertaken.

6. *Practical Measures for Improved Nutrition.*—Among the measures already carried out are the provision of free milk for children in certain schools; establishment of native markets; maintenance of maternity and child welfare centres; improvement of institutional dietaries; training of native workers; establishment of school gardens; opening of suitable experimental stations in the charge of officers of the Agricultural Department; the development of native cattle; demonstrations by the Veterinary Department of the manufacture of ghee; health propaganda; the teaching of domestic science in girls' schools and the training of African midwives and nurses.

As regards measures for the future, the standard of living must be raised before a substantial improvement can be anticipated. This can only be achieved by the combined efforts of the technical departments directly concerned. Employers of labour might be prepared to accept recommendations regarding an improved dietary if assured that this would result in increased efficiency and better health. Employed labour forms, however, a small proportion of the total population. Schemes to improve the nutrition of the people must be associated with a better sanitary environment, and it is suggested that trained African

sanitary inspectors, dispensers, agricultural and veterinary instructors, Jeanes teachers and community workers should be provided to assist in achieving this. More time should be devoted in the centres for teaching the principles of nutrition and hygiene and a course of lectures on dietetics should be introduced in the syllabus in the Jeanes Centre. Extension of the maternity and child welfare centres would be of value and when sufficient data are available a simple text book on nutrition should be compiled for the guidance of African teachers and others giving instruction in this subject. Intensive propaganda should also be instituted in other directions. Investigations should be undertaken to improve methods of curing fish for native consumption, the meat supply might easily be increased, and increased provision of groundnuts and soya beans should be encouraged by all officers concerned. The export of oil seeds and possibly even of cotton seed should be carefully watched. Instruction in cultivation of vegetables and/or much greater issue of seed bought wholesale should be undertaken. Every village should have a communal orchard and a start should be made by improvement in the villages of Native Authorities. Demonstrations should be made of growing, harvesting and storing root crops in areas which suffer most from food shortage and encouragement should be given to the local manufacture of impure " salt ".

WEST AFRICA.

GAMBIA.

Area: 4,000 sq. miles.

Population. 199,529 (1931). (Bathurst: 14,141) (1936).

For Bathurst only.

Birth Rate: 25·2 per 1,000 (1936).

Infant Mortality: 369·7 per 1,000 births (1936).

Death Rate: 30·5 per 1,000 (1936).

1. *General.*—A standing Committee has been set up, consisting of senior representatives of the Departments of Health, Agriculture, Education and Customs. The Governor has submitted a survey prepared in consultation with this Committee, together with a report from the Senior Medical Officer.

2. *Composition and Nutritive Value of Dietary.*—Unlike the other African dependencies, the bulk of the staple diet of Gambia —rice in the polished state—is imported. During the months from August to December, millet and guinea corn take the place of rice. Secondary foods are yams, coco-yams, cassava, pigeon pea, ragi, okro, pumpkin, tomatoes, citrus, and other fruits. Plantains are rarely seen in the Gambia. There is, however, no standard diet in the Colony, marked variations existing among different tribes and in different parts. For example whereas the Fullahs and Sarakoolie use butter and milk all the year round, other tribes use these for only a few months and in Bathurst fresh milk is practically unknown. Consumption of meat, fowls and eggs is negligible. Fish, both fresh and dried, is eaten in considerable quantities in Bathurst but to a less extent in outlying districts; it is often of the dried variety. In general, the diet is excessive in carbohydrate and deficient in the protective food substances, animal fat and protein, mineral salts and vitamins.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—In a country having conditions of imperfect sanitation, a vast amount of malaria and a high incidence of parasitic infection, trypanosomiasis and tuberculosis, it is difficult to estimate the precise influence which the customary diet of the people has on their health. Nevertheless, the high infant mortality, the marked prevalence of dental caries and the frequent manifestations of vitamin A and D deficiency are clear evidence of dietary inadequacy. Beriberi is comparatively rare, but mild cases of neuritis are not uncommon. A characteristic is the physical and mental lethargy of the native farmer which is undoubtedly due, in part at least, to lack of proper food.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The economic life of the Gambia is characterised by an exclusive preoccupation with one money-crop, the groundnut. The farmer concentrates on the production of groundnuts to the almost total exclusion of their use as a food and at the expense of other forms of food crop cultivation. The bulk of production is exported in return for imports of rice, and any policy of increased cultivation of other foods at the expense of the groundnut would have, in its early stages at any rate, an adverse affect both on the money wealth of the people and on the revenue of the Colony.

5. *Researches and Surveys.*—Although fuller study of diet and nutrition is desirable and indeed necessary, no scientific research has yet been undertaken nor can be without expensive additions to the present staffs. Co-operation could, however, be effected with other West African colonies where much superior laboratory facilities already exist. It is suggested that the Research Fellowships awarded by the Medical Research Council for work in tropical countries should include one on nutrition.

6. *Practical Measures for Improvement of Nutrition.*—Efforts to strengthen and diversify the dietary of the inhabitants can be, and are being, directed through agricultural and veterinary channels. Certain steps, including dry season irrigated cultivation, are being taken to increase the acreage under rice with a view to encouraging the consumption of the unpolished variety. An adequate supply of meat depends on the success of the anti-rinderpest and anti-tsetse campaign now being actively prosecuted and upon the abandonment of the old native idea of keeping cattle, not for sale, but as an outward sign of wealth —a custom which must be broken down. A more generous milk supply will also result from these measures. The introduction of poultry keeping would be an additional advantage. One measure which, it is suggested, might improve nutrition would be to increase the import duties on rice, canned fish and biscuits, and lower the duty on edible oils. Such changes would result in an immediate increase in the cost of living of the poorest sections of the community and are not recommended until the possibility of replacing these items by more suitable local foodstuffs, without altering the cost of living, has been more fully explored.

On the medical side, as much educational and propaganda work as possible is being carried out in mother and child welfare clinics, hospitals and schools; by means of health weeks and baby weeks; and by directing the attention of outstation Medical Officers, missionaries and native chiefs to the importance of improving the diet of the people.

GOLD COAST.

Area: 91,843 sq. miles.
Population: 3,617,126 (1936).

For 35 *Registration Districts.*
Birth Rate: 34·5 per 1,000 (1936).
**Infant Mortality*: 108·0 per 1,000 births (1936).
Death Rate: 24·5 per 1,000 (1936).
*For the Colony only.

1. *General.*—A survey, prepared by the Director of Medical Services dealing with the medical aspect has been submitted, together with a memorandum by the Director of Agriculture, dealing with the agricultural side of the problem. A Standing Committee including agricultural and other representatives has been set up to co-ordinate and inspire the policy of Government in the matter of nutrition, but, thus far, has presented no full report.

2. *Composition and Nutritive Value of Dietary.*—The main foods are:—

North.	*South.*
Staples: Millet, guinea corn, yams, Fra-Fra potato.	Coco-yams, plantains, yams, cassava, corn, meat, fish.
Secondary: Maize, groundnuts, tomatoes, onions, groundnut oil, shea-butter, pepper.	Groundnuts, maize, palm oil, shea-butter, fruit, rice, pepper.

Oranges, limes, mangoes, pawpaws, and bananas exist, but are scarce especially in the Northern Territory. Sugar cane is eaten raw. The leaves of many plants are used chiefly as spinach. Milk and eggs are very rarely eaten. Meat is scarce, of bad quality, exceedingly deficient in fat, and in general, too expensive for the bulk of the population. Smoked antelope, hippo, elephant and monkey flesh is very popular when obtainable. Fish is readily available on the coast, where an important dried and smoked fish industry flourishes. The better class African in the rural areas makes tinned meat and fish his main source of animal foodstuffs. A large form of roasted snail is considered a great delicacy in areas where it is plentiful. Salt is much appreciated. In some northern areas the people drink water impregnated to a milky colour with kaolin in preference to clear spring water, a habit apparently similar to the pica of Kenya described by Orr and Gilks.

Broadly speaking, the diet is deficient in those animal and vegetable foodstuffs which provide fat, good protein, vitamins and mineral matter. It is believed, but not proved, that the calcium content of the diet is poor. The protein content is

generally very low. This is especially noticeable in the miners' diet. There is also a definite deficiency of vitamin C in the diet of many of the poorer classes.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Food deficiency is a predisposing factor in many local conditions. Tuberculosis, the pneumonias and bronchitis are very prevalent and together account for 30 per cent. of all registered male deaths. Over 70 per cent. of persons in the coast town of Saltpond gave evidence of tubercle infection despite the fact that fish is available in quantity even to the poorest. There seems to be a close relationship between undernutrition and the incidence of leprosy in certain areas. Xerophthalmia and night blindness are not uncommon while pellagra and beriberi have been occasionally reported. Gross scurvy is unknown; but, although rare, a mild form of infantile scurvy has been seen. Rickets is practically unknown, only isolated cases being encountered. A nutritional disease (kwashiorkor), which in some respects simulates pellagra occurs in children breast-fed by foster mothers whose milk supply is inadequate and has to be supplemented with soured preparations of maize. Curative measures are found in a full diet of tinned milk, cod liver oil, eggs and fruit.

On the coast, where fish is plentiful, the standard of physique is higher than elsewhere. From sports records and such growth-rate data as are available it would appear that the physique of the African boy in town schools compares favourably with that of his European contemporary.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc*).—There are three systems of agriculture in the Gold Coast, corresponding to the three climatic zones, namely the coastal savannah, the high forest and the northern savannah. Nutritional problems vary with these zones. The coastal savannah is arid and in consequence sparsely populated and little cultivated. Meat supplies are insufficient owing to shortage of water for stock. Fish, corn and cassava are the staple products. For other foods, e.g. oils, sugar, meat and fruits, the people have to rely on imports, the cost of which is high.

The forest zone is climatically capable of producing any kind of tropical foodstuff. The growing of cocoa is, however, a source of income and there is a strong tendency to neglect the production of food and to use imported supplies instead. Nevertheless, the rougher starch foods such as cassava, maize and coco-yams are grown in considerable quantities. Tsetse fly prevent the keeping of cattle, but sheep, goats and poultry swarm in every village. Fruits, sugar and legumes peas and beans are neglected. Oils (groundnuts and palm-oil) are plentiful.

In the northern savannah food supplies are often deficient both in quantity and quality and water is scarce. Because of the distance of these areas from the coast and the relative poverty of the people, the northern savannahs do not supplement their nutritional deficiencies by imported foodstuffs. Fruits and green vegetables and articles promoting variety of diet in general are very lacking.

Speaking generally it may be said that agricultural and nutritional deficiencies spring in the case of the coastal savannah and of the forest zone, from the practice of shifting cultivation, whereas those in the populated northern savannahs arise from fixed or permanent farming inefficiently applied. Apart from the Northern Territories and the eastern region of the coastal areas, where conditions are favourable, the Gold Coast has no stock rearing industry. Wherever found, cattle are looked upon as an expression of wealth and only old animals are sold. The general population cannot afford to buy meat. The introduction of tinned foodstuffs has proved a mixed blessing in rural areas. Of poor quality and low food value, tinned foods may be obtained on credit, whereas local meat and fish must be paid for cash down. The development of the mining areas and of the cocoa industry has created great demands for foodstuffs. Yams, cassava, and groundnuts are transferred to these areas from agricultural districts, and the constant transference from one district to another has, on occasion, actually resulted in famine in the producing area. Price inflation is frequent. In Kumasi, groundnuts have been sold at £1 per bag as against a world rate of 4s.; and driven cattle costing £1 per head on the northern frontier have been sold to butchers for as much as £15 per head on the coast.

5. *Researches and Surveys.*—No nutritional researches have been carried out; but as conditions are similar to those in Nigeria, the analytical data and other findings obtained there by McCulloch have been accepted as applicable. Studies which appear desirable include surveys relating to diet and health and estimation of the nutritive value of local foodstuffs. It is suggested that the appointment of a full time dietetics research officer is essential.

6. *Practical Measures for Improvement of Nutrition.*—At present, these include the promotion of mother and child welfare; health visiting; school instruction in food hygiene and diffusion of knowledge and information to Medical Officers and social workers. In addition in the coastal savannahs the Department of Animal Health has conducted campaigns against rinderpest and pleuro-pneumonia. The coastal humpless cattle are highly resistant to trypanosomiasis. A livestock station has been established in the area and a programme will be put into

effect by the water section of the Geological Survey Department. The new road which will link Accra to the Keca-Ada areas and traverse the southern plains will probably induce gradual settlement of farmers in the area. Attention will be devoted to such matters as increase of the livestock population, improvement of pasturage, the introduction of cattle-ploughing and manuring, and the improvement and diversification of food crops.

In the forest areas the impossibility of maintaining cattle militates against any system of permanent farming. A system of trial unit-farms throughout the forest areas has been instituted in order to test the possibility of maintaining fertility by means of leguminous green dressings and various food crop rotations. Sheep might be a profitable source of manure and trials are proceeding at three centres.

In the populated areas of the Northern Territories the main lines of work are control of livestock diseases; improvement of pasturage; provision of water supplies; stimulation of mixed farming; propagation of improved strains of cattle; breeding and introduction of new types of food crops. The support given to the work by the Native Administration has been remarkable.

Permanent systems of mixed farming will do much to increase the peasants' food supply, to diversify crops and thus to ensure an adequate and balanced dietary. Special measures, however, will be required to stimulate the production of certain articles of diet including meat, milk, rice, fruit, fish, and salt.

NIGERIA.

Area: 372,674 sq. miles.

Population: 20,224,367 (1936).

For Lagos Area only.

Birth Rate: 29·2 per 1,000 (1936).

Infant Mortality:* 140 per 1,000 births (1936).

Death Rate: 17·2 per 1,000 (1936).

**Approximately* 250 per 1,000 for whole country.

1. *General.*—No special committee has been set up. Committees have been in existence for some years, both in Northern and Southern Nigeria. As the various members expressed the opinion that ordinary inter-departmental co-operation was adequate, there has been, so far, only one meeting of each.

The following summary is based on:—

(1) the report submitted by Dr. J. G. S. Turner, Medical Officer in charge of Dietetics Research;

(2) notes of evidence given orally before the Committee of the Economic Advisory Council on Nutrition in the Colonial Empire by Sir Walter Johnson (lately Director of Medical and Sanitary Services);

(3) a Despatch from the Governor, relating to Dr. Alfred Clark's research on poisoning by food plants in Nigeria, together with a report on the formation of Health Propaganda Units.

2. *Composition and Nutritive Value of Dietary.*—The main foodstuffs are:—

	North.	*South.*
Staples:	Millets, rice, beans, milk, green leaves, kuka leaves, meat.	Yams, cassava, beans, green leaves, coco-yams, plantains, meat, fish.
Secondaries:	Maize, groundnuts, onions, tomatoes, okro, shea butter, butter, honey, sweet potatoes, eggs, cassava.	Groundnuts, iru, okro, maize, palm oil, shea butter, fruit, sweet potatoes, nuts, eggs, shell-fish, rice.

In the North the people are mostly grain eating, whereas in the South they are root-crop (yam) eating. The native method of preparation of cereals involves removal of the pericarp and hence loss of nutritive value. Meat is expensive and, on the whole, the people are meat-starved. The average peasant never eats it except perhaps in the Northern cattle-rearing areas where it is taken probably once a week. Milk is not readily available nor its use customary, many regarding it with distaste although readily converted to it. In the North (Zaria) a recent inquiry revealed that husbands took most of the available meat and milk, wives came next and children got what was left. Fish is plentiful on the seaboard and along inland rivers. Wherever it is eaten, physique is markedly superior. Away from rivers dried fish is the chief source of animal protein. In the North and many parts of the South, fruit is not available. In the dry season fresh green food may be unobtainable for six months at a time (during which the native relies on dried kuka leaves), and the people may be subject to periodical semi-starvation before the new season's crops are ready. Beniseed, which has a high mineral content, is grown for consumption in certain areas. Where this takes place (e.g., among Munshi and Plateau pagans) physique is superior. On the whole, town dwellers are better fed than the ordinary village peasants; but the bush Fulani, a nomadic cattle-owning people, have better physique than the settled Hausa whose diet is known to be deficient.

The main difficulty is qualitative not quantitative. The average diet is high in starchy foods but very low in animal protein and fat, vitamins and minerals. Everywhere that institutional diets have been supplemented with protein, results have been good, e.g., in prisons and boarding schools. Deficiencies of the B-vitamin group are noticeable, especially in schools and during famines. In the North at the end of a long dry season vitamin C shortage is probable. The feeding of local diets to experimental animals demonstrated that optimum growth did not occur unless supplements of protein, minerals and vitamin concentrates were given. It remains to be said, however, that certain sections of the community have a wholly adequate diet and as a result have splendid physique.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—(a) *Deficiency disease.*—In normal years there are no marked signs of deficiency disease; but in the north in famine years beriberi is commonly found. There is a patchy distribution of goitre especially among women in whom the incidence may be as high as 60 per cent. Dental disease is exceedingly common; and there is a generally low resistance to anaemia, pneumonia, tuberculosis and leprosy. Anxiety is being caused by a pellagroid condition, described as optic neuritis, occurring among the boarding-school population and unemployed labourers of the cassava-eating people in the Southern Provinces (Lagos). Clark ascribes this to chronic hydrocyanic acid poisoning; but probably a B-factor deficiency is also concerned. (Nicotinic acid is now being tried in the treatment of this condition.) The condition is associated with poverty and is found not so much among day scholars, who are accustomed to a more varied home diet, but in boarding schools where food preparation is faulty. Poverty diseases and leprosy are also commonly seen in the central part of the Southern Provinces, a district consisting chiefly of small farms and few towns, where pressure of population is acute and has led to forced emigration. (b) *Vital statistics.*—The vital capacity of the Nigerian native is much below European standards. In growth rate and sports record he lags about 10 per cent. behind. Application of the Pelidisi and A.C.H. nutrition indices showed that in one Northern area about 50 per cent. of children were below normal, whereas on another area with a similar disease incidence but better food, only 20 per cent. were below normal. The poorest physique in the whole of Nigeria is among the forest mountain people in the Cameroons whose main article of diet is the banana. Fertility is high, but infant mortality is also very high. The expectation of life at birth is about 22 years in the North. It is stated that mortality rates in prisons have been reduced following dietary improvement but no precise figures are given.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Much of the present difficulty of bridging the gap between production and consumption is due to faulty marketing and inadequate transport. The cattle country of Nigeria is the North, and meat is transported from there to the South, where there are few cattle. In Kano, for instance, about 300 animals are slaughtered daily; but there is no well organised trade from North to South except to Lagos. A system of collecting depots, recognised cattle routes and resting areas is a necessity. As trekked at present, cattle frequently have a 50 per cent. mortality, and the cost of meat varies from 1d. to 1s. per pound depending on availability. Under existing conditions the provision of enough milk in the larger towns is impossible. Towards a general improvement of conditions in the North, the greatest single measure taken is the introduction of mixed farming. Thereby it is hoped to raise the economic status of the people, increase crop yields, make milk more available, and provide for the supplementary feeding of cattle throughout the dry season. Attention has repeatedly been drawn to the fact that valuable protein is leaving the country in the form of groundnuts, beniseed, palm kernels and cottonseed. Further, the ample fish supply on Nigeria's seaboard is still untapped.

5. *Researches and Surveys.*—The work begun by McCulloch in 1927 has been continued and developed by Turner, Fitzgerald-Moore and Clark. Turner proposes further extensions along the following lines: dietary surveys in areas having natives of contrasted physical condition; the establishment of comparative physical standards for different tribes; the analysis of data already available from school medical examination; the collection of infant age and weight records up to weaning; a study of the causes of infant mortality and the scientific aspects of late weaning (women suckle infants up to two and a-half years; weaning probably takes place later in the North than in the South); the collection of accurate statistics on birth and death rates. It is recommended that these researches, coupled with further biochemical examination of foodstuffs, should form part of a co-ordinated scheme involving organised team work and the employment of trained subordinate staff. It is also proposed to survey the South Western Provinces to gauge the precise nature and extent of the retrobulbar neuritis referred to in paragraph 3. If intelligent native co-operation is possible, it is hoped to ascertain exact living costs and obtain family budgets. It has also been recommended that the feeding of Lagos school children be undertaken on an experimental basis to determine whether, by supplementing the home diet with a suitable school meal, physical condition can be improved. It is suggested that assistance might be provided from the

Colonial Development Fund to enable a field experiment to be conducted on the value of supplementary feeding to children in some village, the result of which could be used for propaganda. Dr. Fitzgerald Moore has investigated the pellagroid condition to which reference has already been made. In areas where cassava forms the staple carbohydrate it is found that about 15 per cent. of children show signs of this disease. Of those affected about 10 per cent. suffer from eye defects which cannot be cured by glasses. During these investigations, in the course of which about 9,000 children were examined, an enquiry was made into school boarding house diets and it was found that the average protein consumption was only about 35 grammes a day in public schools as against 80 grammes in Government-controlled schools on approved dietary scales.

6. *Practical Measures for Improvement of Nutrition.*—These are of several kinds, some of which, such as the introduction of mixed farming have been touched upon in preceding paragraphs. Advice has been given to the Agricultural and Forestry Departments on the types of food and fruit trees the cultivation of which, from the nutritional point of view, would be most worth while extending. Vegetable gardens for schools and other institutions have been advised and in many places exist. In the North the solution of the milk problem lies in mixed farming. There is a small but growing trade in the export of eggs and butter from the North to the South. This should be discouraged until local needs are satisfied as good quality protein and fat are lacking in the North. In the larger population centres Government might devise some means of assisting the introduction of mills designed to improve the native milling methods, which involve the loss of the outer layers of the grain. In the South private enterprise has done something along these lines. The introduction of iodised salt into endemic goitre areas is also recommended. Action has already been taken in laying down satisfactory standards of dietary in Government hospitals, prisons and similar institutions.

The Directors of Agriculture and Education have promised co-operation with the Health Service in its propaganda work in schools and teaching institutions, and in the establishment of Rural Health Units. A Rural Health Unit is a representative Committee of voluntary workers who are co-operating with the propaganda branch of the Health Department in creating a health sense among the people and arousing the interest of Native Administrations in sanitary improvement. In the formation of these Units successful propaganda has been conducted by means of a mobile cinema which has recently completed a special lecture and demonstration tour of over 1,000 miles. This is a development which has great potentialities.

SIERRA LEONE.

Area: 27,925 sq. miles.
Population (1931).

Natives	...	1,667,790
Non-natives	...	4,268
Total	...	1,672,058

Birth Rate: 23·0* per 1,000 (1936).
Infant Mortality: 210* per 1,000 births (1936).
Death Rate: 20·8* per 1,000 (1936).

* These figures refer to Freetown only. No reliance can be placed on data from outside Freetown.

1. *General.*—A special Committee has been formed and has submitted a report. A report by the Senior Medical Officer has also been received. In the latter, the available sources of information regarding diet and disease in Sierra Leone are treated chronologically from the year 1607 to the present time. The historical section is of interest in showing that observations regarding ocular disease and the toxic nature of cassava were made as early as 1792.

2. *Composition and Nutritive Value of Dietary.*—The staple foods are rice, palm oil, cassava, and fish (fresh or dried). Supplementary foods are groundnuts, beans, vegetables and fruits. Meat, chicken and eggs are eaten only sparingly and dairy produce hardly at all. Milk and butter (both imported) are beyond the reach of all but the well-to-do. The diet is therefore badly balanced containing excessive carbohydrate and insufficient animal protein and vitamins.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—From early writings it would appear that in the 17th century the natives were of fine physique and lived on a mixed diet with a sufficiency though not a superabundance of animal food. In the early and middle 18th century, conditions continued satisfactory but towards the end of the 18th and throughout the 19th century the diet deteriorated, particularly in respect of animal food deficiency. Outbreaks of avitaminosis A and B encountered in antenatal clinics, maternity hospital wards and schools are very common. The manifestations of the deficiency are glazed tongue, sore mouth and affected eyes, the lids often being devoid of eyelashes and gummed down by discharge. This complex of symptoms readily responds to treatment with cod liver oil and marmite. An analogous problem confronting the public health authorities is that of oedema which has been extensively reported upon as occurring in prisons, barracks and asylums. This was at first thought to be the wet form of beriberi but as no improvement

followed dietary treatment with yeast, cod liver oil, fresh vegetables and fruit, this diagnosis was discarded. The condition is now attributed to the eating of unwholesome and deteriorated rice. (For analogous finding, see under Fiji, paragraph 3.) Cures follow the replacement of faulty rice by fresh uncontaminated supplies. Deficiency of vitamins A and B appears to be exceedingly common throughout the territory and recent observations indicate that lack of sulphur, due to insufficiency of good protein, may also be associated with the syndrome. The prevalence of rickets among young children is also considerable, and goitre is endemic in certain districts.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The agriculture of the country is still primitive, "shifting cultivation" being universally practised. There is a definite shortage of cattle and small stock. It was suggested that an increase in stock might give rise to an increase in human trypanosomiasis, but the Director of Agriculture gives as his view that an increase in stock, necessarily possessing a high degree of immunity, would not be likely to increase the risk of human trypanosomiasis in a country where the disease is comparatively rare and wild ruminants are comparatively plentiful. Ten to twenty years ago there was a regular annual season of scarcity owing to insufficient production of upland farm rice to last through the year. Of recent years, however, owing to intensive propaganda, there has been a remarkable increase in the utilisation of swamp land for the cultivation of rice, the annual production of which has increased by 30-40 per cent. in the last 12 years. Increased production of other foodstuffs such as beans, maize, greens, tomatoes, yams, etc., has not been so easy, but is naturally most marked in those areas to which agricultural officers can devote most supervision. For example, the export of foodstuffs from the districts in which the Njala Agricultural Station is situated increased from 379 tons in 1926 to 2,183 tons in 1936. With a view to encouraging the consumption of foodstuffs of high nutritive value the Government has abolished the import duty on Empire milk and largely reduced that on foreign milk. More recently, the import duties on the following articles were either abolished or reduced:—biscuits, flour, edible oil other than soyabean oil, onions, salt, sugar and preserved vegetables.

5. *Researches and Surveys.*—The Committee conclude that it is impossible to frame a nutrition policy for the future without further knowledge of local conditions. Accordingly, they recommend that a comprehensive nutrition survey be undertaken to include analyses of native foodstuffs and investigation of the best means to implement dietary deficiencies out of local resources.

6. *Practical Measures for Improvement of Nutrition.*—Measures already engaging the attention of the Agricultural Department are the increase and improvement of local breeds of cattle and small stock, and the extended cultivation of fruit and vegetables. Satisfactory experiments proving the suitability of the Rhode Island Red breed of poultry have been undertaken; and a scheme to increase the production of food in mining areas has been drawn up and is likely to receive financial support from the Sierra Leone Protectorate Mining Benefit Fund. It is recommended that steps be taken to organise the fishing industry especially as regards methods of catching, preserving and distributing both fresh and salt water varieties. Red palm oil is especially rich in vitamin A and its use should be strongly encouraged. Steps to this end have already been taken. Quite recently an intensive campaign has been directed towards the improvement of infant nutrition, and provision for the training of women and girls in maternity and child welfare work is also receiving attention.

ST. HELENA.

Area: 47 sq. miles.
Population: 4,341 (1936).
Birth Rate: 30·87 (1936).
Infant Mortality: 120 per 1,000 births (1936).
Death Rate: 15·20 (1936).

1. *General.*—An isolated and mountainous island of 47 sq. miles, St. Helena has a population of about 4,000 people. The Islanders are of very mixed ethnological origin, including Chinese and Japanese elements. In stature they are small; in build, slim.

2. *Composition and Nutritive Value of Dietary.*—The diet of the Islanders consists of polished rice; fish, when available; milkless stick tea, very rarely a potato, lettuce or tomato. Early in life, malnutrition begins. Nursing mothers have very little milk and young infants a diet of rice-water and tea. Goats are sometimes killed for meat; but their milk is not used. Many have never tasted cow's milk, butter, cheese, or eggs. Fish are not numerous and are difficult to obtain; several hours of dangerous fishing often produce no more than a few mackerel, sold for sixpence, the purchase price of a little rice.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Irregular pulses and sub-normal temperatures are quite usual. Many children, after walking 1¼ hours to school are too tired to perform physical exercises. Disease, malnutrition, physical and moral weakness are concomitant with the poverty which is almost at the level of starvation. About two hundred clear-cut cases of beriberi exist on the Island.

4. *Economics of Diet (relation to local agriculture).*—The production of " New Zealand " flax is the only industry. The plant is grown on the most fertile part of the Island, which is leased by three families. Workers are paid 2s. a day, the maximum which the present selling price of flax will allow. The low level of wages is reflected in the low standard of living. Almost the only other source of income is from the sale of lace and other articles to tourists. The foodstuffs used on the island are almost all imported.

5. *Researches and Surveys.*—The Government Dental Surgeon carries out dental inspection, but no details are available.

6. *Practical Measures for Improvement of Nutrition.*—Efforts are being made to increase the local production of vegetables and dairy produce. Instruction is to be given in domestic science and hygiene. The Government proposes to deal with the beriberi cases by issuing vegetables, etc., to indigent sufferers.

SOUTH AFRICAN HIGH COMMISSION TERRITORIES.

BASUTOLAND.

Area: 11,716 sq. miles.

Population (1936).

Natives ...	660,546*	*Birth Rate*:		No
Europeans ...	1,434	*Infant Mortality*:	}	statistics
Others	1,604	*Death Rate*:		available.
Total ...	663,584			

* Includes 101,273 natives absent at labour centres.

1. *General.*—No Committee has been set up. The documents summarised include reports from the Director of Agriculture and the Principal Medical Officer, and a comprehensive study of Basuto dietary conditions by Mr. Hugh Ashton.

2. *Composition and Nutritive Value of Dietary.*—In considering nutrition in Basutoland, a distinction must be drawn between the highlands and the lowlands. The approximate area of the highlands is 9,364 sq. miles or four-fifths of the territory, and that of the lowlands is 2,352 sq. miles or one-fifth of the territory. Roughly speaking, the acreage under cultivation is 5 per cent. of the mountain area and 25 per cent. of the lowland area. The extent of cultivation is in approximate proportion to the number of people residing in the two areas.

Kaffir corn and maize form the staple food of the population; but wheat which has been grown in the territory for many years is now being produced on a rapidly increasing scale, and, together with peas, must now be regarded as a standard crop. It is displacing Kaffir corn both for ordinary dishes and as the main ingredient of beer. Peas, beans, root crops and sugar cane are subsidiary foods and various spinaches and pumpkins are used during the spring and summer months. Native beer is highly prized and is often drunk to the total exclusion of other foods. Meat is a luxury denied to at least half the population, the rest getting it only once or twice a month. In regard to milk and butter fat, few children get an adequate supply and a large proportion get none at all. Shortage of meat and milk is especially a lowland characteristic. Fish is not a significant article of diet, the rivers being poorly stocked.

Although a high carbohydrate diet and serious lack of protein, fat and vitamins prevails throughout the whole country, the position is, generally speaking, better in the highlands than in the lowlands, owing to the higher consumption of milk, wheat and peas in that area. It is unfortunate, too, that imported

foods such as tea, sugar, finemeal bread and cheap sweets are finding increasing favour in the lowland area, so that less money is available to purchase more nutritive articles.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—In the view of the Principal Medical Officer the nutrition problem will become very serious unless something can be done to stimulate the natives into changing their ideas and methods in regard to food. The proportion of badly-nourished people is greater in the lowlands than in the highlands and the progressive deterioration in the physique of mine workers, who are recruited chiefly from the lowlands, is becoming a subject of comment. According to residents of long standing, the physique and health of the Basuto to-day is not what it used to be. Malnutrition is seen in every village, dispensary, school and recruiting office. Mild scurvy and subscorbutic conditions are not infrequent; pellagra is becoming more and more frequent and lower resistance to disease increasingly apparent. It is becoming generally accepted, too, that the occurrence of leprosy is associated with faulty diet. Until weaning (Suto babies are weaned when about two years old) babies grow rapidly and strongly; thereafter, from lack of milk, they become thin and bony, and develop the characteristic pot bellies owing to excess of cereal food. Compared with European races, the Basuto are not active or energetic; but the women, who do most of the work, are capable of prolonged effort and endurance, although they have not the physical strength of the men. The only differences in their diet is that they often eat more than men, make greater use of spinach and green foods, and sometimes have more milk.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—The root cause of the somewhat serious nutritional status of the people is over-population. Population has increased by nearly 100 per cent. in the last 40 years. The problem is especially pressing in the lowlands, but even the highlands are now becoming over-populated. Agricultural progress has not been in proportion to this increase in population, although remarkable advances in this respect have been made during the past few years. Continuous cropping has not been responsible for reduction in soil fertility to any marked extent. It is surface wash or sheet erosion, particularly in cultivated areas, that has been the factor mainly responsible. The chief causes contributory to this denudation and erosion have been over-stocking with inferior stock and bad distribution of stock; ploughing up and down slopes instead of along the contour; and shortage of fuel which necessitates burning manure for domestic purposes. The growing poverty of large sections of the population is repeatedly emphasised in these reports. Causes contributory to the present position are apathy towards adopting improved methods of cultivation and shortage of agricultural manpower, the best of which is recruited for mine labour.

5. *Researches and Surveys.*—With the exception of Mr. Hugh Ashton's study of the quantity and constituents of food consumed by Basuto families over certain periods, no surveys or other research work have been undertaken; nor does it appear that any special work of this nature is contemplated in the future.

6. *Practical Measures for Improvement of Nutrition.*—With assistance from the Colonial Development Fund and from Basutoland revenue, strong action has been taken to check existing and to prevent future erosion, thereby preserving the areas under economic crops and improving pasture land. Live-stock improvement is making rapid progress, the aim being to have better high-producing animals and only in such numbers as the territory can carry. Everywhere throughout the territory the production of peas and other legumes is being extended and encouragement is being given to increase the production of wheat, particularly strong wheat. A relatively recent campaign for the encouragement of the production of vegetables and fruit has met with marked success. There are already some 4,000 vegetable gardens in the territory, and with the extension of these all over Basutoland it is hoped to check and finally eliminate deficiency diseases. It is expected to distribute some 40,000 fruit trees annually, this number being available for distribution next season. To provide further supplies of fat and vegetable protein the production of ground nuts is being encouraged and Swiss goats are being introduced in order to furnish additional animal fat and protein.

BECHUANALAND.

Area: 275,000 sq. miles.
Population: 260,064 (1936).

Birth Rate: } No
Infant Mortality: } statistics
Death Rate: } available.

1. *General.*—No special Committee has been established, but the Resident Commissioner states that the Medical, Agricultural and Education Departments work in full co-operation, and he forwards notes of a conference held by these Departments to consider the possibility of supplying milk and cheese to school children. The Resident Commissioner submits a general statement in relation to the meetings of the Native Advisory Council. A report recently prepared by Sir Walter Johnson on Medical Administration in the Protectorate also contains information relating to nutritional matters.

2. *Composition and Nutritive Value of Dietary.*—It is agreed by all observers that natives of Bechuanaland live on a very poorly balanced diet and are suffering from a serious lack of vitamins, which may show itself in frank manifestations of nutritional disease or as lack of resistance to other diseases.

Poor water supplies are at the root of the evil and much is being done to remedy this, but it is also vitally necessary to educate the native in dietetics if his general health is to be improved. The normal diet consists almost entirely of maize and millet (Kaffir corn). The latter, brewed as beer, offers some vitamin as does the very scanty ration of meat and milk which may be taken; unfortunately cattle posts are so far from the villages that the most valuable article of diet, milk, is only obtained intermittently, especially by children who are attending school. A good wild spinach (*moroko*) occurs in the wet season but is not widely eaten; wild fruits (*moretla* berries and *marula* plums) exist, but people are generally too lazy to utilise them. A beer can be brewed from *marula* plums which has a high anti-scorbutic value. With the exception of the wild spinach, no use seems to be made of wild edible leaves, many of which are rich in mineral salts as well as in vitamins.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Besides lacking protein of good biological value the native of Bechuanaland is living on the verge of vitamin deficiency which shows itself from time to time in outbreaks of scurvy and in other symptoms of nutritional deficiency. Thus in 1935, following two seasons of drought, a serious epidemic of scurvy occurred in certain districts. Medical officers frequently report nutritional oedemas (especially in pregnant women), anaemias, skin rashes which clear up on administration of calcium and cod liver oil, muscular tenderness, etc. Night blindness and xerophthalmia are also said to be common and cases have occurred of complete necrosis of the cornea. Frank pellagra occurs but appears to be rare. The poor physique of the Bechuana is attributed to inadequate food. The average weight of five hundred adult males examined as to fitness for work in gold mines was only 8 stone 13 lb.; 33 per cent. were rejected as unfit. Adolescents are 20 per cent. below corresponding Eureopean weight standards. Susceptibility to malaria is high owing to malnutrition, and it is believed to play an important part in the spread of tuberculosis, which is becoming a matter of concern. Malnutrition is to be noticed in the children, especially in the younger children.

4. *Economics of Diet* (*in relation to local agriculture, cost, tariffs; etc.*).—The problem of nutrition is made up of poverty, ignorance with consequent indifference, and agricultural conditions. Periodical droughts are an important factor in the situation. During 1934 and 1935 there were severe droughts, with the result that cattle died in hundreds, milk was not available and green foods non-existent. Naturally, this seriously affected the health of the community as a whole, besides leading to outbreaks of scurvy in certain districts.

5. *Researches and Surveys.*—Investigation of malnutrition among children in the Ngwato Reserve and Tati Concession is proceeding.

6. *Practical Measures for Improvement of Nutrition.*—With the assistance of a grant of £114,000 from the Colonial Development Fund steps are being taken to improve water supplies throughout the Protectorate. The Medical, Agricultural and Education Departments have for some time been co-operating in measures to increase consumption of health-giving foods. The rapidly increasing activities of the Agricultural Department cannot fail to lead to improved nutrition. The growing of drought-resisting types of maize, the rearing of pigs, poultry and rabbits, the reclamation of worn out land which may enable farming to be undertaken nearer villages and the dissemination of knowledge by means of agricultural shows, are all forms of activity which will react upon the health of the people. School gardens are beginning to play an important rôle in the education of children. They teach the health value of various vegetables, fruit trees, etc., which can be grown. Hygiene now forms an important subject in the school curriculum. In addition to work at all the hospitals, two special maternity and welfare centres are in operation. The establishment of field dispensaries is being considered. Proposals have been made to issue free supplies of half a pint of milk or one ounce of cheese per head daily to children attending certain European and native schools, but the cost has so far been found to be prohibitive.

SWAZILAND.

Area: 6,704 sq. miles.
Population (year not stated).

European	...	2,735	*Birth Rate*:	No statistics available.
Native ...	...	152,159	*Infant Mortality*:	
Eurafrican	...	644	*Death Rate*:	
Total	...	155,538		

1. *General.*—A brief report by the Medical Officer is submitted, under cover of a memorandum from the Resident Commissioner, whose experience extends over a period of 34 years, in which the opinion is expressed that little, if any, undernourishment exists among the Swazi. The Agricultural Officer agrees with this statement and both are strongly impressed with the " quite extraordinarily healthy appearance " of the Swazi. This view is somewhat at variance with the facts brought out by the Medical Officer and referred to in paragraph 3 below. Additional information taken from " Notes on the Diet of the Swazi," by Mrs. Kuper, has been incorporated in this summary.

2. *Composition and Nutritive Value of Dietary.*—The staple diet is maize, either green or matured, eaten mostly in the form of porridge. The diet is supplemented by sour milk, pumpkins, sweet potatoes, beans and very occasionally by meat. It is reported to be ill-balanced and monotonous, being too high in carbohydrate, too low in protein and deficient in vitamins. A redeeming feature is the amount of milk consumed, especially by children, either in the natural form or as amazi (sour milk). Unfortunately, this habit seems to be discontinuing in favour of sending milk to the creamery for butter manufacture. A factor of importance is the seasonal variation in the food supply available to the native in his home surroundings. For some months abundance is available; at other times even the richer class of native has difficulty in obtaining sufficient food.

3. *Diet and Health (deficiency diseases and other relevant considerations).—Adults.*—At first sight the average adult appears healthy and well nourished. That the average native dietary is capable of improvement, however, is obvious from the fact that hospital patients and prisoners on institutional diets invariably put on weight. In a recent examination of hospital out-patients 8 per cent. appeared to be undernourished, 80 per cent. of whom were women. Compared with the average ration of the native in his kraal, institutional diets are approximately 20 per cent. higher in calories and are richer in protein and vitamins.

Children.—Evidence of malnutrition among children is more obvious. Over 80 per cent. of babies showed signs of nutritional disorder in a recent out-patient department examination. Although accurate figures are not available the consensus of medical opinion is that infant mortality during the first year approximates 40 per cent., half of which die within the first two months. This is largely due to irregular breast feeding and the custom of feeding babies on sour porridge during the first week of life. The excess of carbohydrate and lack of vitamins in the average diet leads to much intestinal trouble and impaired resistance to disease. Every year cases of scurvy are noted among children, these being particularly numerous in 1936. Its prevalence varies with the nature of the season. In the Southern District children are anaemic, poorly nourished and suffer from recurrent attacks of malaria. Following a period of drought and want, malaria always takes a more serious and fatal form.

4. *Economics of Diet (in relation to local agriculture, cost, tariffs, etc.).*—The Swazi natives grow about one-quarter of the foodstuffs required for consumption, the remainder being for the most part produced by European farmers while a little is imported. The average yield per acre of native land is about

one-half that of land owned by Europeans. The great importance attached to the number of cattle in assessing wealth tends to decrease the amount of land cultivated.

5. *Researches and Surveys.*—No detailed dietary survey or extensive research has been carried out; but samples of local foodstuffs have been examined for vitamin content by Dr. Fox at the Institute of Medical Research at Johannesburg. An unexpectedly high anti-scorbutic power was found in a large number of them, especially in the succulent tops of many herbs used as spinach.

6. *Practical Measures for Improvement of Nutrition.*—The following are the directions in which it is hoped to effect improvement in nutrition: child welfare work; increased hospital facilities; improved land cultivation; extended cultivation of protein-rich foodstuffs such as groundnuts instead of so much maize; the planting of fruit trees; and the development of storage facilities against times of scarcity.

EASTERN.

ADEN COLONY.

Area: 75 sq. miles.
Population: 45,992 (1931).
Birth Rate: 32·07 per 1,000 (1937).
Infant Mortality: 196·61 per 1,000 births (1937).
Death Rate: 31·72 per 1,000 (1937).

1. *General.*—No standing nutrition Committee has been appointed; but a comprehensive preliminary survey by the Senior Medical Officer of the Colony has been submitted. This survey deals primarily with the 75 square miles of volcanic rock and sand which constitute the Colony of Aden; a detailed review of the nutritional affairs of the Protectorate has been postponed until a later date. The Colony is almost entirely urban and so cosmopolitan in make-up as to complicate the task of reviewing the nutritional conditions as a whole. Arabs, Jews, Somalis and Indians of various races predominate, and a preponderance of males is occasioned by the fact that those who come to Aden for varying periods of time to seek livelihood as coolies or tradesmen leave their womenfolk behind in the interior or in India. The natural division is to classify Arabs, Jews and the poorer classes of Indian Mohammedans as the indigenous population and it is to these, particularly the middle and lower classes, that the present nutritional considerations mainly apply.

2. *Composition and Nutritive Value of Dietary.*—All the chief articles of diet are, with the exception of fish, imported from overseas or from Arabia. They are: rice, flour, sugar; fish, mutton, beef, goats' milk, eggs, ghee; fruits, vegetables, dates, lentils, simsim oil, tea, coffee and spices.

Rice, of varying quality but always milled, is imported from India and the East. It is the foundation of the mid-day meal at which it is eaten together with cooked fish or meat. Flour comes in large quantities from India and Australia. That used both by Indians and Arabs for chapatties is the Indian variety known as " atta " which retains most of the essential parts of the wheat grain. White flour is used extensively for bread making. Jowari (*Sorghum vulgare*) is imported from the Protectorate and ground into flour; but its use is not so general as that of flours imported from overseas.

Of animal foods, fish is the most constant item, especially in the diets of Arabs and Jews. All varieties from sprat to shark abound in local waters. Mutton, imported from British Somaliland, is of excellent quality and has a high fat content. The bulk of imported beef is earmarked for ship chandlers; the local

consumption (mainly by Jews) is small and scarcely merits mention. The supply of milk for the poorer classes is derived from goats which live in or around the dwelling houses. Cows' milk is also sold; but is relatively expensive and insufficient in quantity to meet the needs of the whole population even if they could afford to buy it. There is a certain amount of goats' milk available, but the supply and quality vary with the amount of green fodder available. Owing to frequent scarcity of green fodder (which is procured from the interior) the goat has to rely on poor quality hay supplemented with such extras as it can pick up in the streets or off garbage heaps. Mainly, it is thought, as a result of missionary education, the custom has developed of boiling all milk given to children. This may provide a much needed safeguard against bacterial contamination, but the question arises whether or not its nutritive value may be unduly impaired in the process. The consumption of milk *per caput* is small.

Vegetables, mostly of the European type, are produced in the garden owned and controlled by the settlement and are retailed in the markets to the public. Pumpkins, water melons, cucumbers, spinach, bringals, lady's fingers, cress, tomatoes, potatoes, onions and various herbs are usually available and are cooked as a separate evening dish or added to fish and mutton dishes. Dates are not a regular dietary item in the average Arab family, but are largely consumed by the coolie class and by Somalis.

In general, the dietetic régime would be fairly sound if adequate quantities could be guaranteed for all. Unfortunately, however, quantitative deficiency in the poorer classes is a serious consideration. As the social scale descends the diet becomes quantitatively and qualitatively poorer, a fact which is reflected in the extent of deficiency disease in the poorer classes, particularly among children.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—On the whole, Aden can boast a high standard of public health. The greatest drawback is overcrowding. Large families occupy inadequate and ill-ventilated accommodation in which, as often as not, the domestic goat also claims a quota of space. In consequence of these conditions, respiratory and alimentary diseases are all too common. Diseases directly attributable to qualitative dietary deficiency are not a prominent feature of hospital returns in Aden and the more classical of the tropical deficiency diseases—beriberi, scurvy and pellagra —do not occur. Evidence of qualitative deficiency is found, however, in the incidence of rickets among children and of certain eye infections. An examination of 527 unselected children (consecutive cases treated in the Civil Hospital) showed that 33, or 6·2 per cent., were suffering from rickets.

Although most of these cases were mild and without gross deformity, their occurrence indicates that all is not well with the diet, mode of living or both. The most common eye conditions met with are the various forms of conjunctivitis, and keratitis. These yield rapidly to administration of vitamin A as cod liver oil. Xerophthalmia and keratomalacia are uncommon; but night-blindness is frequently found among adults. Other facts worthy of record are the heavy incidence of intestinal and bronchial affections. Urinary calculus, too, is the cause of much invaliding and points to deficiency of vitamin A and of animal protein.

Data in regard to physical standards in relation to nutritional status are almost entirely lacking. The Arab is of slight but stocky build averaging 5 ft. 9 ins. in height and turning the scale at 105-115 lb. with, as a rule, a well developed musculature. The Jew is slimmer and taller, and light in proportion to his height; in physique he is inferior.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The peculiar local topography precludes the Colony from producing its own natural foodstuffs. The fishing industry and the local production of milk and eggs are exceptions to this general rule; and it is true that there are possibilities of a limited agriculture on the oasis of Sheikh Othman and at Hiswa. But the main source of supply must remain, as it has always been, imports from Arabia and overseas. Aden is a free port and therefore prices of essential foodstuffs are not raised by customs charges. An efficient marketing system with minimal dues makes fresh meat and vegetables readily available.

The relationship between purchasing power and food consumption is noticeable. As a rule labour supply is in excess of demand and wages are low. Moreover, the demand for food depends entirely on earnings, for labour is irregular. Consequently as the labourer has no other resources, the individual daily diet is too frequently below actual requirements.

5. *Researches and Surveys.*—On account of the relatively small size of the Colony, its cosmopolitan population, and the fact that the bulk of the essential foodstuffs are imported, it is considered inadvisable to embark on any elaborate local scheme of investigation. Data from other sources where conditions are similar would provide an adequate guide for the correction of the more obvious dietetic errors and deficiencies which occur.

It is recommended that for the present further study and research be confined to the compilation of reliable vital and anthropometric statistics including an accurate estimate of the degree of malnutrition which exists, its type and its incidence among the various racial and social groups. At the same time a closer

examination of the customary diets would be made. This work can be handled by the existing staff of the Government Medical Department working in conjunction with the Health Authorities of the Aden Settlement.

6. *Practical Measures for Improvement of Nutrition.*—In the past, practical measures with a bearing on nutrition have been mainly indirect, *e.g.* the maintenance of a free port and absence of tariffs on imported foodstuffs. Various endeavours have been made to introduce some form of poor-relief into the Colony and at present a very small fund operates through which cash payments are made to a few poor people. Endeavours are being made to organize this system on an extended and permanent basis.

Child welfare and maternity work has progressed slowly in the clinic attached to the Civil Hospital and through the Keith Falconer Mission of the Church of Scotland. Future expansion of these services is envisaged by means of a fully equipped and adequately staffed Maternity Centre of which Government has already guaranteed the maintenance. It is hoped that public subscription on the occasion of the Aden Centenary will provide a suitable building.

In regard to the expansion of agriculture the main difficulty is one of water supply. In the oasis of Sheikh Othman (see paragraph 4), all cultivation is entirely dependent on artificial irrigation for which the only water really suitable is the deep bore system which constitutes the main settlement supply. Formerly an undeveloped type of agriculture existed on irrigation from shallow wells too brackish for general purposes. It is recommended that this be re-investigated with a view to discovering whether certain fruits, vegetables and animal fodders could not be produced by this means, thus increasing local supplies at a price competitive with that of imported articles.

A practical suggestion in respect of milk supply is that the Aden Settlement should provide free, or at low cost, pens for goats at various points in the Settlement, when milk could be distributed for sale at a controlled price. If such were adopted as a municipal enterprise a fair supply of fodder might be made available by extension of cultivation in the Settlement gardens, and any loss of revenue, or actual expenditure involved, would be amply compensated for by the popularisation of an article of diet so essential for the growing population.

MALAYA.

(STRAITS SETTLEMENTS; FEDERATED AND UNFEDERATED MALAY STATES.)

Area: 50,997 sq. miles.
Population: 4,660,215.

Birth Rate:* 44·33 per 1,000 (1936).
Infant Mortality:* 170·85 per 1,000 births (1936).
Death Rate:* 24·91 per 1,000 (1936).
* Straits Settlements only.

1. *General.*—A Committee representative of the Departments of Education, Agriculture, Medical Services, Veterinary Research, together with the Director of Co-operation and the Registrar-General of Statistics, has been set up. The interim report of this Committee has been received, and includes the following: (*a*) a review by Dr. Rosedale (Professor of Biochemistry, College of Medicine, Singapore), (*b*) notes on the incidence of dental caries in Malaya by Professor Tratman, (*c*) report on dietary standards in Kedah by Dr. Strahan, (*d*) report on nutrition among Malays in coast districts by Dr. Burgess, and (*e*) summary of reports on deficiency disease among prisoners.

It is important to remember that Malaya is primarily a rural country. Its population may be roughly divided into:

A. *Chinese*:

(*a*) those working and eating singly or in small groups, *e.g.*, town dwellers and retail shopkeepers throughout the country;

(*b*) those working and eating in larger groups, *e.g.*, labourers on estates and mines.

B. *Malays*: almost all small agriculturists or fishermen.

C. *Indians*:

(*a*) shopkeepers in towns;
(*b*) labourers on estates.

2. *Composition and Nutritive Value of Dietary.*—As a result of extensive work by Rosedale there now exists information regarding the composition and relative values of Malayan foods. The available food supply in towns is wide and varied and the means to rectify any possible deficiency are at hand if only the people had the resources to buy and the knowledge to make the best use of the present supplies. In remote country districts the case is different and enquiry is still necessary to ascertain precisely what foods are available there.

Rice is the most important food (see below) and is supplemented with vegetables of the root variety, leaves and pulses. The red unbleached palm oil produced in Malaya makes an excellent substitute for the usual vitamin A containing foods. Fish is the only animal food which enters into diets to any extent. Very little milk is drunk although recently there has been a tendency to increased consumption in rural areas, but of tinned, not fresh milk. Meat is rarely eaten, and eggs infrequently, but more so by inland than coastal Malays.

The Committee finds that, in general, the main deficiencies are of B-vitamins and protein. Although the Chinese eat considerable fat of kinds poor in vitamin A, the diets of most other people are fat deficient, and in the Kedah survey people were found whose food intake was little greater than that required to supply the very minimum energy requirements of the average Malay in the south.

Rice.—Special consideration has been given to the nutritive value of rice. In rural areas most of the inhabitants eat the locally grown rice (padi) prepared by hand. In other parts, the rice sold in shops is usually polished and washed, and thus devoid of any vitamin whatever. One satisfactory rice is that prepared by the Government rice mill at Bagan Serai, which is husked but not polished or only slightly so. The striking superiority of this husked rice has been proved by animal experiments and it would appear better to live on a poor man's diet with husked rice as the basal cereal than upon a supposedly better class diet with white rice as the basis.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Beriberi xerophthalmia and other gross deficiency diseases are not infrequently reported. Physique and stamina appear to be inferior when judged by European standards. In regard to weight, for example, it has been found that Chinese are 18 per cent., Malays 13 per cent., and Eurasians 10 per cent. below European standard at 16 years of age. But a more important point is that for the first six months of life the weight of children coincides with European standards. It is only after weaning and the transference to white polished rice unsupplemented with milk that the drop occurs. From the Kedah survey, too, it appears that in remote rural areas some 60 per cent. of children are below par, two-thirds of whom are in dire need of extra nourishment. The situation in the more prosperous coastal and rubber areas is less serious, although here also 40 per cent. of children are below par. This survey also reveals the fact that, in general, the diet of the Malay is deficient in energy value, in first class protein, and in the B vitamins. The rural people, especially,

live on the " verge of safety ", and consequently, any unusual demands upon the slender stamina tend to produce some form of deficiency disease.

There is evidence that general disease resistance is lower in immigrant Indians than in Malayans or Chinese. The factor of safety in the Malay diet appears to be the fresh natural produce grown by the peasant on his own smallholding although a reduction in the number of these home vegetable plots goes hand in hand with improved economic conditions. As purchasing power increases the cultivation of vegetables is considered less and less worth the trouble involved. The same considerations apply to the consumption of rice. An increasing death rate from beriberi is coincident with improvement in general prosperity the explanation being that higher purchasing power makes it possible to indulge the preference for the more expensive highly polished rice instead of the unpolished home-grown variety.

Nutrition in relation to malaria and hookworm infestation is also considered at some length and it appears that even where the incidence of these diseases is high the physique of children getting good diets may be better than that of children in districts of low incidence but having poorer food. In the section dealing with prison diets the interest lies in the fact that the diet rejected on account of its deficiencies was based as nearly as possible on the home diet of the prisoners. The deficiency diseases which developed were counteracted by the substitution of unpolished for polished rice, and by the addition of green vegetables. In general, it may be said that the incidence of dental caries is from 70-95 per cent. and that it is higher in urban than in rural areas. It is presumed that the more sophisticated and less wholesome foods obtainable in the towns and the extensive hawking of sugary cakes and sweetmeats in schools are the factors primarily responsible for the extent of dental decay seen among urban children.

Some two-thirds of the labourers employed on estates in Malaya are Southern Indians and of these the vast majority are Tamils, others being Telugus and Malayalees. All are emigrants or descendants of emigrants from the Madras Presidency. Wages and living standards are higher than in Madras, but, unfortunately, just as in the case of the Malays mentioned above, increased purchasing powers frequently mean reduced cultivation of fresh foodstuffs. Moreover, the change from a village to a plantation environment renders it almost inevitable that a bigger percentage of their foodstuffs must be bought. Every estate is, of course, required by law to set aside land for allotments (one-sixteenth of an acre for each labourer who has dependents) but these are not always taken advantage of owing

to the natural disinclination of the labourer to spend a considerable part of his leisure in cultivating gardens when his wages enable him to live in reasonable comfort without recourse to his allotment.

The basis of the diet of the Southern Indian is parboiled rice supplemented with dhall, spices and coconut oil. Dhall is a mixture of the husked and split seeds of numerous grams and pulses. The spices they use include capsicum, cardamons, coriander, cinnamon, turmeric and pepper, all flavouring agents of low nutritive value. Coconut and sesame oils are the main sources of fat. Additions to this basis are haphazard, varying widely with the food resources of the district and the saving habit of the individual (the Telugu, in particular, being over-inclined to frugality)—vegetables, mostly tubers, two or three times a week, dried fish once or twice a week; goat flesh on high days and holidays; tinned milk; tinned fish occasionally and eggs once in a while. Large numbers of labourers rear cattle or goats and many grow their own vegetables, while others, particularly in the coast districts, become expert fishermen. When markets are near, some purchase fresh vegetables and fish or meat to supplement their rice and curry, but there are others who, either from want of facilities or from want of enterprise, depend far too much on the dried and parched miscellany of the estate shops.

South Indians have two principal meals a day—at noon and at sundown. Most labourers' wives do field work to swell the family income, so food is prepared in the afternoon after the day's work is completed. Each family has its own cooking arrangements and there is little attempt at variety. Analysis of the diets consumed suggests that they are not well balanced. The protein standards are low; protein of good quality, meat, fish, milk, eggs, is deficient. The fat is almost entirely of vegetable origin, and fat soluble vitamins A and D probably below optimal requirements. Supplementary sources of vitamin A, leafy vegetables and carotene-containing tubers are often absent.

Associated with these deficiencies, possibly correlated with them, are low physical standards, poor stamina, susceptibility to bacterial disease and the occurrence of clinical evidences of lack of vitamin A, xerophthalmia and night blindness. Clinical deficiency of vitamin B is almost unknown, and of the vitamins C and D rare; vitamin B is fully provided by the rice and dhall of the diet, vitamin C by occasional fresh fruits and tubers, and vitamin D by the sun.

Chinese labourers are an important section of the community. More than 80 per cent. of the labour employed on mines and in factories and more than 20 per cent. of the estate labour in Malaya is recruited from Chinese emigrants—mainly from the southern maritime provinces of Kwantung and Fukkien.

All but a few are of one of the five tribes Cantonese, Kheh, Hokien, Tiechew and Hailam, mostly of the first two. Their diet in Malaya follows the traditional dietary of Southern China as closely as circumstances permit. They produce for themselves the foods to which they have been accustomed, if soil and circumstances allow, or else, failing this, import them from China. They are extremely conservative and show little disposition to adopt the food customs of the other races with whom they come into contact.

The basis of this diet is rice and the main supplements vegetables, beans and pork. The rice is polished and of pleasing appearance but inferior in quality from the loss of vitamins and mineral salts produced by excessive milling. The distinctive features of the diet are the high consumption of vegetables, the importance of soya bean and the inclusion, whenever means permit, of fat pork. The Chinese are the vegetable gardeners of the Malay Peninsula. They cultivate for the market and for their own consumption a wide variety of leafy vegetables, tubers, pumpkins and gourds, and moreover import large quantities of dried and salted vegetables from China. Soya bean, and bean sauce, bean curd and bean paste, foods derived from soya bean, are constant additions. Pork is the main source of animal protein. Most labourers buy pork as often as they can afford it and fry their vegetables in the fat. Either pork or dried fish probably enter the daily diet of most labourers who are in employment. Milk has no place in the diet. Eggs, mostly duck eggs, poultry and fresh fish are occasional luxuries. Additions of fruit depend on circumstances.

When times are good most Chinese labourers feed themselves very well. Many indeed spend most of their wages on food, for they are not of the saving habit of the Tamil labourer. It is said that their food expenditure is often double that of the Tamil. The preparation of food is a matter for careful attention. Most " kongsis " or groups of labourers employ a cook. Food is well prepared and cooked and served in an appetising manner. Meals are looked on rather as a social occasion. Like most Orientals, they have but two main meals a day, early morning and evening, with an occasional interim meal in the middle of the morning of rice water with a little fried vegetables or a sweet made of sugar and bean flour. Typically the main meals consist of a bowl of boiled white rice with pork or dried fish and a generous addition of vegetables and beans fried in groundnut oil or pork fat.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Beyond the references in the preceding paragraph to economic conditions and purchasing power there is little for further comment under this head. Research is necessary on the economics of a well balanced diet under urban, estate and mine conditions and to ascertain the minimum acreage of rubber, coconuts, padi, etc. necessary at given prices to enable a family to secure an adequate diet.

5. *Researches and Surveys.*—Laboratory research is being actively prosecuted at the King Edward VII College of Medicine, Singapore, and at the Institute for Medical Research, Kuala Lumpur. The factors of time and expense demand that clear limits should be set to these studies and, though possibly of very great importance, academic studies are being postponed till problems of more immediate practical importance have been solved. In addition to the researches which form the basis of the conclusions reached in the preceding paragraphs, much work has been done on basal metabolism in the tropics, work which it is proposed to extend. It has been found that the average Asiatic inhabitant of Malaya has a basal metabolism about 10 per cent. lower than that of the normal European. Further, it appears that the basal metabolism of the European becomes lowered in Malaya and can be raised by leave in Europe and even by local leave at a hill station. Accordingly, it would seem that climate is a more important factor than race in determining the basal metabolic rate.

6. *Practical Measures for Improvement of Nutrition.*—It is Professor Rosedale's opinion that while Malaya spends much time and money in securing scientific knowledge, comparatively little use is made of it because until further field surveys have been carried out it is difficult to judge what to apply. The Standing Committee apparently concurs in this view inasmuch as they state that while their report may be taken as reasonably accurate so far as present knowledge goes, much further investigation is necessary before any useful recommendations can be made with a view to putting into effect a co-ordinated nutrition policy. The main difficulties to be faced are the inability through poverty of the great majority of the people to supply themselves with the requisite articles of diet and the difficulty of persuading them, especially the Chinese, regarding the advantages of undermilled rice. The health services have made considerable efforts towards improving nutrition, and an enthusiastic response has been made to their scheme for disseminating information through the schools.

NORTH BORNEO.

Area: 29,347 sq. miles.

Population: (Census, 1931).

Natives of North Borneo	...	205,218
Chinese ...	...	47,799
Other Races	...	16,612
Europeans	...	340
Total	...	269,969

Birth Rate:* 26·8 per 1,000 (1937).

Infant Mortality:* 163·3 per 1,000 births (1937).

Death Rate:* 25·2 per 1,000 (1937).

*Certain districts only.

1. *General.*—(*a*) The natives of Borneo comprise 76 per cent. of the total population and consist of five main groups: Dusuns, Muruts, Bajaus, Bruneis and Sulus.

The Dusuns numbered 117,482 at the last Census in 1931, they are of short but sturdy build, and are a peaceable and law-abiding race, with a strongly developed agricultural instinct. They may be looked upon as the farmers of the country: they produce most of the padi (rice) grown and are also successful growers of native tobacco. The Dusun population is mainly located on the north and west coasts, and at Tambunan in the Interior.

The Muruts numbered 24,444 at the last Census, and inhabit for the most part the hills of the interior. They are excellent hunters and subsist mainly by hunting and bartering jungle produce.

The Bajaus numbered 34,099 at the last Census. They are Mohammedans and are established in villages along the coast, and on the islands from Caya Bay to Cowie Harbour; in the Tempassuk district their settlements extend considerable distances inland. The average Bajau swims like a fish and is an intrepid seaman. He earns a precarious livelihood by fishing, collecting sea produce and making salt.

The Bruneis, numbering 21,112, are Mohammedan immigrants but have firmly established themselves along the coast and up the rivers from the Brunei border as far as Papar. They practise agriculture, but are chiefly known as boat builders.

The Sulus, of whom there are 8,081, are also Mohammedan immigrants or the descendants of immigrants from the Sulu Islands and their settlements are to be found along the east coast. Like the Bajaus, they are a race of sailors and their chief business is fishing and the collection of sea produce.

(*b*) *The Chinese population.*—The Chinese in North Borneo, 47,799 in number, fall into five groups, the coolie class; the servants; the farmers and market gardeners; the small shopkeepers and traders; and the merchants.

2. *Composition and Nutritive Value of Dietary.*—Wet rice is the staple diet of the native at Tambunan in the interior and in the district of the west coast. Tapioca and dry rice form the staple food among the hill natives. Other crops more or less common to most districts are maize, sweet potatoes, marrows, gourds, cucumber, egg-plant, bananas, papaia, pomeloes, limes, oranges, pineapple, mango, durian, keladi, chillies, bamboo shoots and fern tops.

The principal domestic animal of the native is the water buffalo, or *kerbau,* which is found throughout the country, except in the hilly Murut districts. This animal is called upon to

perform the functions of hack, hunter and heavy draught; once broken in it is equally tractable whether being ridden to market by its master, whether it is taking part in a deer hunt, pulling a native bamboo sledge, or dragging a plough through a muddy rice field. It has its uses in death as a substitute for beef, but is only killed by the natives themselves on feast days.

Native cattle are numerous in many parts of the country, especially at Papar, Tempassuk and Keningau. They do not, however, receive the same attention as the water buffalo and they are allowed to roam wild over the plains unless they are rounded up for sale.

Pigs and goats are seldom slaughtered for food by the natives except on special occasions. Fresh milk and its products are not utilized at all.

From data obtained in assessing the nutritive value of both the Murut and Dusun diets, it appears that the calorie requirements are met but animal protein and fat are deficient and the amount of carbohydrate more than necessary for normal requirements.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The staple diet of the native of North Borneo is whole rice or tapioca, and beriberi, in consequence, is rarely seen among the native population. On the other hand among the immigrant Chinese labourers working in isolated timber camps on the east coast, where polished white rice is the staple food, beriberi frequently occurs especially after heavy rains which destroy the camp vegetable gardens. Endemic goitre occurs in the hilly regions; in the Bokan country 33·6 per cent. of 1,014 natives examined were found to be affected.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—No information on the minimum cost of adequate nutrition for the native population is available. All foodstuffs are grown by the natives themselves, on their own land, and small luxuries are obtained by means of barter at native markets. On the other hand 99 per cent. of the food of the immigrant Chinese is imported, and the minimum cost on which a Chinese labourer can live is from $4·50 to $5·00 per month ($=2s. 4d.).

Cattle, including sheep and goats, may be imported free and the import tariff on rice is suspended. The tariff on bean oil is 4 cents per catty (1 catty=1½ lb.) and 10 cents per catty on coconut oil in order to stimulate local manufacture. On butter of British origin the tariff is 5 per cent. ad valorem and 15 per cent. in the case of foreign origin.

5. *Researches and Surveys.*—In 1936, Dr. J. O. Shircore, C.M.G., late Director of Medical Services, Tanganyika Territory, spent 12 months in investigating native health in the interior

and west coast of North Borneo with special reference to the sociological and economic factors bearing on the depopulation problem of the west coast and interior.

6. *Practical Measures for Improvement of Nutrition.*—Among the recommendations made as a result of the survey referred to to above were the formation of a malaria research unit at Tambunan, the institution of maternity and child welfare centres, the training of native sanitary inspectors and the expansion of the subordinate medical staff. Schemes to give effect to the first three recommendations have already been prepared and the first batch of native sanitary inspectors will complete their training in December this year. Arrangements have also been completed by Government for the examination and treatment of vernacular school children by a dental surgeon. All children attending the vernacular schools are examined twice yearly by a medical officer; they are also examined twice yearly for hookworm infection and treated if found to be infected. Children attending mission and private schools in the towns of Sandakan and Jesselton are also examined twice yearly for hookworm infection and treated when found infected. The infection rate among these children has decreased from 71 per cent. in 1924 to an average of 5 per cent. during the past five years. An attempt to stimulate the interest of vernacular school children in milk has been made in Sandakan during the past 12 months by the free issue of seven ounces of milk daily to 30 selected children over given periods of time.

SARAWAK.

Area: 50,000 sq. miles.
Population: 443,000.

For Kuching only (1936).
Birth Rate: 32·8
Infant Mortality: 232·5
Death Rate: 24·9.

General.—There is a Chinese population of upwards of 100,000. The remainder of the population is made up of Malays, Dyaks and a number of miscellaneous tribes. Rice is the staple food both of immigrant Chinese and of the native population. Imports amount to anything up to 32,000 tons a year, and there is considerable local production. Other food crops include soya beans, millet, yams, maize, groundnuts and sugar cane. There is no doubt that the increased demand for labour on rubber gardens is causing a number of Chinese and natives to abandon padi cultivation in favour of rubber tapping. Numbers of cattle, goats, etc., are kept by the natives but there is no organised industry. Butter and ghee are produced locally.

HONG KONG.

Area:

	sq. miles.
Island ...	32
New Territories	358
Total ...	390

**Population* (mid-year 1938).

Non-Chinese ...	23,096
Chinese ...	1,005,523
Total ...	1,028,619

Birth Rate: 32·1 per 1,000 (1937).

Infant Mortality: 361 per 1,000 births.

Death Rate: 34·4 per 1,000 (1937).

*Estimated on arithmetical basis utilising intercensal increase between 1921 and 1931. No account is taken in this estimate of the temporary increase due to the influx of between 200,000 and 250,000 refugees from disturbed areas in China.

1. *General.*—The population of Hong Kong is concentrated into the urban districts of Victoria and Kowloon and into a few minor townships such as Cheung Chau, Taipo and Un Long in the New Territories. Less than 10·6 per cent. live in rural areas.

According to the Census of 1931 some 42,000 persons were engaged in agriculture. In addition, a certain proportion of the maritime population, estimated approximately 100,000, is engaged in fishing enterprise.

By far the greater number of the inhabitants of the Dependency are employed in industrial undertakings, in transport, engineering, building, public works, domestic service, etc.

2. *Composition and Nutritive Value of Dietary.*—Rice is the staple diet of the Chinese inhabitants. With the exception of a small amount of red rice consumed in the rural areas, white rice is almost exclusively used. Locally produced rice, especially that from the Shatin Valley in the New Territories, has for centuries been held in such high esteem in parts of China as far distant even as Peiping, that it is largely exported and cheaper rice imported from Burma, French Indo-China and Siam for local consumption. This rice diet is augmented where funds are available by small quantities of beans, vegetables, ginger, meat, fresh, dried or salted fish and by fresh or salted eggs; but the lowest wage-earners are able to buy very little of these additional foodstuffs and milk is almost unknown amongst the really poor.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The situation has changed considerably in the last two years.

This may be due partly to the considerable influx of refugees into the Colony resulting from the outbreak of Sino-Japanese hostilities in 1937. Although such diseases as rickets, pellagra and scurvy are rarely encountered in Hong Kong, beriberi is responsible for a heavy toll of suffering and death, and there is little doubt that a proportion of the large number of cases and deaths in infants from enteritis is attributable to faulty feeding and malnutrition in some form or other. In this connection, it might be interesting to note that some 1,661 deaths were certified as being due to beriberi out of a total of 34,635 in 1937 and that a further 2,365 infants under one year died of enteritis. The fact that beriberi is common amongst the poorer inhabitants of both sexes and of all ages in Hong Kong can be easily established by visiting the Chinese Hospitals. No difficulty, for example, was experienced in May, 1938, in discovering 150 in-patients suffering from beriberi in a group of three Chinese Hospitals when steps were being taken to relieve, in part, the overcrowding existing in them and it was desirable to transfer such curable cases to a temporary hospital.

Moreover, observations carried out on women at the Tsan Yuk Maternity Hospital by Dr. W. C. W. Nixon, Professor of Obstetrics and Gynaecology, University of Hong Kong, in 1936-7, lent further support to the belief that malnutrition and signs of definite deficiency of vitamin B1 were present in a proportion of the Chinese women cared for at this institution. Again, the investigations in 1937 by Dr. L. T. Ride, Professor of Physiology, University of Hong Kong, on the oedema found in cholera cases strongly suggested that a prima facie case existed that the condition was due in part to some type of malnutrition. This research work was made possible by a grant-in-aid of $500 from Government. The high incidence of pulmonary tuberculosis and of diseases of the respiratory system generally may perhaps serve as yet another possible indication of the existence of some degree of malnutrition amongst the community.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Although food prices are comparatively low in Hong Kong as compared with those prevailing in many other parts of the world, the average daily earnings of members of the labouring class are also low and rentals are high for the standard of accommodation usually provided. Since only a very small proportion of the total food supplies concerned in the Colony is home-grown, it is fortunate that Hong Kong is, practically speaking, a free port and that no customs duties are payable in respect of imported foodstuffs.

5. *Researches and Surveys.*—Useful work has already been carried out by the members of the Nutrition Research Committee and has been briefly referred to in section 3 of this summary.

In the view of the Director of Medical Services, there are ample grounds for further research and survey being undertaken locally, although he considers that such research work and surveys should not be of a laboratory character but should take rather the form of field work.

The actual plan of campaign will be decided upon by a newly constituted and enlarged Nutrition Research Committee under the Chairmanship of the Director of Medical Services after the receipt of information from Professor Rosedale of Singapore as to which portions of the proposed programme of work have already been effectively studied and reported on by him in the Straits Settlements. This should help to obviate any unnecessary overlapping of investigations in the two countries.

In co-operation with the Commissioner of Prisons and the Superintendent, Botanical and Forestry Department, it is planned to carry out experiments locally on the production on a large scale of alfalfa (*Medicago sativa* L.) and of the true and Chinese spinach (*Spinacea oleracea,* L. and *Amarantus Blitum,* L.). Alfalfa has been grown on a small scale in these territories since 1922, and special seed was obtained from Australia in 1936 which produced a good crop. The actual scale of both experiments was, however, rather too small to be of general value.

Mention should also be made of three factors having a bearing on the subject under discussion.

(*a*) A Housing Committee appointed by Government has issued a report—which deals, *inter alia,* with the question of economic rentals.

(*b*) A group of local volunteer welfare workers has carried out a housing experiment on a settlement basis and in the face of considerable difficulties, and has issued a report. The proportion of income spent on rent as compared with that available for the purchase of food has, of course, an important influence on nutrition.

(*c*) The Government has decided to appoint a Labour Officer to investigate cost of living, wages, conditions of work, etc.

6. *Practical Measures for Improvement of Nutrition.*—In consultation with the Professor of Physiology, new dietaries have been devised by the Government Medical Department for prisoners in the Hong Kong prisons. Similarly, the diet of parturient women in the Government Tsan Yuk Maternity Hospital has been varied by direction of the Director of Medical services as the result of discovery of symptoms of beriberi in a

certain proportion of the patients. Free meals are being supplied daily to nursing mothers and young children attending the two welfare centres in Hong Kong and in Kowloon on the mainland. About two hundred mothers and children are assisted in this way. The Hong Kong Society for the Protection of Children assisted at the Welfare Centres by supplying milk foods free for distribution among deserving cases. The Society and the Welfare Centres also assisted mothers by giving them letters which enabled them to buy condensed milk at cost price from certain retailers. Two charitable organisations have also established food distribution centres, one for destitutes and two for destitutes and refugees. The dietary consists of rice, beans, green vegetables, tomatoes and, to younger children, skimmed milk (ordinary full-cream milk being too high in price for the numbers catered for). About 2,000 persons, including many women and children receive one good meal a day at these food distribution centres. Occasional checks were made by Medical Officers with regard to the general and nutritional condition of those attending the food distribution centres. These somewhat hurried surveys have disclosed definite signs of malnutrition in 31·44 per cent. of those attending. Plans and estimates have been drawn up for establishing another welfare centre at the old Government Civil Hospital and at Health Centres to be established on the Island, in Kowloon, New Kowloon and Kowloon City and in the New Territories should funds be available. It is the considered opinion of those who have studied the problem that Welfare Centres provide the best means of educating the less fortunate (but by far the larger) section of the population in the way in which the rising generation should be brought up and more especially, in the most suitable dietaries for babies, young children and expectant mothers. It is believed that a vast amount of sickness and suffering could be prevented were even more facilities available for this work. It should be remembered that a mother who has received adequate instruction at a Welfare Centre is not only in a position to put the principles she has learnt into practice in her own family circle, but also helps to propagate such knowledge in the tenement or street in which she lives. Radio talks have been broadcast and published in the English and vernacular press on the feeding of infants and children, on diet in relation to teeth, and on kindred matters. The importance of pure milk has been brought home to the general public and legislation has been enacted making the pasteurization and clean bottling of milk compulsory from the 1st of January, 1939. Efforts have been made to encourage large producers of milk to transfer their farms to the mainland where their herds of cattle can be expanded considerably in numbers. Attempts have also been made to encourage those engaged in paddy farming to undertake dry cultivation of vegetables. It is hoped to be able

to carry out experiments with the cultivation of alfalfa and amaranth both of which are of high dietetic value. The co-operation of the Prisons and Botanical and Forestry Department will be sought in this direction. Finally, in order to counteract the incidence of beriberi as far as possible experiments were made to find a cheap anti-beriberi factor. Rice polishings are obtained locally at a cost of $12·50 per hundredweight and are used extensively in hospitals and other public institutions.

Hong Kong is for the majority of its population only a very temporary place of sojourn. The annual migration of some 500,000 individuals to and from China leads to great difficulties in effecting permanent improvement in the nutrition of the Colony.

CEYLON.

Area: 25,332 sq. miles.
Population: 5,631,000 (1936).

Birth Rate: 34·1 per 1,000 (1936).

Infant Mortality: 166 per 1,000 births (1936).

Death Rate: 21·8 per 1,000 (1936).

1. *General.*—Information in regard to Ceylon is contained in Sessional Paper No. II of 1937, entitled " Report on Nutrition in Ceylon ", and in Sessional Paper XXIX of 1937, entitled " Further Report on Nutrition in Ceylon ". The Director of Medical Services, who submits the Report states that the major portion is the work of Dr. Lucius Nicholls, the Director of the Bacteriological Institute, Colombo. His main studies were investigation of the diets of children in upper, middle and poorer class schools—the last covering five towns and fourteen districts—and mineral analyses and vitamin assays of all the most commonly used local foodstuffs. These analyses were carried out in London.

2. *Composition and Nutritive Value of Dietary.*—The staple articles of diet are rice, two-thirds of which is imported polished; coconut, usually included in some form in all three meals of the day; leafy vegetables, yams, tubers, beans, lentils, peas, dhals, and gourds, which are made into curries of various types; curry stuffs such as chillies, coriander, saffron, garlic, nutmegs, etc.; and fish. *Upper classes*: the diets consumed by the upper class Ceylonese appear to be a blend of local and European practice and are so well supplemented with other foodstuffs that the evil effects of polished rice do not arise. Nevertheless it would be better if more unpolished rice were used and if much of the meat (meat is used only by upper classes) were replaced by more milk.

Poorer classes: here the diets may be summed up as consisting of rice (polished in the wet zones of the south and south-west, and unpolished in rural areas and dry zones of the north), fish, vegetables, coconut and numerous condiments. Fish is the principal foodstuff of animal origin eaten by the poorer classes: meat is rarely eaten and milk and milk products seldom occur in their diets. On the whole the diets in towns are better than those in rural areas; and the diets in the wet zones (S. and S.W.) superior to those in the dry zones (N. and S.E.). The one redeeming feature in the diets of most parts of the dry zone is unpolished rice. Tea is the principal beverage in Ceylon but toddy made from the fermented sap of coconut is also widely used. The toddy yeast which settles out from the supernatant alcoholic fluid is rich in vitamin B complex. Much might be done to encourage the use of this yeast which is as a rule discarded. *Institutional diets* in general use consist mainly of rice, dried fish, very little meat, and some vegetables, according to seasonal availability. They were found by Nicholls to be seriously lacking in vitamins, especially vitamin A.

Analyses and assays show that the most serious deficiences in the diets of the masses are those of animal protein, calcium, vitamin A and vitamin B complex. To improve the calcium content a greater use of small fish and leafy vegetables is advocated. The amount of vitamin B complex can be increased by the use of dhals and grams, but it will never be adequately supplied until the present vast quantities of imported milled rice are replaced by unpolished varieties such as are to be obtained in many country districts of Ceylon.

3. *Diet and Health (deficiency diseases and other relevant considerations)*.—Social status to a great extent governs the health and physical condition of the people. Children of the upper classes, whose diets are much superior, are taller and heavier than lower class children of the same age accustomed to much inferior diets. Nicholls has described the prevalence of phrynoderma and sore mouth among poorer class children and their association with vitamin A deficiency. This dietary defect is also responsible for the occurrence of blindness which is exceedingly common in Ceylon. At the deaf and blind institute 66 per cent. of cases of blindness were attributable to keratomalacia and xerophthalmia. The high incidence of dental defects and irregular development of teeth is also ascribed to defective nutrition. The excessive maternal and infant mortality is attributed, in part at least, to undernutrition of the poorer classes. Expectant mothers frequently exhibit stomatitis and glossitis (eroded lips and tongue). Rickets is rare in Ceylon; but " mandama " (often somewhat misleadingly translated as " rickets " in official returns) accounts for over 3,000 child deaths annually. Mandama is a multiple deficiency of

vitamins A and B with the following signs and symptoms: stunted growth, xerophthalmia or kerato-malacia, skin eruptions (phrynoderma), pot-belly and wasting. One characteristic feature of Ceylon diets is the excessive use of condiments and spices. Diabetes is very common among upper class sedentary workers and is attributed to gluttony aroused by the stimulus of potent curries which enable the consumption of undue quantities of rice. Cirrhosis of the liver is also exceedingly common and is thought to be due to excessive consumption, not of alcohol, but of highly spiced curry stuffs.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—About two-thirds of all the foodstuffs consumed in Ceylon are imported, mainly in the form of polished rice and pulses. The calorie value of the imported rice allows about 1,400 Calories per man-value per day and that of all other imported foods an additional 250 Calories. Local production, including fish, must amount to less than 1,000 Calories per man unit per day because all the evidence shows that average total calorie consumption does not reach 2,600 per day. The minimum cost of a diet made up of those foods generally eaten in Ceylon, which could be regarded as adequate but not optimal in respect of protein, fat, carbohydrate and total calories, is about 15 cents per day. For a family having a man-value of five, the cost would be 75 cents. Considering that the wages of working classes vary from 40 cents to about Rs.1 per day it is clear that the average wage is insufficient for maintaining adequate nutrition in a family, say, of two adults and five children of ages between two and ten years. Insecure economic conditions of this kind affect a very large number of families in Ceylon.

The question of milk supply calls for comment. The two reasons for the very low milk consumption are insufficient production and prejudice against its use. The total production does not exceed 20 million gallons annually which for a population of $5\frac{1}{2}$ millions allows rather less than 4 gallons per head per year. The poorer classes support their prejudice against milk with the contention that it causes illness—a contention which is probably well founded in view of the highly insanitary conditions under which milk is at present produced.

5. *Researches and Surveys.*—The surveys by Nicholls which form the basis of the report from Ceylon have already been referred to in paragraph 1. Extension of this work is required and to this end the establishment of a special Department of Nutrition is recommended, the functions of which should include: analysis of local foods; prescribing institutional diets; teaching the principles of tropical nutrition; establishment of standards for the inspection of school children; regional and

seasonal nutrition surveys; and co-operation with the Education, Agricultural and other Departments in appropriate measures for the improvement of nutrition.

6. *Practical Measures for Improvement of Nutrition.*—(*a*) Emphasis is laid on the urgent need for teaching the principles of tropical dietetics and nutrition, not only to medical students in Ceylon but also to medical officers training in the United Kingdom for service in Ceylon.

(*b*) Instruction on the subject of proper feeding should be given in all schools in the country.

(*c*) More attention should be paid by the Agricultural Department to the improved cultivation of those local foodstuffs proved by analysis to be of high nutritional value. Leafy vegetables, pulses, yams and sweet potatoes are specially mentioned. The yellow variety of sweet potato is a more valuable foodstuff than the ordinary potato of which over 10,000 tons are annually imported and there appears no reason why sweet potatoes should not be extensively grown.

(*d*) A greater production and consumption of milk is essential if the poorer class children are to be well grown and energetic. Improved breeding and the better care of cattle should ensure the production of large quantities of milk but there must be strict regulations against adulteration and pollution. Some work has recently been done on the use of curds, which is the principle form in which milk is taken in many parts of the tropics.

(*e*) The present practice whereby free mid-day meals are supplied in vernacular schools should be extended to cover more and more children. It cannot be too strongly urged that these meals must be adequate and well cooked.

(*f*) It has been suggested also that Government should consider whether some of the existing duties on imported foodstuffs might not be reduced or abolished altogether.

7. *Establishment of a Department of Nutrition.*—Since the reports referred to in paragraph 1 were published, a Department of Nutrition has been started and the work in hand at the present time includes the following:—

Field work.

(1) The examination of large numbers of school children to decide if there is a correlation between somatic measurements and the prevalent clinical signs of malnutrition.

(2) The study of the A.C.H. index of various classes to decide if it is adaptable to the children of Ceylon.

(3) Further dietary surveys are being carried out, the main purposes of which are to obtain quantitative data of the diets of village and urban workers.

Nutritional Education.

(1) Theoretical and practical classes on nutrition are being given to elementary school teachers.

(2) An elementary book on dietetics has been prepared for publication. The values of foodstuffs are represented by coloured graphs which contrast one foodstuff with another. The book is written for school teachers, social workers and other members of the lay public.

Research.

(1) The examination of still-born children is being continued. The amount of vitamin A in the livers, and certain calcium determinations are being carried out.

(2) Experiments are being done on the calcium metabolism of poor class children who have a low calcium intake, with special reference to the calcium balance.

(3) Some bacteriological and chemical work has been done on curds. Two organisms predominate in the curds used in certain parts of Ceylon, a yeast and a streptococcus. The amount of acidity produced is sufficient to destroy such organisms as those of dysentery. There is little doubt that the use of curds is far safer than milk under the primitive sanitary conditions existing in villages. Also the presence of yeast brings additional vitamins to the diet. A paper is being prepared on this subject.

MAURITIUS.

Area: 720 sq. miles.
Population (1936).

Indian	...	268,546
General	...	142,374
Total	...	410,920

Birth Rate: 34·9 per 1,000 (1936).

Infant Mortality: 142·3 per 1,000 births (1936).

Death Rate: 26·4 per 1,000 (1936).

1. *General.*—The papers concerning Mauritius consist of a despatch from the Governor covering a memorandum by the Director of the Medical and Health Department. In order to co-ordinate such efforts as can be made to investigate the problem or to educate the public in the elements of the nutrition question, the Governor proposes to set up a representative local Committee.

2. *Composition and Nutritive Value of Dietary.*—The staple foods are rice and pulses which together with oil used in cooking provide most of the energy. Animal protein, consumed as fresh fish, meat or goat flesh, is eaten about once a week. Bread is consumed by the Creole but not as a rule by the Indian, who, however, occasionally uses wheat flour for his chupatties.

The consumption of fruit in due season is liberal. Attempts have been made by the Medical Department to collect records of typical domestic budgets, but in view of the unreliability of the returns no definite conclusions can be based upon them. It does appear, however, that judged by European standards the diet often contains too little protein and too much carbohydrate, a feature common in the diets of Asiatic communities living in the tropics.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The entire lack of records of past investigation and the difficulty of obtaining reliable information on present day conditions is emphasised. Nevertheless, the memorandum inclines to the general view that the earnings of the labouring classes are sufficient under present conditions to provide them with an adequate diet. Support is given to this conclusion by the healthy and well nourished state of the children attending the elementary schools of the Colony, and there is a noteworthy absence in this Report of any mention of gross deficiency disease. That degrees of undernourishment must exist, however, is evidenced by the improvement seen in the weight and general health of prisoners when placed on a regular and adequate dietary. Further, although based on casual impressions, there may be substance in the view held by some, that the field labourers of to-day are decidedly less robust than those of a generation or more ago and that the tasks performed are smaller.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The economic life of the Island is dominated by the sugar industry. The bulk of basic foodstuffs is imported and at present the prices of these are nicely adjusted against the price of sugar. If this balance is not disturbed the outlook is fair; but if the price of imported foods should rise without there being a compensatory rise in the price of sugar nothing that can be done locally will prevent great privation for a considerable period. Experiments made locally give little promise of rice ever being grown within the Island in sufficient quantity, and efforts to encourage the production of supplementary foods such as maize, peas, beans and potatoes have met with very limited success. Only pressure of economic necessity forces the population to substitute these foods to any extent for the staple rice. However, a further and more extensive attempt is shortly to be made to supplement the existing production of home-grown foodstuffs.

5. *Researches and Surveys.*—It is agreed that nutritional research is desirable but that it could not be undertaken without the services of a special staff. If the Colonial Development Fund were prepared to assist by the provision of a special

officer to study the question, a more comprehensive investigation of the whole problem might be undertaken, but no guarantee could be given at this stage that funds would subsequently be forthcoming from the local Treasury to implement any programme which might be drawn up as a result of such a study.

6. *Practical Measures for Improvement of Nutrition.*—Financial considerations preclude any extensive development but attempts have been made to counteract the drift away from field labour towards artisan and black coated employments by the establishment of allotment settlements, the holders of which are encouraged to become self-supporting in respect of food requirements. Efforts are also being made to stimulate the local production of slaughter cattle in substitution of the somewhat poor quality animal now imported from Madagascar. With assistance from the University of Pretoria a study is being made of grasses and pasturage. On the medical side, useful agencies such as child welfare societies are in existence in a few areas and free milk is sometimes supplied in necessitous cases. Attempts are also being made to stimulate the fishing industry.

SEYCHELLES.

Area: 156 sq. miles.
Population: 29,803 (1935).
Birth Rate: 27·48 per 1,000 (1935).
Infant Mortality: 91·57 per 1,000 births (1935).
Death Rate: 14·09 per 1,000 (1935).

1. *General.*—The papers submitted include minutes by the Senior Medical Officer and the Director of Agriculture and a memorandum by Mr. W. F. Stephens, unofficial member of the Executive Council. The establishment of a Standing Committee on Nutrition is considered desirable but until a preliminary scientific estimate of the Colony's needs and its means to supply these needs has been made, such a Committee would, in the Governor's opinion, have no basis for effective action.

2. *Composition and Nutritive Value of Dietary.*—Although polished rice is generally accepted to be the staple food of the natives in the main island (Mahé), and the unpolished variety in the outlying islands, the quantity imported is, by calculation, manifestly insufficient to provide all the carbohydrate being consumed by the population. By inference it is assumed that manioc, sweet potato, breadfruit and banana must together form a much more important element in the average diet than is generally admitted. Fish is said to be largely consumed but in Mr. Stephens' opinion this is an exaggeration owing to the frequent uncertainty of supplies. The consumption of milk is very low and that of green vegetables almost negligible mainly

because the natives have no natural liking for these articles of diet, and partly also because praedial larceny is so habitual and widespread as to discourage potential producers. Bacca, the native toddy, which is a wholesome beverage made from the juice of the sugar cane, has of late years been largely superseded by a noxious and illicit drink called La Purée, which is derived from the fermentation of all kinds of vegetable refuse. Certain restrictions upon the cultivation of sugar cane and the home manufacture of Bacca have recently been abolished with the object of combating the Purée evil and restoring the use of an invaluable food.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—The state of nutrition of the majority of the people is poor. There is much chronic ill-health, low resistance to disease and incapacitating sickness, which is a constant source of economic loss to employers of labour. Neuritis and the disease locally known as " decoque " are regarded as evidence of vitamin deficiency. Beriberi is still seen occasionally even in the outlying islands where unpolished rice is used. Pulmonary tuberculosis is very prevalent and chronic ulcers are exceedingly common.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—The islands are dependent for their income on the sale of coconut products and various essential oils.

5. *Researches and Surveys.*—A dietary survey to include the analysis of local foods is considered highly desirable; but such could not be undertaken without employing a specialist officer.

6. *Practical Measures for Improvement of Nutrition.*—The stamping out of the abuses surrounding the manufacture of Purée and the evils of praedial larceny are the two most urgent measures for improvement occupying the close attention of Government. The Director of Agriculture recommends further measures for the introduction of better milk and meat-producing animals, poultry, etc.; the continued extension of good quality pasturage crops; improvements in the cultivation of local food crops and fruits, including citrus, mangoes, and avocado pears. On the medical side measures will include the expansion of maternity and child welfare services, health visiting, and the provision of a cheaper milk supply.

WEST INDIES AND NEIGHBOURING TERRITORIES.

BAHAMAS.

Area: 4,403 sq. miles.
Population: 66,219 (1936).

Birth Rate: 32·9 per 1,000 (1936).
*Infant Mortality**: 66·3 per 1,000 births (1936).
Death Rate: 18·8 per 1,000 (1936).
* Refers to New Providence.

1. *General.*—A Standing Committee has been appointed to advise on all matters pertaining to public welfare. In forwarding a survey of the situation, prepared by the Medical Officer, the Governor emphasises the close co-operation and co-ordination of the Medical, Agricultural and Education services secured by the Government.

2. *Composition and Nutritive value of Dietary.*—The diet of 75 per cent. of the labouring classes, who compose the bulk of the population, consists of boiled fish and hominy (finely cracked maize with husk removed) for breakfast; corned beef, salt beef, fish, hominy or peas and rice (polished), Irish potatoes, sweet potatoes, plantains and bread without butter, for dinner; and bread and tea without milk for supper. Mutton or pork is bought once a week as a rule. Lettuce, spinach, cress, beets and carrots are never served and tomatoes only occasionally. The remainder of the labouring classes have a slightly more varied diet with somewhat more vegetable food. Citrus and other fruits (excepting bananas, perhaps) are not readily available and too expensive for the labouring classes. Milk is also too expensive for consumption on a large scale. Making generous allowances, the calorie value of the diet does not exceed 2,000 per head per day.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Pellagra is very prevalent and accounts for a great deal of illness and debility. Dental caries is also extremely prevalent; general debility and lethargy are prevalent; skin eruptions and catarrhal infections, fairly common; and beriberi, scurvy and rickets of occasional occurrence.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—There is little in the report calling for comment under this heading. When next the existing tariffs come under review it will be borne in mind that these should be adjusted in such a manner as to encourage the consumption of foodstuffs

of high nutritive value. Steps which it is proposed to consider are either an increased duty on such foods as white flour and polished rice, or a reduced duty on whole-wheat flour and unpolished rice. The Agricultural and Education Departments working together have endeavoured to arrange for the employment of an increasing number of agricultural school teachers, the establishment of school gardens and to encourage generally the development of agriculture. Increased farm production would render the Colony less dependent on imported fruit, vegetables, dairy produce and eggs. One of the main exports is tomatoes which are shipped mostly to Canada. This has greatly encouraged vegetable farming and is expected to result in an increased use of tomatoes in the local diet.

5. *Researches and Surveys.*—On the agricultural side there is need to investigate the possibilities of growing suitable fodders for cattle. It is not practicable to grow timothy, for example, and almost all hay is imported. This results in fresh cow's milk being too expensive for the poorer classes.

6. *Practical Measures for Improvement of Nutrition.*—On the medical side several new measures have recently been adopted, namely, the periodic examination of school children, lectures and demonstrations in hygiene, and the inauguration of prenatal and post-natal clinics. As a result of instruction on diets and nutrition, two settlements decided to eat more vegetables, such as cabbage, etc., and to adopt the use of fresh goats' milk. The inhabitants of these two places admit that the state of their health and that of their children has greatly improved. On the agricultural side people are being encouraged to engage in backyard vegetable farming and in general to increase the cultivation of citrus fruits and other nutritive produce.

BARBADOS.

Area: 166 sq. miles.
Population: 188,294 (1936).

Birth Rate: 31·80 per 1,000 (1936).
Infant Mortality: 198 per 1,000 births (1936).
Death Rate: 18·54 per 1,000 (1936).

1. *General.*—The local Committee appointed to consider and report on the question of nutrition in Barbados has submitted a printed report in which the nutrition of infants, the nutrition of school children and the nutrition of the working classes are separately considered.

2. *Composition and Nutritive Value of Dietary.*—The average diet of the working classes consists chiefly of rice, flour and

other cereals, sweet potatoes, yams, onions, salt pork or beef, salt fish, sugar and tea. Milk consumption is exceedingly low, and in the majority of cases condensed milk is used instead of fresh. The great shortage of milk, eggs and fresh vegetables cannot be too strongly stressed and there is no reason to doubt that many households live on the borderline of extreme poverty. Infants are weaned at the age of one to three months and thereafter are fed on sugar-tea and cornmeal pap with the addition of potatoes, rice and biscuits as they get older. It is known that the weekly wage of parents (paid on Saturdays) is insufficient to feed the whole family for a week and that many children have no regular meals after Wednesday in each week and come to school hungry on Thursdays and Fridays.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The poor physique of the average labourer, the very high incidence of dental caries, the prevalence of pellagra, the increasing prevalence of tuberculosis, and the general low resistance to infectious disease, provide sufficient evidence that the diets are seriously deficient.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The present condition of the sugar industry which precludes the possibility of paying higher wages, and the fact that large families are the rule rather than the exception, provide the main limitations to satisfactory nutritional conditions. Wages have increased since the war, but more is spent on clothing and transport; the result has been an increase in the basal cost of living to such an extent that probably less is being spent on food than before the war.

5. *Researches and Surveys.*—The Committee's investigation into the position leads them to recommend that the Medical Department should carry the enquiry further.

6. *Practical Measures for Improvement of Nutrition.*—Government has accepted the recommendation of the local Nutrition Committee for the establishment of a system of daily distribution of milk and biscuits to elementary school children at an annual cost of about £5,000. The proposal that Baby Welfare Clinics and Creches should be established in parishes not already provided with these has also been approved.

Steps are also being taken to encourage the more extensive cultivation of vegetables by peasant proprietors and by those who rent small plots of land for their own use. Consideration is also being given to the possibility of encouraging the greater use of wholemeal flour and other essential articles of food, by the removal or reduction of the duty imposed on them under the customs tariff.

BERMUDA.

Area: 19 sq. miles.
Population: 30,951 (1937) 12,143 white, 18,808 coloured.

Birth Rate: 22·1 per 1,000 (1937) 17·3 white, 26·8 coloured.
Infant mortality: 71 per 1,000 births (1937) 49 white, 81 coloured.
Death Rate: 10·6 per 1,000 (1937) 9·6 white, 11·3 coloured.

1. *General.*—The appointment of a Committee is not mentioned in the report submitted by the Governor.

2. *Composition and Nutritive Value of Dietary.*—Practically every family eats some meat or fish once a day—though much of it is from tins. Salt codfish is extensively used, but less than it used to be. Bread, potatoes and rice are important items of diet. Fresh vegetables are eaten in fair quantities, but fresh fruit only a little by the poorer people, while milk, butter and eggs are expensive. There are 1,750 milk cows on the island, and condensed or dried milk was imported to the value of £22,000 in 1937.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The school children have been examined. Figures are given for the findings in 500 white and 500 coloured.

	White.	*Average No. of children in family.*	*Coloured.*	*Average No. of children in family.*	*Total.*
Small but healthy	7		7		14
Bones suggestive of old rickets ...	19		14		33
Poorly nourished ...	25	4·6	27	7	52
Over nourished ...	15		8		23

About two-thirds of the children have dental caries and many have enlarged tonsils. Slightly enlarged thyroids are found occasionally, serious enlargements almost never.

4. *Economics of Diet.*—The labourer's wage has been 10s. a day. So unless a family be careless, as is sometimes the case with the poorer whites, or if the family be not too large, as it frequently is among the coloured, the living conditions are comfortable. The deaths from tuberculosis illustrate this, and have steadily declined since the Great War to 12 in 1937—(a rate of 37 per 100,000 living).

5. *Researches and Surveys.*—Only a beginning has been made on the study of diets, but the evidence is that all classes eat much the same variety, the poorer people having fewer sweets and

eggs and less fresh milk and fresh fruit. Poverty is the usual deterrent to a good diet, and poverty is usually due to too large a family.

6. *Practical Measures for the Improvement of Nutrition.*—A beginning has been made towards the practice of birth control under the direction of the Health Department. A domestic science school has been started to teach school girls the fundamentals of dietetics and to provide training for hotel and domestic help. The Welfare Society with its district nurses gives prenatal instruction and runs baby clinics. The Department of Health is providing dental care to the poorer children and endeavouring to clear other foci of infection.

BRITISH GUIANA.

Area: 89,480 sq. miles.

Population (1935).

East Indians...	138,334
Africans ...	128,559
Europeans ...	10,689
Others ...	50,637
Total ...	328,219

Birth Rate: 35·3 per 1,000 (1936).

Infant Mortality: 120 per 1,000 births (1936).

Death Rate: 20·4 per 1,000 (1936).

1. *General.*—The comprehensive report which is submitted was prepared by a specially appointed Committee, since formed into a Standing Nutrition Committee.

In considering the position in British Guiana it is of some importance to remember that the various races—Indians, Africans, Portuguese, Chinese—which make up the total population have very different dietary habits, and further, that even the dietary of immigrant Indians born in India differs largely from that of the creole Indian descendants of immigrants, born in the Colony.

2. *Composition and Nutritive Value of Dietary.—Cereals.*—Rice is grown over wide areas and is the staple food of more than a quarter of the population; maize is also grown to some extent. *Vegetables and fruits.*—Sweet potatoes, tannias, yams, cassava, bananas, plantains and bread fruit are commonly used by the labouring and other classes as also are imported pulses and groundnuts. *Animal foods.*—Although protein deficiency is common it cannot be said that there is a shortage of fresh meat; many varieties of local fish are marketed and eggs and milk are fairly plentiful; with the exception of limited supplies in rural areas, all butter is imported. The main difficulty about milk is its

unsatisfactory quality due to adulteration and contamination. The *per caput* consumption is unknown but is probably very low even though supplies of a kind are quite readily available. Fats are generally obtainable from such local products as coconuts and avocado pears.

In regard to the nutritive value of dietaries, the average diet of the immigrant Indian shows a general shortage of protein, fat and vitamin A and a relative excess of carbohydrate. They drink almost no milk. With the passing of time, the creole Indian will wholly replace the immigrant Indian and the stricter and narrower dietetic customs of the latter will give place to the broader and more balanced diet of the former. Africans as a rule enjoy an unrestricted dietary except perhaps on the mines where fresh fruit and vegetables are generally conspicuous by their absence. No special comment is called for with respect to other races. A point worth noting is that if mineral deficiency in the soil is paralleled by a similar deficiency in its produce, then calcium and to a less extent phosphorus will be deficient in British Guiana vegetable foodstuffs.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—The generally low protein, fat and vitamin A content in the dietary of the East Indian is reflected in the high incidence of pyorrhoea, gingivitis, xerophthalmia, asthmatic conditions and infectious diseases found among them. The African is more robust than the Indian and it is chiefly in remote districts and on the mines, where rations may be limited, that xerophthalmia and keratitis occur with any frequency. Among the Portuguese tuberculosis is fairly common and suggests a lowered resistance consequent on vitamin A deficiency.

Nephritis is responsible for a large number of deaths annually; but it is not improbable that the many cases thus diagnosed are in reality beriberi or endemic dropsy. The high incidence of megalocytic anaemia, most frequent in East Indian women, is another problem of grave social and economic importance. Prevalent customs in regard to infant feeding are notoriously bad, and medical officers are unanimous as to the general malnutrition among infants and young children seen in institutions, villages and rural areas. The occupational efficiency of the estate labourer is low; his resistance to disease is poor and he quickly succumbs to attacks of bronchitis, pneumonia and enteritis—conditions which are complicated by malaria and hookworm infection, the most widespread diseases in the Colony.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—Quantitatively, there probably exists no shortage of any essential foodstuffs produced and available in the Colony. The source of nutritional disease is to be found in poverty,

racial prejudice, restricted availability of certain foods in hinterland or isolated areas, general dietetic ignorance, or a combination of two or more of these. Agricultural wages have increased by 90 per cent. since pre-war days while the cost of living has increased by only 4·2 per cent. during the same period. Although these figures represent a very considerable improvement in conditions the fact that more money is being spent on non-essentials makes it by no means certain that the nutritional status of agricultural workers has improved to the extent suggested by the index numbers. It may be said that no systematic attempt has so far been made to organise the agricultural production of the Colony from the standpoint of the nutritional needs of the people. This is particularly true in regard to milk, there being no dairy farms in existence capable of providing towns and institutions with a guaranteed supply of reasonably high quality milk.

5. *Researches and Surveys.*—Although a certain amount of work relating to human nutrition has been done it is not yet possible clearly to define the precise extent of undernourishment and malnutrition in the community. It is recommended that further work should be organised to include three stages of investigation as follows: (1) preliminary dietetic and disease surveys, adequately designed in the light of modern methods, to determine the present nutritional status of the inhabitants; (2) experimentation to test the efficacy of any suggested measures for improvement, *e.g.* testing improved ration scales for labourers in mining areas, and recording height, weight and mental aptitude in milk-fed and non-milk-fed groups of school children; and (3) practical application on a wide scale of those measures of improvement which by experimentation have proved feasible. The work envisaged does not, in the opinion of the local Committee necessitate the appointment of highly paid experts but may well be undertaken by existing Government staff provided that allocations for subordinate staff and some additional equipment are made available.

An experiment in feeding milk to school-children is now being undertaken.

6. *Practical Measures for Improvement of Nutrition.*—Having acquired more exact information as a result of the investigations referred to in the preceding paragraph, the Government will first of all direct its attention to improving the nutrition of expectant mothers, infants, and pre-school and school children. Thereafter, Indian immigrants, shop assistants, and workers in mining areas will receive consideration. Revision of dietary scales for hospitals and public institutions, lectures and demonstrations in clinics and schools, and co-operation with the Agricultural and Veterinary Departments with a view to improving milk and meat supplies, will form part of the programme to be undertaken.

BRITISH HONDURAS.

Area: 8,598 sq. miles.
Population: 56,071 (1936).

Birth Rate: 33·5 per 1,000 (1936).
Infant Mortality: 152·7 per 1,000 births (1936).
Death Rate: 20·2 per 1,000 (1936).

1. *General.*—The Governor has appointed a Committee consisting of the Senior Medical Officer, the Agricultural Officer and the Superintendent of Education. In preparing the report, the Committee enlisted the services of the Customs Department, the Forest Department, the Registrar-General, District Commissioners and interested members of the community. The report, with its thirteen appendices, extends to nearly 200 pages of typescript and contains much detailed information on the geology, water supply, and agricultural produce of British Honduras. In addition very full accounts of the dietetic habits of the various communities living within the Colony are given and full indications of the schemes on hand for the improvement of nutrition and public health are provided.

2. *Composition and Nutritive Value of Dietary.*—A discussion of the dietetic habits of the population of British Honduras is complicated by the number of races, ethnologically diverse and differing in their food habits according to economic status and the place of abode, urban or rural.

The following divisions of the population must be considered separately:

(*a*) The indigenous *Mayan Indians* are agriculturists, living on a diet of which the basis, both of food and drink, is some preparation of maize. One method of preparing the cereal described in the report results in the *tortilla* a very thin pancake, which is served at every meal. Another method provides *tamales,* in which a stuffing of various vegetables, compounded with chicken meat is inserted into the " husk " of the maize. *Posol* is a drink made with maize steeped in a solution of lime water, washed, and then boiled into a thickish liquid.

No fresh milk is available, but tinned milk of the cheapest kind is imported and sold at enhanced prices in the villages. Although chickens and pigs abound in Indian villages, eggs and pork are seldom eaten, being transported to the coastal towns. Wild game and fish from the creeks supply protein, but in some districts the heart of the cohune palm, boiled and seasoned, is used as a substitute for meat. The

women and children of the Toledo district, probably because of a mineral deficiency unconsciously felt, use an edible calcareous earth.

Although an almost infinite variety of foodstuffs is available, the Indians subsist chiefly on the products of maize.

(*b*) The *Caribs* are a class of negro people whose staple diet is cassava and fish. Occasionally they eat rice and beans, seldom meat and never green food. Sweetened tinned milk is used to flavour tea.

(*c*) The *East Indians* who have been introduced into the Colony have to a great extent dropped the dietetic prejudices of their race. In addition to large quantities of rice, they eat beef and pork and in some districts have the reputation of being heavy meat eaters.

(*d*) The *Spaniards,* who for the most part are political refugees from the neighbouring republics, use rice and beans for their main foods and consider no meal complete without tortillas. Salt pork or salt beef is eaten twice in the week and green vegetables are added when in season. Fruit, though plentiful, is not utilised as a main article of diet.

(*e*) The *Creoles,* direct and indirect descendants of the slaves transported to fell mahogany, form the largest group in the Colony. If they can afford it, the urban Creoles eat large quantities of meat. Polished rice, dried beans, plantains and fish are the staple food of the others. Tinned milk takes the place of butter and while fresh salads are never prepared, cabbage and spinach are relished.

(*f*) The *Chicleros* and the workers in the mahogany camps form a special group because their food is provided by the mahogany contractors under a Labour Ordinance of 1934, confirming an established tradition. Salt pork and flour is the universal ration, but the labourers supplement this with a variety of supplies purchased from the commissary, with game hunted in the forests, and with green vegetables grown in gardens in some of the more progressive camps or procured from neighbouring villages.

(*h*) *Americans, Europeans and Syrians* are found in isolated groups throughout the Colony and are dependent on locally grown food and on imported tinned food.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The Medical Officers of the Colony are unanimous in saying that while malnutrition and deficiency diseases do exist, they are not so prevalent as might be expected. Deficiency of vitamin A leads to phrynoderma amongst school children, while hemeralopia and xerophthalmia are also noted

occasionally. Since 1899, 27 cases of beriberi have been reported, but there is a larger incidence of cases of oedema of the legs probably accounted for by B-avitaminosis. Twenty-one cases of definite pellagra have been recorded since 1920 but it is thought that a pellagroid type of dermatitis is widespread, while symptoms such as " burning feet " and " butterfly wing " are regarded by the doctors as due to lack of vitamin B_2 complex. Scurvy is not unknown especially among the youngest children, the Medical Officer at Corozal reporting that he noticed three cases of scurvy in a month. Only mild manifestations of rickets are encountered.

Dental disease is not markedly evident, but the children in the El Cayo district whose parents permit them to drink rain water show a markedly greater percentage of carious teeth compared with the river water drinkers in the same area.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc).*—Details of labour conditions existing in the Colony are confined to the employees in the forest industries. A sample budget of a labourer in one of the mahogany camps shows that of the five dollars which is the average wage, three dollars are spent in the camp and two dollars are contributed to the family's expenses. The report, while admitting that some camp managements are enlightened, enters with some detail into various abuses to which the " truck ", " seminal " and " giro " contracts are subject and note that many cases of hardship are incurred through the families in the towns not receiving a proper and regular allowance. This matter is now receiving the attention of Government.

In the camps the labourer is encouraged to buy tinned foods because he has not the available cash to purchase other foodstuffs in the open market. The Committee note that during the Great War the people were dependent on imported supplies of food. They are concerned with the quality of tinned supplies. A leading contractor in a communication to the Committee emphasises that food, sufficient both in quantity and quality is available, but the labourer has not the initiative nor the knowledge to use it. He adds " It . . . is a pity both from the point of view of personal health and the country's economics, that the people are not educated to a freer use of fresh (untinned) meat and green vegetables ". Elsewhere in the report mention is made of the task it will be to educate the people to use the anti-scorbutic fruits which are at hand.

5. *Researches and Surveys.*—The Committee are anxious to establish a properly constituted team of workers to make:

(1) A dietary survey of the various sections of the inhabitants.

(2) An analysis of foodstuffs consumed.

Once in possession of these highly essential data, they will be able to plan propaganda on a sound basis.

6. *Practical Measures for Improvement of Nutrition.*—These include the encouragement of local produce, improved marketing, development of transport, and propaganda by educational and nutritional services. There is a valuable infant welfare centre in Belize. There is general agreement that the days when the Colony can depend solely on the export of mahogany are passing and of possible sources of wealth, agriculture is both the most promising and the most universally beneficial.

JAMAICA.

Area: 4,450 sq. miles.
Population: 1,138,558 (1936).

Birth Rate: 32·35 per 1,000 (1936).
Infant Mortality: 118 per 1,000 births (1937).
Death Rate: 17·4 per 1,000 (1936).

1. *General.*—A special Committee, consisting of representatives of the Medical and Agricultural Services, a private medical practitioner, and members of all classes of the community has been appointed. The major responsibility for devoting attention to development of nutritional knowledge rests with the Chairman of this Committee whose substantive position as Assistant Director of Medical Services brings him constantly in touch with matters bearing on nutrition. The Committee first submitted an interim report together with a special note by Dr. D. Whitbourne on the nutrition of children in the corporate area of Kingston and St. Andrew, and, later, a fuller report following the collection of additional data.

2. *Composition and Nutritive Value of Dietary.*—With so many grades of society, diets vary considerably in quantity and quality. The best nourished receive as protein small amounts of fresh beef and occasionally goat flesh, chicken and fish. Salt meat and salt fish are more largely consumed. Peas and beans are used to a large extent and are the chief source of protein for the poor. Milk, when used, is nearly always sweetened condensed, fresh cows' milk being rarely taken even when available. Cheese is seldom used.

Carbohydrates are represented mainly by polished rice (an aversion from unpolished rice exists), and by tubers such as yams, coco-yams, sweet potatoes, cassava and bread fruit. Bread and biscuits made from white flour are largely used in

towns, and constitute a large part of the diet of the poor. Fat, the chief source of which is coconut oil, is deficient in the majority of diets; butter is a luxury, native beef provides little fat, and, as already mentioned, milk is the cheap tinned variety. Vegetables such as pumpkins, onions and tomatoes are not extensively used and are not very popular among children who are in many cases allowed to choose their diet and so omit vegetables and fresh milk. The most commonly used is a coarse spinach; an uncooked green salad is never eaten. The unripe banana is used as a vegetable by all classes. Oysters, prawns and crabs are occasionally used as supplementary foods. Beverages include tea, cocoa and coffee, the last being the most popular among labouring classes who also favour " bush tea " infused from various local leaves and roots.

Special stress is laid on the shortage of protein. Local animal products are sparingly used, but the shortage in the habitual vegetable diet is partly made good by imports of salted and canned fish and meats, and of condensed milk.

To sum up, although there is no lack of variety nor shortage of food for those who can afford to buy it and know how to use it, the diet of the poorer classes is deficient in animal protein and fat, and contains much salted or otherwise preserved foods, polished rice and white flour.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The generally strong physique, good humour, contentment and patience of the Jamaican negro labourer are regarded by some as evidences that the nutritional conditions are not seriously at fault. It is authoritatively reported also, that the island products contain abundant vitamins and that there is little evidence that vitamin deficiency is a serious cause of disease or disability. Others, on the other hand, conclude that a very high percentage of the population are suffering from varying degrees of subnormal nutrition and that the nutritional state of a distressingly large proportion of the labouring classes is definitely bad. The reason for this divergence of opinion is that satisfactory statistical data in regard to adults are not available. The position with regard to children seems, however, to be much clearer. Of 12,000 children examined, multiple avitaminosis was found in about 20 per cent., the most striking signs being blindness, glossitis, stomatitis, dry skin and anaemia. Evidence of mild rickets is frequently found among younger school children and although no cases of beriberi, pellagra and scurvy have been detected in schools, the condition of many children suggests a near approach to these diseases. Dental caries is also exceedingly prevalent. The state of nutrition, alike in adults and children, is complicated by the considerable prevalence of yaws, hookworm infection and malaria.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Adverse economic conditions, the poverty of the masses, low wages, unemployment, the over-large family, and the high percentage of illegitimacy (71 per cent. of all births) are the root causes of most of the malnutrition found. The average income of 184,000 or 92 per cent. of the employed population in 1935 fell below 25s. per week, and 147,700 or 71 per cent. received an average of 14s. per week. These are the sums earned by the male wage earner responsible for an average of five persons, but in a large number of cases he shirks his responsibility leaving it to the women to bear most of the family burden on an intermittently earned wage of 5s. per week. The difficulty of maintaining families under such circumstances is reflected in the infant mortality.

Jamaica, being an agricultural country, depends economically on its export trade in agricultural products. A natural consequence of this has been an agricultural policy directed primarily to fostering production of export crops such as the banana, and until recently there has been no conscious attempt to develop such local food supplies as are necessary for a proper dietary. Tomatoes, lettuce, carrots, turnips, etc., are not produced on a large scale, and are mostly sold by the small cultivator, who has little taste for them, to the upper and middle classes. The question of reduction of import duty on skimmed milk has been considered; but it is thought preferable to approach the problem of increasing milk consumption by concentrating on the development of the local dairy industry.

5. *Researches and Surveys.*—An examination of 12,000 school children has been made (see above). It has been suggested that inquiry is desirable into the food value of sugar cane, raw sugar and molasses on the grounds that their dietetic value may be greater than that of refined sugar.

6. *Practical Measures for Improvement of Nutrition.*—Measures by which it is proposed to improve present conditions include the development of animal husbandry with a view to providing an adequate supply of meat. It is also hoped, as part of the scheme for developing animal husbandry, to replace imported condensed milk by a product manufactured locally. Though in itself, however, this will not cause any improvement in nutrition, it should greatly assist in making husbandry remunerative. Improvement of fisheries and intensification of poultry farming are other matters which will receive attention. The possibility of cultivating vegetable products rich in protein will be investigated.

A scheme of instruction in schools likely to produce valuable results has already been put in operation. This concerns the establishment of lunch kitchens in a number of elementary schools where the older girls are employed in preparing lunches as part of their domestic science course. Boys are also brought into the scheme through encouraging their interest in agricultural pursuits, the produce from their school gardens being partly used for the lunches and partly marketed under the auspices of the Jamaica Agricultural Society. It is intended to make periodical comparisons of the physical condition of children in schools having well-established lunch kitchens with that of children in schools where there are no such amenities. The Jamaica Welfare League are co-operating in the work.

Provision of a daily supply of milk to the school children of Kingston is engaging the attention of the Government; and a public health nursing service, now in process of development by the Medical Department, promises to be a useful factor in the improvement of child welfare and maternity services.

LEEWARD ISLANDS.

ANTIGUA.

Area: 108 sq. miles.
Population: 34,230 (1936).

Birth Rate: 37·1 per 1,000 (1936).
Infant Mortality: 111·2 per 1,000 births (1936).
Death Rate: 20·4 per 1,000 (1936).

1. *General.*—Short memoranda have been submitted by the Senior Medical Officer and the late Inspector of Schools. It is proposed to appoint a special Committee to make further investigations and practical suggestions for dealing with the problem.

2. *Composition and Nutritive Value of Dietary.*—The principal meal of the day is usually composed of fish (salted or pickled) boiled with rice or cornmeal; some vegetable foods such as egg plant, ochroes, squashes, unripe bananas, and mangoes; and starchy foods such as sweet potatoes, yams, tannias, cassava, eddoes and dasheens. In the case of children cornmeal " pap " with sugar is almost the sole article of diet. On questioning nearly 2,000 children it was found that 35 per cent. drink practically no milk and the rest an average of less than half a pint per day, most of it being taken on Sundays; 71 per cent. eat few or no eggs; 67 per cent. eat little or no

meat and 11 per cent. little or no fish. Green vegetables were, however, included in 71 per cent. of these dietaries. The widespread custom of chewing sugar-cane is important. Town conditions are slightly better than those in rural districts.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Nutrition on the whole is fairly good among people of working age; the chief sufferers are children and old people. General oedema is not uncommon among infants and there are evidences of vitamin A and B-complex deficiencies. Statistics covering the years 1927-36 show a tendency towards a falling infant mortality rate.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—The nutrition problem on this island is very largely an economic one. Parents cannot afford to buy proper food; and working mothers are often obliged to leave their children with neighbours who neglect to feed them.

5. *Researches and Surveys.*—The Governor suggests that a general survey of the whole Leeward Islands group would be more advisable than any endeavour to arrange a local survey in Antigua only.

6. *Practical Measures for Improvement of Nutrition.*—A five-year scheme for the development of peasant agriculture, which has recently been drawn up, includes proposals for the improvement of livestock with the double aim of increasing the market value of the stock and improving the nutritional value of livestock products. The conditions under which milk is produced and retailed in the island require careful investigation. At present there is great danger from tubercle infection, and possibly more use might be made of goats' milk which is practically free from this danger.

LEEWARD ISLANDS.

DOMINICA.

Area: 305 sq. miles.
Population: 48,280 (1936).

Birth Rate: 31·58 per 1,000 (1936).
Infant Mortality: 99·60 per 1,000 births (1936).
Death Rate: 13·71 per 1,000 (1936).

1. *General.*—A comprehensive report has been submitted by the Governor.

2. *Composition and Nutritive value of Dietary.*—The diet of the artisan and better class labourer normally consist of meat once a week, fish (fresh or salted) on other days, bread or

cassava meal, bananas (usually green and cooked), bread-fruit, avocado pears, coconuts, unrefined sugar or molasses, an occasional egg, cocoa or coffee, a few ounces of milk, and a very small quantity of fat for cooking purposes. The amount of milk available is insufficient for the needs of the population, and milk and butter as well as meat are too expensive for the poorer labouring classes who therefore rely mostly on locally grown root vegetables such as sweet potatoes, yams and tannias, together with bananas and pigeon peas. Quantities of flour, rice, maize and other cereals are imported. Most of the sugar used is imported, as also is dried and salted fish.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The Report emphasises the improvements in general health which have taken place in recent years. Both the general death rate and infant mortality rate are falling and, as a result of an active campaign against yaws and syphilis, there have been appreciable increases in attendances at elementary schools. It is remarkable that this improvement in general health has coincided with a period of severe economic depression.

The average adult labourer shows no sign of malnutrition unless in association with parasitic infection, venereal disease, malaria, or tuberculosis which is very prevalent. Anaemia is commonly associated with ankylostomiasis, but severe anaemias of pregnancy are rarely seen. School children compare well with European and American children of the same age as regards height, but the average weight for height and age is generally less. It is among infants and pre-school children that malnutrition is very commonly seen and assumes its greatest importance. The common practice of feeding infants on starchy foods, often from the first week of life, and the fact that mothers have to leave home to work, very often at considerable distances, and hence are unable to breast-feed their infants, are two factors largely responsible for the extent of infant malnutrition. The fact that malnourished children respond well to treatment with iron and a diet consisting of milk, marmite, cod liver oil and fruit juices, reveals the nature of the deficiencies which exist among them.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Citrus cultivation is the mainstay of the island. Unfortunately, the recent world economic depression coupled with devastation by hurricanes and damage to lime trees by fungus disease, has meant the abandonment of many estates, and general unemployment. Fortunately the soil is fertile and land for the growing of vegetable foodstuffs is available on easy terms.

5. *Researches and Surveys.*—Researches on the physical standards of children and the precise nature of malnutrition among infants are suggested as desirable. [See also under Antigua, paragraph 5.]

6. *Practical Measures for Improvement of Nutrition.*—Desirable measures mentioned are:—greater attention to dietetics in elementary schools; more active encouragement of the growing of crops of high food value for local consumption; improvement of milk supplies and especially the keeping of goats for milk purposes; extension of ante-natal and infant welfare centres.

LEEWARD ISLANDS.

MONTSERRAT.

Area: 32 sq. miles.
Population: 13,630 (1936).

Birth Rate: 39·32 per 1,000 (1936).
Infant Mortality: 118·7 per 1,000 births (1936).
Death Rate: 14·88 per 1,000 (1936).

1. *General.*—The papers include a memorandum by the Commissioner covering a report by the Medical Officer of Health. The formation of a special Nutrition Committee is considered unnecessary as the existing Board of Health, which includes in its membership two Medical Officers and the head of the Agricultural Department, is competent to deal with the matter.

2. *Composition and Nutritive Value of Dietary.*—The ordinary articles of diet include rice, white flour and cornmeal, which are imported in steadily increasing quantities, locally grown root crops and green vegetables, salted cod fish and herrings which are consumed in considerable quantities by the poorer classes, meat usually taken three times a week, and such fruits as plantains, bananas, oranges and mangoes in season. Citrus fruits are grown locally, but the bulk of supplies come from Dominica. Milk is cheap and should be within the reach of all; this also applies to meat which is usually of good quality. Sugar is produced locally but the bulk of that consumed is imported. The diets of the middle and upper classes conform to accepted standards of adequacy but those of the poorer classes are as a rule too rich in carbohydrate and too low in protein. Labourers perform heavy tasks of work on diets consisting mainly of bread and sugar with a small savoury of salted fish.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Nutrition is not a pressing public health problem in this island with its equable climate, wealth of sunshine

and a population largely consisting of peasants who cultivate their own small holdings. The people are normally robust, industrious, energetic and apparently well fed. It is only among poorer class expectant mothers and very young children that malnutrition assumes any importance. Among nursing mothers anaemia is not uncommon; and the problem in early childhood is solely one of unsuitable infant feeding. The percentage of illegitimate births is high as also is infant mortality.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—There has been a tendency in recent years, in consequence of the large area planted in cotton, for the people to pay insufficient attention to the growing of food crops, and it is generally agreed that the importation of rice, white flour and cornmeal is far in excess of what it should be in a community capable of growing its own foodstuffs in large quantities. Although the bulk of the population is self-supporting, there is always a certain amount of unemployment; and much poverty and destitution is to be seen especially following hurricane disasters.

5. *Researches and Surveys.*—Facilities for research do not exist. [See under Antigua, paragraph 5.]

6. *Practical Measures for Improvement of Nutrition.*—Measures specially mentioned are:—the raising of stock in larger numbers for meat and milk and the possible establishment of a model dairy farm; encouragement in the cultivation of school gardens and the further production of locally grown foodstuffs; a possible revision of customs tariffs in an effort to bring the prices of certain imported foods within the reach of the poorer classes; and the appointment of a Committee to deal with the problems of infant feeding and welfare.

LEEWARD ISLANDS.

ST. KITTS-NEVIS.

Area: 152 sq. miles.
Population: 37,454 (1936).

Birth Rate: 36·0 per 1,000 (1936).
Infant Mortality: 162·9 per 1,000 births (1936).
Death Rate: 26·0 per 1,000 (1936).

1. *General.*—No Committee has been formed. The Governor has forwarded a brief memorandum, prepared by the Senior Medical Officer.

2. *Composition and Nutritive Value of Dietary.*—The chief foods used are bread, sweet potatoes, rice, tannia, yams, maize, bread fruit and sugar, especially the fresh cane which forms a

considerable proportion of the dietary during the months of February to July. Imported cheese is largely used. Fish is plentiful; and fruits, such as mangoes, coconuts and wild raspberries are extensively used in season. Beef and mutton are always available, but high cost prohibits their use by the poor. Milk is also available, but here again price restricts its use.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Malnutrition is not present in any marked degree. It is most frequently seen among children and is mainly due to the insufficient wages earned by parents.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—No details given.

5. *Researches and Surveys.*—No facilities available. [See under Antigua, paragraph 5.]

6. *Practical Measures for Improvement of Nutrition.*—It is stated that a scheme to supply free milk and bread to school children would be of value but no specific recommendation is made.

LEEWARD ISLANDS.

VIRGIN ISLANDS.

Area: 58 sq. miles.
Population: 6,165 (1936).

Birth Rate: 38·2 per 1,000 (1936).
Infant Mortality: 140·6 per 1,000 births (1936).
Death Rate: 18·1 per 1,000 (1936).

In the brief memorandum submitted by the Commissioner it is stated that the staple food is an abundance of West Indian vegetables and fresh fish, and an unlimited supply of fresh, tubercle-free cow's milk. Nutritional diseases are practically non-existent and the physique of the people in general and children in particular is excellent. Their limbs are straight and sturdy, and the skins healthy and with scarcely a blemish.

TRINIDAD.

Area: 1,978 sq. miles.
Population: 448,253 (1936).

Birth Rate: 32·93 per 1,000 (1936).
Infant Mortality: 96·82 per 1,000 births (1936).
Death Rate: 16·28 per 1,000 (1936).

1. *General.*—The representative Standing Committee which has been established has submitted a report and has also issued various pamphlets. The Committee regard the problem as

essentially one of making the Colony more food conscious and of finding ways and means to bring about an immediate increased consumption of the most nutritive foods. In addition to the publication of explanatory and advisory pamphlets on food and health, a propaganda "nutrition drive" was recently organised and carried through by the Agricultural, Health and Education Departments.

2. *Composition and Nutritive Value of Dietary.*—The diet of the *East Indian* labourer is almost exclusively composed of polished rice, white flour and dried peas, with small amounts of green and root vegetables and coconut oil as accessories. With the possible exception of salt fish, foods of animal origin (meat, eggs, milk and butter) are either absent from the diet or are consumed in such quantities as to have no practical value. In cocoa growing areas, fruit (mango and banana) is plentiful but is eaten mostly by children and not adults; in cane growing areas fruit is scarce and seldom eaten. The most serious factor is the under consumption of milk. A family of six or seven will have no more than one tin of condensed milk per week. The diet is grossly deficient in first class protein, animal fat, and vitamins. The diet of the *West Indian* is also ill-balanced and qualitatively deficient but is relatively superior to that of the East Indian especially as regards the amount of milk supplied to infants and young children.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Xerophthalmia is widespread throughout the Colony amongst East Indians of the labouring class and is prevalent not only on sugar estates but in towns and villages, in barracks and in the small holdings of peasant proprietors. It reflects the gross inadequacy of the East Indian diet especially in respect of vitamin A. The malnutrition from which the agricultural labourer suffers inhibits the urge to work, and as a general rule he is physically incapable of performing efficient work even for the habitual working week of 20 hours. The general physique of the East Indian is definitely inferior to that of the West Indian and he is much less resistant to chronic infectious disease such as hookworm and malaria. Especially noteworthy is the prevalence of a peculiar chest condition (aphan) confined to East Indians which consists in a marked degree of fixation of the chest wall accompanied by breathlessness and asthmatic cough. The aetiology of the condition is obscure but may possibly, it is suggested, be related to vitamin B deficiency. Clark, who has done considerable work in the Colonies (see also under Nigeria) on the toxic principles occurring in native foods, has examined the relationship between diet and nephritis in Trinidad. Nephritis of all types is unusually prevalent in Trinidad where tannia and other aroid tubers find a large place in the dietary.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The more or less self-contained farm has as yet no real place in Trinidad agriculture. Here the emphasis has, in the past, been on export crops (cocoa, sugar, etc.), food crops being considered of secondary importance. In the past, a highly priced article, for example cocoa, was produced and sold in exchange for low priced imported foodstuffs. To-day, the position is somewhat changed; exportable articles tend to be relatively lower priced and the imported relatively higher priced. The development of the oil industry, which brings wealth into the Colony, tends, however, to offset this factor.

Over £1,000,000 is spent annually on imported foodstuffs, chiefly flour and meal, rice, condensed milk, meat, beans, peas, dholl, potatoes, onions and fresh vegetables. To meet world competition, the cost of production of economic crops must be kept as low as possible. This is not easy in Trinidad where labour achievement is low in relation to its cost. Consequently in times of depression caused by severe economic competition work must of necessity be curtailed, cultivation restricted and labourers thrown out of work. In the Colony to-day are numerous instances of estates where, say, a 20 per cent. greater efficiency on the part of labourers might prove the determining factor in the maintenance of the estates. It is in this connection that nutrition assumes real practical importance. If, owing to improved health, the labourer can, without more cost to the owner and without more strain to himself give, say, 20 per cent. more work, then estates, that in the aggregate form a valuable asset, will be retained to the benefit of the Colony in general and the labourer in particular. There is ample margin for expansion in the growth of food crops for consumption by labourers and their dependents; and time after time it has emerged that those labourers who had food gardens of their own were in a far better position than those who did not have this accessory means of balancing their family budgets.

5. *Researches and Surveys.*—Portions of this report are based on investigations by Drs. Lassalle, Seagar and Clark carried out between 1916 and 1931. Nothing further in the way of dietary surveys has been done. Several of the replies from the other West Indian Colonies suggest that comprehensive analyses to determine the nutritive value of West Indian foodstuffs are desirable. The Government of Trinidad do not consider that large expenditure on this subject would be justified. Data regarding the nutritive value of most of the foods which are to be found in the West Indies are available from the Philippines and Hawaii, and apart from minor differences due to soil and climate, country of origin will have but little effect on the composition of any particular foodstuff. The more important problem is considered to be essentially a practical one,

namely to find ways and means to bring about an increased consumption of protective foods as a whole (the broad general value of which is well known), rather than to determine whether one particular kind of fruit or vegetable is of higher nutritive value than another.

6. *Practical Measures for Improvement in Nutrition.*—It is possible here to make only brief reference to one or two of the more important directions in which efforts are being made. Public health and educational measures include the inauguration of cookery and domestic science training in girls' schools and women's training centres; courses in mothercraft; health weeks; hygiene teaching in schools and colleges; school medical inspection; and the improvement of dietaries in prisons, hospitals and other public institutions. The feeding of children will be given special attention in future and it is suggested that Government support should be given to the voluntary organisation conducting the School Children's Meal Centre at which 197,213 meals were given in 1938, 56,434 of which were free. Pre-school children, i.e., between the ages of two and five at present fall between two stools, for they have passed beyond the sphere of the Child Welfare League and are not yet eligible for care by the School Children's Meal Centre. Provision was made in the Estimates for 1938 for $10,000 for the supply of milk to school children and for $1,000 as a grant to the School Children's Meal Centre. The former figure has been increased to $20,000 for 1939.

On the agricultural side no efforts will be spared to devise further means to improve the milk situation and especially to encourage the keeping of goats for milk purposes. Of scarcely less importance is the need to stimulate an increased production and consumption of green vegetables. To arouse interest in this, school garden competitions have already been started. The Nutrition Committee is also considering the problem of white flour and is making enquiries in Great Britain and elsewhere in the hope that wholesale importers may be able to supply a grade of flour less highly milled or in some way re-inforced with wheat germ.

WINDWARD ISLANDS.

GRENADA.

Area: 133 sq. miles.
Population: 87,105 (1936).

Birth Rate: 31·98 per 1,000 (1936).
Infant Mortality: 104 per 1,000 births (1936).
Death Rate: 15·5 per 1,000 (1936).

1. *General.*—The papers consist of a despatch from the Governor covering a memorandum by the Senior Medical Officer. The formation of a local Commitee is unnecessary as close touch will be kept with the Standing Committee on Nutrition in Trinidad.

2. *Composition and Nutritive Value of Dietary.*—The following locally grown foods form the bulk of the dietary of the working-class population. *Carbohydrates*: muscovado sugar, sweet potatoes, breadfruit, yams, cassava, maize; *proteins*: beans, peas, pork, poultry, fish, eggs and milk; *vegetables*: pumpkins, ochroes, cucumber, cress, spinach and onions; *fruit*: bananas, pawpaws, mangoes, apples, oranges and avocado pears; *nuts and oils*: coconut, breadnut, peanuts and cashew nuts. In addition, appreciable quantities of vegetable oils, wheat flour, rice, tinned milk, salted fish and meats, butter and butter substitutes are imported.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Signs of deficient nutrition are not marked in adolescents and adults, and although they suffer to some extent from lack of protein and vitamins the absence of rickets, scurvy, keratomalacia, etc., shows that such deficiency is not excessive. The standard of physical fitness among labourers in Grenada appears to be superior to that of East Indians in Trinidad. It is among children that the position is most serious. The Colony is almost entirely given over to the cultivation of economic and food crops with the result that the cattle population is insufficient to supply the necessary quantity of milk. In consequence, children and infants suffer severely; and this state of affairs is aggravated by the deeply rooted superstition that milk is the cause of worms in children. These harmful dietetic superstitions are wedded to profound ignorance on all matters pertaining to infant feeding and child welfare with the result that " marasmus " in infants is widespread. Despite this there has been a steady improvement in the infant mortality rates during the last few years.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Owing to the fertile soil and abundant rainfall, food crops are easily grown. Many labourers have small gardens and are thus able to provide themselves and their dependents with sufficient quantities of food. Economic conditions, although not ideal, are at least as good as are to be found elsewhere in the tropical belt and with the recent commencement of public works likely to require a large amount of labour the future prospects of the Grenadian peasant are brighter than they have been for a considerable time.

5. *Researches and Surveys.*—A complete investigation by a nutritional expert is recommended as desirable; but the Governor considers that, at this stage, Grenada should be content to rely on the results of any investigations carried out in Trinidad, where the conditions are not dissimilar.

6. *Practical Measures for Improvement of Nutrition.*—There is general agreement that the first essential step is to train mothers and potential mothers in the elements of domestic economy and child welfare. The publication of a West Indian cookery book containing information on local foods and the best methods of preparing and cooking them would be invaluable for educational purposes, and the Trinidad authorities have been consulted in regard to the possibility of its compilation being undertaken there.

Every effort will be made to strengthen and expand maternity and infant welfare services as considerable results have already been obtained towards decreasing death rates due to the work of district nurses, midwives, and the children's ward of the Colony's hospital.

WINDWARD ISLANDS.

ST. LUCIA.

Area: 233 sq. miles.
Population: 65,026 (1936).

Birth Rate: 32·0 per 1,000 (1936).
Infant Mortality: 97·9 per 1,000 births (1936).
Death Rate: 14·9 per 1,000 (1936).

1. *General.*—A minute from the Senior Medical Officer and a despatch from the Administrator, make up the papers from St. Lucia, where no Committee has yet been set up.

2. *Composition and Nutritive Value of Dietary.*—Diets made up from the following foods are generally representative among servant classes in receipt of regular wages, town dwellers less well educated, and labourers in occasional employment: white bread, brown rice, cassava, flour, peas, beans, plantains, bread fruit, salt fish, cottonseed oil, cocoa and lime juice. Meat (pork) may be eaten once or twice weekly and fruit only occasionally. The diet is mainly carbohydrate and even if protein is included, it is usually not of the first class type. Beef, fresh milk and eggs are consumed only in very small quantities owing to their relatively high price. These dietary deficiencies are more exaggerated among East Indians, whose chief carbohydrate is brown rice or cassava, than among West Indians of African

origin who use cassava, yams, bread fruit and tannia interchangeably, although, it is true, there is a growing tendency among town-dwelling West Indians to substitute imported rice for local starchy foods.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—The existence of these qualitative dietary defects is mainly reflected in the low resistance to disease and high incidence of infection. Septic infections are very prevalent and lowered resistance to disease is more marked among Indians than in Europeans. There is definite evidence that undernourishment exists among children of both school and pre-school age; but beri-beri, pellagra, scurvy and rickets are unknown in the Colony. Boys selected for training at the Agricultural Experiment Station are at first small for their age, with a poor reserve of energy, and subject to malaria and digestive disease. During a two-years course of training, with regular habits and meals, a marked improvement in physique, intelligence and work output takes place.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—Agricultural and fishing conditions in the Colony permit of a wide range of foodstuffs being produced to supply a much more protective diet than is at present customary; but it is difficult to interest the adult labourer in the matter since his earnings provide a bare margin for his needs, and he tends to accept malnutrition in his children as the natural state of existence. Recent legislation has brought about higher rates of wages than hitherto existed and the time seems appropriate to encourage a movement towards improved feeding conditions in order to put to the best use any small surpluses consequent on the improved earnings. Without education in regard to food, ameliorative economic efforts concerned with tariff adjustments and exemptions from duty will have little or no effect.

5. *Researches and Surveys.*—Existing knowledge is based on clinical observations; there are no facilities for specialised research work.

6. *Practical Measures for Improvement of Nutrition.*—It is the intention of Government to extend its maternity and child welfare services to the limit of available funds. The distribution of milk to school children is a measure which cannot be applied immediately, but will be borne in mind. The Agricultural and Education Departments will intensify their efforts to improve and increase the production of vegetable foodstuffs through the medium of " farmers' clubs " and school gardens. The keeping of goats for milk will also be encouraged; and the widest publicity will be given to the whole subject of nutrition by means of printed pamphlets and articles in local newspapers.

WINDWARD ISLANDS.

ST. VINCENT.

Area: 150 sq. miles.
Population: 56,511 (1936).

Birth Rate: 39·14 per 1,000 (1936).
Infant Mortality: 119·3 per 1,000 births (1936).
Death Rate: 16·35 per 1,000 (1936).

1. *General.*—A local Committee has been appointed which has since been reconstituted as a Standing Committee consisting of the Senior Medical Officer, Agricultural Superintendent, Inspector of Schools and Labour Commissioner, with the Chief Sanitary Inspector as Secretary. The Administrator forwards a copy of the report to this Committee, together with documents indicating the action taken to deal with the problem of malnutrition. The bulk of the despatch deals with the measures which have been, or are about to be, put into effect to cope with the situation, the unsatisfactory nature of which seems to be generally recognised.

2. *Composition and Nutritive Value of Dietary.*—No precise information exists on this but it is obvious that the diet is overwhelmingly a carbohydrate one, animal protein, vitamins and mineral salts being deficient or absent. Such foods as milk and eggs are not ordinarily consumed, and the same is true of fruit and green vegetables.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Sickness and disability due to underfeeding are widespread among children of school and pre-school age. The chief causes are poverty, overcrowding, insanitary housing conditions and destitution, consequent on the birth of children as a result of casual unions.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Little is reported under this head. As regards import tariffs there are no foods of high nutritive value ordinarily consumed by labourers or peasants which are heavily taxed.

5. *Researches and Surveys.*—There are no records of any research having been carried out. Any investigations, if practicable, should be co-ordinated for the whole of the West Indian Colonies taken together.

6. *Practical Measures for Improvement of Nutrition.*—It was decided in the first place to deal with the problem of undernourished school children and to endeavour to organise a daily

milk supply for them. Accordingly a note was made of all the schools in the Colony, of the amount of pasturage available at each school, of the number of cows required to provide a sufficient milk supply at each school and of the estimated number of undernourished children. Thereafter all the leading planters and heads of religious denominations were invited to give or lend cows to the schools and, where pasturage was not available on school or church lands, to provide this. There has been a fairly generous response to this invitation and a further report will be sent as the scheme progresses. Next, attention was directed to improving and expanding maternity and infant welfare services, and provision has been made for the appointment of individuals competent to organise and control infant welfare work throughout the Colony. Other measures which are being encouraged are the education of public opinion by means of propaganda lectures and the distribution of informative leaflets. A questionnaire has been circulated to schools with the object of obtaining information on the dietaries usually consumed and on the physical status and intelligence of pupils. This information is required before the problem of improvement in the nutrition of children can be systematically dealt with.

ISLANDS OF THE WESTERN PACIFIC.

FIJI.

Area: 7,083 sq. miles.
Population (1936).

European	...	4,159
Fijian	...	98,291
Indian	...	85,892
Others	...	12,744
Total	...	201,086

Birth Rate: 37·96 per 1,000 (1936).
Infant Mortality: 109·76 per 1,000 births (1936).
Death Rate: 20·17 per 1,000 (1936).

1. *General.*—A permanent Committee has been appointed to deal with the subject of nutrition in Fiji, and it is now engaged in obtaining information preparatory to a scientific examination by an officer who is undergoing a special course of training in America. At present, no precise information exists. Data from sources other than the report have been incorporated in this summary.

2. *Composition and Nutritive Value of Dietary.—Fijians.*—The standard food crops consist of ndalo, yams, cassava, kumala, kawai, bread fruit, coconuts and bananas. These are supplemented by green vegetables and leaves of wild plants. Fruits are abundant and sugar cane, which is widely cultivated, forms part of the staple diet. The majority of Fijians obtain an adequate supply of protein food from fish and shellfish obtained from the lagoons and rivers. In many instances the diet is supplemented by the purchase of bread, biscuits, butter, rice, tinned meat and tinned milk. The principal lack in the customary diet is that of fresh milk. Fresh cattle, meat and milk are rarely used; but pigs and poultry are kept in most villages and are consumed as occasion demands.

Indians.—The average diet consists of rice, dhal, green vegetables, poultry, eggs, fish (crayfish), milk, ghee, vegetable oils and sugar, with supplements of fruit and fish. Although ample in quantity there is some evidence that the Indian diet is deficient in calcium.

It is considered that, while the general value of the Fijian diet seems established by the manner in which the race continues to reproduce, it is probably poorly balanced, is marginal in vitamins A and B, and is short in protein.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—The average Fijian is physically very well developed. Superior development is also apparent among Fiji-born Indians as compared with immigrants from India. Under the heading of "food diseases", cases of epidemic

dropsy are recorded in recent reports from the Medical Department. Oedema of the lower extremities, anaemia, digestive upset and diarrhoea are characteristic of all cases. There is some evidence that the consumption of deteriorated rice may be a contributing factor. (For analogous findings, see under Sierra Leone, paragraph 3). Tropical ulcer is also seen in Fiji, but only appears among natives or East Indians at schools and other institutions, or in road gangs receiving food which approaches European standards. A return to native foods, fruits and fresh coconut milk drunk from the nut is the most successful treatment. Dental caries is of frequent occurrence among those Fijians who have ceased to adhere strictly to their customary diet.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—Fiji is fertile and sparsely populated, the population density being about 28 per sq. mile. Owing to the communal system of society there are no rich Fijians, but there is also no poverty. The Fijian is a landowner and under Native Regulations each adult male is required to plant and to keep in cultivation sufficient food crops to satisfy the requirements of himself and his dependants. All women are exempt from communal work in order that they may devote their energies to the care of their houses and children, and in many districts the husbands of pregnant women are temporarily exempt from work to enable them to provide adequately for the needs attendant upon childbirth.

5. *Researches and Surveys.*—The collection of exact information regarding existing diets and their nutritive value is considered necessary. Preliminary surveys to include physical examination of individuals in various age groups and a determination of the incidence of diseases attributable to malnutrition can be carried out by Medical Officers and in Government schools and other institutions. Biochemical and animal experiments can be undertaken in the new Pathological Laboratory. As the work proceeds provision of additional funds will probably be necessary. It is pointed out in the report that conditions in Fiji are very similar to those prevailing in Hawaii, and it is hoped that, when the results of nutritional problems at present being investigated in the University of Hawaii become available, Fiji may indirectly benefit. Fiji also offers scope for the study of changes in diet due to race-contact among the three main races, Fijians, Indians and Europeans.

6. *Practical Measures for Improvement of Nutrition.*—A growing amount of instruction is being given in the planting of crops for home consumption. At both Government and Mission schools food gardens are cultivated by the pupils under the direction of teachers. A considerable amount of work has been done through the Child Welfare Organisation in improving the

diets of mothers and young children, and adequate ration scales have been laid down for use in schools, hospitals and prisons. The investigations referred to in para. 5 must precede any attempt to formulate further measures for the application of scientific knowledge to the improvement of local conditions.

GILBERT AND ELLICE ISLANDS.

Area: 180 sq. miles.

Population (1936).

Native	32,761
Asiatic	893
European ...	222
Total ...	33,876

Birth Rate: 34·5 per 1,000 (1936).

Infant Mortality: 245·9 per 1,000 births (1936).

Death Rate: 41·1 per 1,000 (1936).

1. *General.*—The papers forwarded from the Gilbert and Ellice Islands comprise:—

(*a*) A non-professional interim report by the Resident Commissioner.

(*b*) Two reports by the Senior Medical Officer.

(*c*) A memorandum prepared by the Superintendent of Education.

(*d*) A review of food production in the Gilbert Islands by Sir A. F. Grimble, now Governor of the Seychelles, formerly Resident Commissioner in the Gilbert and Ellice Islands.

2. *Composition and Nutritive Value of Dietary.*—The normal native diet consists of coconut toddy which is drunk regularly by most adults, fish (fresh and dried), coconuts, pandanus and babai, a species of wild taro. To these, as delicacies eaten only rarely, may be added sugar-cane and bananas. Fresh milk is never obtainable; and fresh vegetables and meat are practically unknown. Eggs are scarcely ever eaten. The Carbohydrate content of the diet is thought to be unusually low; the protein is probably adequate as fish is highly favoured; indeed, the people have a craving for fish and will put out to sea in face of almost impossible weather conditions to get it. There is a known shortage of animal fat which is to some extent relieved, in men at least, by the eating of the revettus (castor oil fish) which is very rich in fat and is greatly valued in spite of the diarrhoea which it causes. Sir A. F. Grimble provides a useful account of the manufacture of coconut toddy and of the food uses of various products of the coconut and pandanus.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—The natives are by nature a healthy race, of good physical stamina and development. Beriberi, however, exists, and cases of apparent shortage of the anti-beriberi factor

without frank symptoms occur. There is also a very high incidence of a form of adenitis (usually cervical) among children and young adults which, clinically, resembles, but is not identical with, the tuberculous variety commonly seen in Europe. Although there are no supporting statistics, it is believed that the population has an unduly low resistance to influenza and the common cold. Chronically enlarged tonsils among native children are almost the rule. Infant mortality is high (averaging about 200 per 1,000 births) and is very probably connected with diet.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—The purchasing power of the native for imported foodstuffs is limited to about 10s. per head per annum. Any dietetic improvements to be expected from the adjustment of tariffs towards an increased use of imported foods must therefore be discounted. The native has no money to buy anything but the very cheapest and, therefore, the imported article most favoured is flour, the customary charge for which is 4d. per pound. At this price, and assuming the native devoted his entire purchasing power to buying flour, he could get only about 30 lb. of it in a year.

5. *Researches and Surveys.*—The Senior Medical Officer urges that a scientific and systematically controlled investigation of the whole nutrition question in these Islands be carried out.

6. *Practical Measures for Improvement of Nutrition.*—The application of certain desirable measures towards improvement, e.g. the free issue of tinned milk for infants and children, has proved impossible for reasons of cost. On the other hand, hundreds of pounds have been spent on the wide distribution of cod liver oil, but without any very striking benefit. The placing of whole meal flour within the purchasing power of the native is recommended. If it could be had for, say, 2d. and not 4d. per lb., the native could afford to buy about 60 lb. per head per annum which would do at least something to relieve the present (conjectural) shortage of carbohydrate in his diet.

NEW HEBRIDES CONDOMINIUM.

Area: 5,700 sq. miles.
Population (1936).
Approximate figures.

(1) Europeans ...	950
(2) Asiatics (other than those referred to in (3) below) ...	130
(3) Indo-Chinese coolies	850
(4) Natives	40,000-60,000

Birth Rate: | No statistics available.
Infant Mortality: |
Death Rate: |

1. *General.*—These territories are administered jointly by British and French authorities and there are no Medical, Agricultural and Education Departments in the usually accepted sense. The Resident Commissioner forwards a report compiled with the help of the Medical Officer of the British Mission.

2. *Composition and Nutritive Value of Dietary.*—1. *Europeans, Asiatics and Indo-Chinese coolies.*—Generally speaking, Europeans have sufficient means to afford an adequate diet, both in quantity and quality, and their standard of health is good. Well-to-do Japanese and Chinese traders are likewise well provided for and are strong, healthy and rarely sick. They favour rice, fish, poultry, eggs and vegetables, but eat little meat and dislike milk. Indo-Chinese coolies receive rations under French regulations and are well cared for and frequently medically inspected. Their standard of health is mainly good and they stand up well to the rigours of plantation life, but suffer occasionally from beriberi. 2. *Natives.*—The natives may be roughly divided into three classes (*a*) bushmen, (*b*) salt-water or coast natives and (*c*) plantation labour. (*a*) *Bushmen.*—Bush natives are almost completely out of touch with civilisation. They live in the interior of islands and rarely come down to the sea or join a mission school. Their diet consists of yams, taro, manioc, coconut milk and oils, bread fruit, banana, sugar cane, nuts and vegetables. Their food is deficient in animal protein and they eat no salt. The birth rate is low, the infant mortality rate high and it is clear that in the bush only the fittest survive. Those who reach maturity are muscular, wiry and of great endurance. But the only time the bushman eats really well is when engaged on plantation labour where, on a more regular diet, he gains considerably in weight. (*b*) *Coastal natives* are those living near the coasts of the various islands. They are in continuous contact with missionaries, traders and Government Agents, and are the main source of plantation labour. They eat what the bushman eats but make more use of meat, fish and eggs and imported " white man's luxuries " such as bread, biscuits, tea, sugar and tinned meats. In addition they consume quantities of local fruits. They use little or no salt. They are on the whole better fed and nourished than the bushmen and in consequence are able to do more and harder work. (*c*) *Plantation labourers,* who are recruited chiefly from bush and coastal natives receive rations and get more to eat than in their villages even under circumstances of comparative wealth. During life on plantations, the native generally improves in weight and physique. Plantation diets consist of rice, meat and fish, bread, tea, sugar and supplements of yam, taro, manioc and other native products. It is a curious fact that natives, particularly bushmen, eat little salt and dislike milk. Milk is regarded as a dirty food, and only the most sophisticated natives after long contact with whites can be prevailed upon to touch it.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Deficiency diseases are practically unknown. A few mild cases of beriberi are occasionally seen on plantations, but these rapidly clear up when the labourer returns to his own village. Natives have, generally speaking, splendid teeth.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—When copra prices are high the salt-water and plantation native is well-off and has money to spend on food and clothes; but the question of how he is to maintain his prosperity standard when prices decline is a question which requires study. The bushman is virtually unaffected by the economic prosperity or depression in these islands. Biscuits, fresh fruit and vegetables, rice, cereals, potatoes, onions, beans and flour enter the New Hebrides duty free. Other foodstuffs pay a duty of 12 per cent. and it is unlikely that any reduction in this would affect local nutrition conditions.

5. *Researches and Surveys.*—No facilities exist for research or dietary survey work.

6. *Practical Measures for Improvement of Nutrition.*—The means at the disposal of the Condominium Government are exceedingly slender and there is little hope that it will be economically possible in the immediate future to put into effect any measures for improvement which may be considered desirable. The formation of a small Anglo-French Commission to study and advise the Joint Administration on the various aspects of the subject would no doubt be helpful.

SOLOMON ISLANDS.

Area: 11,000 sq. miles.

Population (1931).

Natives ...	...	93,415
Europeans	...	478
Asiatics ...	...	173
Total	...	94,066

Birth Rate: 22·0 per 1,000 (approx.).

Infant Mortality: No data available.

Death Rate: 19·0 per 1,000 (approx.).

1. *General.*—A detailed report prepared by the Senior Medical Officer has been submitted. The Group comprises nine large islands and numerous smaller ones inhabited by a heterogeneous people of varying races, cultures, religions and standards of living. Although the following summary treats with conditions as a whole, generalities are apt to be misleading, and a statement which is perfectly true of one island, or section of an island, may be entirely inapplicable to another part of the group. There are no Government schools and no Agricultural or Veterinary Departments in these islands, although advice is given by Fijian Departments.

2. *Composition and Nutritive Value of Dietary.*—The staple foods are taro, yams, panna, sweet potatoes, bananas, plantain, bread fruit, sago, cassava, native cabbage, ngali nuts, coconuts and fish. Supplementary to these but only occasionally eaten are maize, tropical fruits, flesh of wild pig, opossum and flying-fox, crabs, shellfish and the eggs of fowl, megapode and turtle. Cereals such as rice and maize have almost no place in the dietary. Fresh milk is unobtainable and the tinned variety expensive. From weaning until death the native consumes no milk and no milk products whatever. Speaking generally, the natives do not suffer from want of food, but the excessive carbohydrate and deficiency of fat, protein and vitamin A render the diet insufficient for the maintenance of perfect physical condition. The practice of betel nut chewing is general throughout the islands. It relieves hunger and is said to prevent tooth decay; but its effect on the gums is disastrous and every confirmed betel nut chewer has severe pyorrhoea. Imported foods such as rice, tinned meat and fish, and biscuits are only eaten very occasionally by natives who can afford them or when issued as rations to plantation labourers.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—Although there is no shortage of food, the fact that plantation labourers rapidly put on weight and improve in physical strength when on regular rations shows that the customary native diet is not fully adequate. There can be no doubt that the dietary deficiencies of the villagers are an important factor in lowering resistance to such infectious diseases as tuberculosis, leprosy, hookworm, malaria and influenza.

Night blindness and other pathological eye conditions due to vitamin A deficiency are frequent. Beriberi and scurvy are uncommon among the general native population but not infrequent among the plantation labourers when their diet is restricted to rice, biscuits and tinned meat. The incidence of tropical ulcer is high, especially where taro is the staple food; where fish is largely eaten, the incidence is much lower.

4. *Economics of Diet (relation to local agriculture, cost, tariffs, etc.).*—As in the New Hebrides, here also the natives are either " bushmen " or " salt-water " coast dwellers. The establishment of law and order has altered the manner of life of the native and affected his nutrition to a profound degree. Formerly, the coastal peoples were the hereditary enemies of those in the interior, barring them from reaching the sea. The bushmen in their turn, were continually raiding the coastal natives and laying waste their crops and gardens. Now the two tribes are no longer concerned with war with the result that larger gardens are planted and the standard of agriculture is slowly improving. New varieties of foodstuffs are being introduced and food is

more abundant and more diversified in character than it used to be. The Protectorate depends for its revenue almost entirely on the export of copra and apart from those natives who sell their labour on plantations, each native community is dependent on its own subsistence agriculture. There appears to be little reason to hope or expect that improvement in nutrition will materially alter the economy of the Protectorate in the immediate future.

5. *Researches and Survey.*—Nothing has been done in this direction; but it is recommended that an attempt be made to collect accurate vital statistics, data on physical standards, and detailed information regarding the incidence of disease in relation to diet.

6. *Practical Measures for Improvement of Nutrition.*—Arrangements are under consideration for providing increased agricultural assistance. This is considered an essential preliminary to improving native living conditions. Encouragement should be given to natives to cultivate food gardens, and gifts of seeds to responsible villagers would be a desirable measure. Hitherto there have been no maternity and child welfare services; but the organisation of these is at present under consideration.

TONGA.

Area: 250 sq. miles.

Population (1937).

Europeans	...	443
Tongans ...	...	31,753
Others ...	...	665
Total	...	32,861

Birth Rate: 35·70 per 1,000.

Infant Mortality: 100·59 per 1,000 births.

Death Rate: 14·58 per 1,000.

1. *General.*—The papers include reports from the Agent and Consul and from the Acting Chief Medical Officer.

2. *Composition and Nutritive Value of Dietary.*—In general, the diet of a Tongan consists of root crops, such as yams, taro and kumaras, fish and a little meat. Pork and fowl are consumed on ceremonial occasions, which are frequent. The diet is deficient in milk, eggs, fruit and green vegetables. The Tongan likes fresh milk, but the trouble of feeding and milking cows dissuades him from keeping them. Eggs are plentiful but are not eaten; and the only green vegetables used are, generally speaking, the leaves of taro and cabbage. There is a very marked preference on the part of the native for tinned instead of fresh meat. Quantitatively the diet is sufficient but qualitatively it falls short of accepted standards, being deficient in vitamins A and D and in salts such as calcium, iron and iodine.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—Judging by the physique and health of the average Tongan man and woman the diet might be regarded as satisfactory; but that pronounced qualitative deficiencies exist is evidenced by the amount of tuberculosis, cutaneous and eye diseases, septic conditions and low resistance to infection which is encountered. Pyorrhoea and dental caries are very common, and there is a certain amount of goitre which points to iodine deficiency. The prevalence of rheumatic infections may also have a bearing on the nutrition problem. Rickets and beri-beri are not met with; but degrees of anaemia are to be seen among children and adults.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—Except in the smaller coral islands, land is fertile, pastures are good and foodstuffs can be produced in abundance. The country is one of small-holders and there are no large towns to be fed from the land. There is little real necessity to import exotic foodstuffs and the question of tariffs is not therefore of major importance.

5. *Researches and Surveys.*—This question does not arise as no facilities exist.

6. *Practical Measures for Improvement of Nutrition.*—Practical measures already adopted by the Medical Department are the supply of cod liver oil to necessitous cases and of Glaxo for infant feeding. The teaching of food values and mothercraft has been adopted and included in the curricula of all schools. Provision has been made for the appointment of an additional trained European nurse to enlarge the scope of the work already being done with regard to infant welfare and ante-natal work. Further measures recommended are: the encouragement of children to eat wholemeal bread which should be imported from New Zealand free of duty; the suppression of the growing habit of sugar-eating and the eradication of the erroneous idea, commonly held in these islands, that the tubercular subject should abstain from animal fats. On the agricultural side, it would be advantageous to encourage the rearing of goats and to engender a taste for goat's milk. Milk and its products are rarely taken, and then only in the form of tinned milk. The growing of cabbages, carrot, spinach and tomatoes is another agricultural problem which needs development.

ISLANDS OF THE SOUTH ATLANTIC.

FALKLAND ISLANDS.

Area: 4,618 sq. miles.
Population: 2,432 (1936).

Birth Rate: 18·8 per 1,000 (1936).
Infant Mortality: No data.
Death Rate: 8·79 per 1,000 (1936).

1. *General.*—A Board of nutrition has been established under the chairmanship of the Governor composed of 18 members representative of all interests in the Community. A number of Committees of the board have been formed for research and investigation, and for the agricultural and educational aspects of the problem. The population consists almost entirely of white people and has been derived to a large extent from the United Kingdom.

2. *Composition and Nutritive Value of Dietary.*—Mutton, tea and bread are staple articles of diet amongst the Falkland Islanders, supplies of fruit being irregular and costly except in urban areas. Milk consumption is low; good supplies of vegetables are, however, available. Although the normal dietary may be adequate in quantity it is ill-balanced and lacking in variety.

3. *Diet and Health* (*deficiency diseases and other relevant considerations*).—It is a striking fact that the major food deficiency diseases such as oedema, pellagra, beriberi, scurvy, rickets, xerophthalmia and night blindness do not occur. Nevertheless, the monotony and qualitative imbalance of the dietary is regarded as responsible for the considerable prevalence of dental caries, respiratory infections, appendicitis and constipation. Further, there is a well-founded impression that the Falkland Islander as a physical type tends to be below par, and Dr. Cheverton in 1936 showed that 42·7 per cent. of children in the Government School were below normal standard as judged by the Von Pirquet height and weight ratio. Information, however, which has been collected since that date in connection with the scheme for the distribution of milk in schools, referred to below, suggests that this figure may be an overstatement of the degree of the malnutrition existing.

4. *Economics of Diet* (*relation to local agriculture, cost, tariffs, etc.*).—A dietary survey is now in progress which will, it is hoped, provide data regarding the cost of living. The Medical Officer suggests that a duty might be levied on highly milled food products the proceeds of which could be used to encourage the consumption of whole wheat flour.

5. *Researches and Surveys.*—In the past, few precise observations relating to nutrition have been made. A dietary survey is being undertaken in Port Stanley to ascertain what the people do and do not eat and to work out any relationship which diet may have to the incidence of infection. Smaller investigations already begun include blood examinations with reference to the incidence of anaemia, and certain dental studies with a view to determining whether the prevalence of caries is related to malnutrition or is hereditary. Work is in progress on a comparison on the stature of the islanders during the last four generations. During the winter months it is hoped to undertake tests for deficiency of Vitamin C.

6. *Practical Measures for Improvement of Nutrition.*—A scheme has been instituted for the distribution, free of charge, of milk and a vitamin concentrate to students in schools who show signs of malnutrition. Under this scheme some 50 students have received a pint of evaporated full cream milk plus 1 c.c. of Radiostoleum (a vitamin A and D concentrate) each day. Records have been kept of the physical condition of the students concerned and in June, 1938, upon re-examination a number were so improved that they were removed from the list. The mean gain in height and weight of the general school population is being compared with the mean height and weight of the malnourished group over the same period with a view to the making of comparisons.

Other measures for improvement, either in force or envisaged for the future, are: health education by lectures and demonstrations, domestic science teaching in schools, the provision of pre-natal, infant and adult welfare clinics; and encouragement in the production of green vegetables, eggs and a reliable supply of fish.

TRISTAN DA CUNHA.

Area: 16 sq. miles.
Population: 183 (1937).

Birth Rate: 23·23 per 1,000 (1937).
Infant Mortality: No data available.
Death Rate: No data available.

1. *General.*—The most recent information is that collected by medical and dental officers attached to His Majesty's Ship "Carlisle" during a visit to the Island in 1937. Their reports show that conditions have somewhat altered since 1932, when an earlier report was made. Imported additions to the dietary have been followed by changes in the Islanders' outlook on life, and in their physical health: the condition of the teeth being somewhat adversely affected. Peaceable, contented, and

unemotional, the Islanders have developed these characteristics as the result of a simple minded acceptance of environment, rather than from apathy or sub-normal intelligence.

2. *Composition and Nutritive Value of Dietary.*—The water supply is abundant and easily accessible, and although open to pollution by cattle and poultry, no epidemics have resulted from this defect.

The ingenuity of the women has evolved many dishes the basis of which, in one form or another, is the potato, the staple food of the Islander. Fish, chiefly crayfish, are plentiful and are largely eaten; meat being reserved for festive occasions. Milk, butter and cheese are more easily procured than in civilized slum communities. The eggs of the albatross, mollyhawk and penguin are collected in Spring; and in Autumn, young sea-birds are caught, the carcases giving an adequate supply of fat for cooking. Lettuce, cabbage, beans, onions and other vegetables are grown in the low-walled enclosure before each of the houses. Apples are the only fruit which ripen.

In contrast to the period pre-1932, 10 ships in three and a-half years have brought wheat flour, sugar, tea and other luxuries to the Island and now scones and bread are made several times a week. This novel factor probably accounts for the rising incidence of dental defects. Occasional rations of tinned fruit, tinned meat, biscuits and jam, gifts from visiting ships, are issued from a communal storehouse.

3. *Diet and Health (deficiency diseases and other relevant considerations).*—For the maintenance of the exceedingly good health of the population the home-grown food is undoubtedly responsible. Infants are breast fed. Rickets, bow-legs, flat feet, arthritis, rheumatism, adiposity are absent. Up to the age of nine years, the children tend to be rather pot-bellied, and a mild form of bronchitis is all that the adults complained of. The medical report states that of 183 persons examined, 140 were in perfect health. The dental report, however, reveals that the gums of the people are by no means as healthy as they were in 1932. Against the five cases of gingivitis in 1932, there are now 48. Pyorrhoea is also slightly increased.

4. *Economics of Diet.*—The resources of the Island are adequate to support the community. A population of twice the number could be supported if Inaccessible Island were exploited for food production.

5. *Researches and Surveys.*—The British Medical Journal for 1932 and 1936 contains reports of surveys made by Sampson and Owen. The visit of His Majesty's Ship " Carlisle " in 1932 and 1937 may possibly be repeated.

In addition at the end of 1937 a party of six Norwegian scientists including a doctor and a dentist, under the direction of Dr. Erling Christophersen left England for Tristan da Cunha for the purpose of scientific research work. The investigations to be made amongst others included (*a*) a detailed survey of the health conditions of the population including clinical, physiological, and bacteriological-serological investigations and anthropometric measurements; (*b*) a detailed investigation of the state of caries and alveolar pyorrhoea and of the form and development of the teeth. An X-ray outfit was taken; (*c*) a survey of the social organisation and of the psychology of the population and an attempt to reconstruct a complete genealogy to be used in connection with the medical work.

6. *Practical Measures for Improvement of Nutrition.*—None required.

SUB-SUMMARIES.

MEDITERRANEAN.

Cyprus.—On the whole, dietary conditions are believed to be satisfactory except among the poorer classes who are subject to considerable disease consequent on underfeeding. There is great need for the extension of sound knowledge on elementary matters of food and nutrition. The Cypriot does not appear to consider fresh milk an important article of diet. Dietary surveys and active research on staple food products along well planned lines are advocated. This could be undertaken only with increased staff and facilities. The Medical Department and Government Analyst are already active in so far as time permits.

Gibraltar.—No serious nutrition problem can be said to exist in Gibraltar. Underfeeding due to poverty is recorded. Measures are in force to deal with it. The one question deserving of further study is whether the high incidence of pulmonary tuberculosis is related to nutritional deficiency; but no specific recommendations are made with a view to furthering such study.

Malta.—It appears that undernourishment is very common among the poorer classes, the worst sufferers being expectant and nursing mothers. Malta's infant mortality rate is abnormally high, being 286 per 1,000 in 1935. It is abundantly clear that one of the worst features of the situation is the very low consumption of milk. Goats' milk is the chief source of supply. The average daily consumption among those who drink milk is about 4 oz. per head, but a large percentage of the population drink no milk at all. Poverty and ignorance are the main causes of such malnutrition as exists. Numerous Government measures are in force with a view to improving conditions, special attention being directed towards the provision of an adequate milk supply for the general public and for Government charitable institutions and schools.

Palestine.—Among rural communities, the Jews consume a satisfactory diet, both qualitatively and quantitatively, while the Arab diet is often considerably below that generally considered necessary for normal requirements. Regarding urban populations, the attainment of dietary adequacy depends almost entirely on the prosperity of the groups concerned. Wide variations exist in the means and standard of livelihood of the different races and sections of the population and the nutrition position is liable to be profoundly and persistently modified by the rapid expansion of the population both by natural growth and immigration.

AFRICA.

East Africa.

Note.—Research for all the East African territories other than Somaliland is to be centred at Nairobi. Proposals are on foot to extend the work already being done.

British Somaliland.—The report submitted gives valuable information in regard to the very special conditions in the Territory. Important points are the fairly general quantitative lack of food, particularly among town dwellers; the almost entire neglect of green vegetables and fruit; the emphasis laid on the importance in the diet and the high nutritive value of camel's milk; the absence of parasitic infection so common in other East African countries; the characteristic physique of the race, the spare, lean bodily frame and yet an ability to endure long continued hardship and privation without apparent ill-effects.

Kenya.—With its well equipped laboratories and the stimulus given to nutrition study by the earlier activities of the Economic Advisory Council and Empire Marketing Board (1925-8), research has tended to move ahead of agricultural practice and policy. Although a certain amount of specialised nutrition research is still in progress, the weight of attention is now being directed towards agriculture and animal husbandry with a view to increasing the production and consumption of local foodstuffs and thus applying in practice the precepts regarding the need for improved nutrition emphasised as a result of the various dietary surveys and laboratory studies which have been completed.

To this end various schemes have been set on foot to educate the native in modern methods of pasture management, stock-breeding and improved cultivation. Eventually this policy must result in a general raising of the standard of native living.

Tanganyika.—In Tanganyika little nutritional research has been undertaken in the past although considerable data on the subject are now being collected. Consequently this report deals largely with measures necessary towards securing improved nutrition in the future, and to a less extent with past activities. There is abundant evidence that malnutrition exists but its precise extent has not yet been determined. It is generally agreed, however, that the majority of the population does not get enough meat and milk and that a major difficulty is the recurrent annual period of food shortage between harvests. A large percentage of illness suffered by the natives employed on estates is traceable to unbalanced dietaries. By improving dietary conditions, one employer has increased his average daily turn-out of labour from 50 to 98 per cent. The reviewing Committee detail the directions in which the Agricultural,

Veterinary, Education and Medical Departments are endeavouring to improve the situation. In addition to concentration on the improved production and distribution of meat and milk, and the encouragement of mixed farming and vegetable growing, the Committee advocate the abolition or reduction of existing duties on certain foods. Further, the appointment of a special nutritional research officer is strongly recommended.

Uganda.—Certain valuable and informative surveys have been carried out which show that faulty nutrition is responsible for a considerable amount of disease. Deficiencies of first class protein, fat and vitamin A are particularly noticeable. Further research is strongly advocated, especially the determination of basal metabolic rate in natives and the analyses of local foodstuffs. Important studies have been carried out in the Teso district in which both the Agricultural and Medical Departments co-operated. These might well serve as a model for similar investigations elsewhere in the Colonies. What appear to be adequate measures for the continued improvement of nutritional conditions are being actively prosecuted by the Medical, Agricultural and other Departments most closely concerned.

Zanzibar.—A detailed report of 20 printed pages has been submitted. Excessive carbohydrate and deficiencies in protein (both animal and vegetable) and animal fat are outstanding characteristics of the Zanzibar native diet. From medical observations, it is concluded that a marked degree of avitaminosis exists among the general population. Only one-third of the children can be described as well nourished. Towards improved nutrition, numerous practical measures, both agricultural and medical are described.

Northern Rhodesia.—A very detailed report has been submitted. Nutritional disease, which is considerable, is referable chiefly to dietary deficiency of protein, fat and vitamins normally provided by meat, milk and vegetables. Generally speaking, the consumption of these is insignificant, a circumstance which is reflected in the poor physique exhibited by large numbers of natives. Considerable attention is paid to the dietary requirements of the miners whose physique undoubtedly benefits during their employment. There is need for improvement in the rations given for agricultural, domestic and casual labour. A striking feature is the scant attention which has in the past been paid to native agriculture due to the slender resources of the Agricultural Department. The Committee recommend that the resources of the Agricultural Department be increased to enable it to encourage the development of subsistence agriculture along sound lines. The need for research is recognised, the Committee considering that the appropriate body to plan and supervise the necessary studies is the Standing Committee on Medical Research in East Africa. The part which for the present the Medical

Department will play in relation to the improvement of nutrition will be the extension, so far as possible, of maternity and child welfare work and the collection of information to guide the activities of the Administration and of the Departments of Education, Agriculture, and Veterinary Services.

Nyasaland.—The question of nutrition has been referred to the Native Welfare Committee which has submitted a detailed report. The staple foodstuff of the indigenous population is maize except in certain areas unsuitable for its cultivation, where cassava is relied upon. Both are eaten in the form of porridge. Local vegetable relishes play a very important part in the dietary. According to the standards accepted for non-tropical races the intake of first-class protein is inadequate, more especially during the important periods of childhood, pregnancy and lactation. The consumption of fats is also low and they are mainly of vegetable origin. Carbohydrate intake is adequate or even excessive. The intake of vitamins A and C during certain months must be reduced to a dangerously low level. It is probable also that local diets are deficient in calcium and phosphorus. There is a high incidence of catarrhal affections, conjunctivitis, and tropical ulcers which may be regarded as indicating a latent state of malnutrition in the population. Pellagra occurs, principally among the prison population. It is generally agreed that the native family could produce more food without additional labour by adopting better methods of agriculture. A comprehensive survey of diet in relation to health is at present being carried out with the co-operation of the International Institute of African Languages and Cultures, and under the scientific direction of Dr. B. S. Platt who has been appointed by the Medical Research Council to co-ordinate surveys on diet and health in colonial territories. The report also describes a series of practical measures which have been taken to improve the nutritional condition of the population and puts forward a number of suggestions for the future.

West Africa.

Gambia.—In general, the diet is excessive in carbohydrate (imported rice is the staple food) and deficient in animal fat and protein, mineral salts and vitamins. Infant mortality is very high and there is much disease of all kinds. Groundnut cultivation for export dominates the economic life of the Colony at the expense of other forms of agricultural industry. No scientific work has been undertaken, nor can be without expensive additions to present staffs. Research co-operation with other West African territories is considered desirable.

Gold Coast.—Broadly speaking, the diet is deficient in those animal and vegetable foodstuffs which provide fat, good protein, vitamins and mineral matter. In most parts meat is scarce,

expensive and of poor quality. The consumption of milk and eggs is negligible. Fish is plentiful on the coast where the standard of physique is higher than elsewhere. An increasing use of tinned foods is apparent. Tuberculosis and respiratory diseases are very prevalent and manifestations of classical food deficiency disease are frequent. There seems to be a connection between undernutrition and the incidence of leprosy. Nutrition research, although considered desirable, has not been undertaken owing to lack of facilities. It is recommended that a full-time dietetics research officer be appointed. The agricultural aspect of the problem is important. There are three systems of agriculture corresponding to the three climatic zones, namely the coastal savannah, the high forest, and the northern savannah. Agricultural and nutritional deficiencies spring for the most part in the case of the first two from the practice of shifting cultivation, in the case of the third from fixed or permanent farming inefficiently applied.

Nigeria.—Of first importance are the two broad distinctions between the North and South of Nigeria. The Northern staple is grain whereas that of the South is yams, cassava and root-crops. Secondly, in the North, cattle are used for the production of meat whereas in the South they are of negligible importance. Although one finds splendid physique among certain tribes (e.g., among fish eaters and beniseed eaters), physique is, in general, much below European standards owing to qualitative dietary deficiencies. The average diet is high in starchy foods and low in animal protein and fat, vitamins and minerals. Of deficiency diseases retrobulbar neuritis among the cassava eating people of the South is causing concern. This and other pellagroid conditions may be due to poisoning by toxic elements in cassava; but probably a B-factor deficiency is also involved. Considerable nutrition research has been done in Nigeria and much more is contemplated by the Medical Department; but a suggestion is made that the Colonial Development Fund might assist in a field experiment in the supplementary feeding of children. Noteworthy among the many practical measures suggested for the improvement of nutrition is the formation of Rural Health Units.

Sierra Leone.—As the staples are rice and palm oil and animal foods are eaten only sparingly, the diet is badly balanced and grossly deficient in animal protein and vitamins. Avitaminosis A and B is widespread, and infants and school children suffer considerably from rickets and other forms of malnutrition. Goitre is also prevalent in certain districts. Measures designed to improve conditions are engaging the active attention of the Agricultural and Medical Departments; but the Committee conclude that until further surveys of local conditions have been made, no adequate nutrition policy can be framed.

Accordingly, they recommend the appointment of two specialists, one competent to undertake nutrition surveys and the other a biological chemist.

St. Helena.—The population of St. Helena is of mixed ethnological origin and tends to be of poor physique. The diet consists of polished rice, small quantities of fish (when available), milkless tea, and very rarely includes vegetables. Little use is made of dairy produce, and many have never tasted milk since childhood. The flax industry cannot afford to increase the wages of its employees, and the low level of nutrition is consequent on poverty. Malnutrition begins early in life. Children are too tired after the walk to school to benefit from physical exercises. Two hundred cases of beriberi are reported It is hoped to effect improvement by teaching Domestic Science, by increasing the production of dairy produce and vegetables and by supplying vegetables to the indigent.

SOUTH AFRICAN HIGH COMMISSION TERRITORIES.

Basutoland.—The question of food and nutrition is one of the most pressing problems that has to be faced in Basutoland and unless it is improved the position may become serious. Malnutrition is seen in every village, dispensary and school, and the progressive deterioration in native physique is becoming a subject of considerable comment. Energetic measures are being taken by Government to stimulate agricultural development.

Bechuanaland.—The physique and health of the Bechuana are considerably impaired by imperfect dietary conditions. There is considerable vitamin deficiency and widespread shortage of protein. Susceptibility to disease due to improper nourishment is high. Recently 33 per cent. of recruits for work on the gold mines were rejected as unfit. Poor water supply is at the root of the evil and much is being done to remedy this but it is also vitally important to educate the native in better dietetic habits. Hygiene is taught in the schools and many school gardens have recently been started. The activities of the Agricultural Department are expanding rapidly with beneficial results upon general health.

Swaziland.—The diet of the Swazi—maize porridge, supplemented by sour milk, pumpkins, sweet potatoes, beans, and meat occasionally—tends to be ill-balanced, being too high in carbohydrate, too low in protein and deficient in vitamins. Seasonal famine afflicts even the richer natives. Although, on a general impression, the adult appears to be healthy and well fed, clinical examination reveals undernourishment. Hospital patients benefit by the balanced institutional diet and invariably increase in weight. Signs of malnutrition were detected in over 80 per cent. of babies in a recent examination. The infant

mortality rate during the first year is nearly 40 per cent., half of the deaths taking place within the first two months. Scurvy makes yearly ravages on the child population and malaria is recurrent in the Southern district. Increased hospital facilities, child welfare work, improved agriculture, extended cultivation of groundnuts and other protein-rich foods and the development of storage facilities against times of scarcity will, it is hoped, effect improvement.

EASTERN.

Aden Colony.—A comprehensive preliminary survey has been submitted which deals primarily with the Colony. The Protectorate will form the subject of a separate study. The Colony is almost entirely urban and is cosmopolitan in make-up. Arabs, Jews, Somalis and Indians of various races predominate. All the chief articles of diet are, with the exception of fish, imported from overseas or from Arabia. They are: rice, flour, sugar; fish, mutton, beef, goats' milk, eggs, ghee; fruits, vegetables, dates, lentils, sim-sim oil, tea, coffee and spices. In general the dietary would be fairly sound if adequate quantities could be guaranteed for all. Unfortunately, however, as the social scale descends the diet becomes quantatively and qualitatively poorer, a fact which is reflected in the extent of deficiency disease in the poorer classes, particularly among children. On the whole the standard of public health is high, but there is much overcrowding, and respiratory and alimentary diseases are all too common. Diseases directly attributable to dietary deficiency are not a prominent feature of hospital returns in Aden, and the more classical of the tropical deficiency diseases—beriberi, scurvy and pellagra—do not occur. Evidence of qualitative deficiency is found, however, in the incidence of rickets among children and of certain eye infections. The peculiar local topography precludes the Colony from producing its own natural foodstuffs. The fishing industry and the local production of milk and eggs are exceptions to this general rule. Aden is a free port and therefore prices of essential foodstuffs are not raised by customs charges. Positive efforts for the improvement of nutrition are being made through the organisation of poor relief and the establishment of a fully equipped and adequately staffed Maternity Centre. The expansion of agriculture is dependent upon the provision of an adequate water supply. Proposals have also been made for the distribution of goats' milk for sale at controlled prices at various points in the Aden Settlement.

Malaya.—As a result of extensive work at the King Edward VII College of Medicine, Singapore, and at the Institute for Medical Research, Kuala Lumpur, there now exists very complete information regarding the composition and relative

values of Malayan foods, and considerable other data on nutritional conditions in Malaya. As rice is the most important food special consideration has been given to its nutritive value. A satisfactory variety is the husked unpolished rice prepared at the government rice mill in Perak. Root vegetables, leaves, pulses and palm oil are supplementary foods. Fish is the only animal food eaten to any extent, the consumption of meat, milk, butter and eggs being almost negligible. The most noteworthy deficiencies are of B-vitamins and protein. The markedly inferior physique, as judged by European standards, seen alike in Malayans, immigrant Indians and Chinese is a striking feature, the most important point being that the divergence from European standards takes place only after the first six months of life. The incidence of dental caries is high especially among urban children, and it is presumed that the use of sophisticated foods and the extensive hawking of cakes and sweetmeats in town schools are the factors primarily responsible. Economic conditions have a direct bearing on nutritional status but, at any rate in one respect, in a manner opposite to that usually found in Western countries; improvement in general prosperity is coincident with an increased death rate from beriberi. The reason is that greater purchasing power enables the poorer classes to indulge the preference for the more expensive highly polished rice, and less attention is given to the growing of vegetables in garden plots. The local Nutrition Committee agree that, although much has been done, more investigation is necessary before any useful recommendations can be made with a view to putting into effect a co-ordinated nutrition policy.

North Borneo.—The staple food of the native of North Borneo is whole rice and tapioca. In consequence, beriberi is rarely seen among the indigenous population. It occurs, however amongst immigrant Chinese labourers working in timber camps, who consume polished rice. Other crops such as vegetables and fruit, maize, sweet potatoes, bamboo shoots and fern tops are more or less common to most districts. Animal protein and fat are deficient and the amount of carbohydrate is more than necessary for normal requirements. Goitre is endemic in the hilly regions and the question of providing iodised salt is at present under consideration. A predilection for edible earths is common, especially among women and children.

Sarawak.—Rice is the staple food both of immigrant Chinese and of the native population. Imports amount to anything up to 32,000 tons a year, and there is considerable local production. Other food crops include soya beans, millet, yams, maize, groundnuts and sugar cane. No nutritional research has been possible; consequently there is no information available on the relation between diet and disease.

Hong Kong.—Rice is the staple diet of the Chinese inhabitants. With the exception of a small amount of red rice consumed in the rural areas, white rice is almost exclusively used. This rice diet is augmented where means permit by small quantities of beans, vegetables, ginger, meat; fresh, dried or salted fish; and by fresh or salted eggs. The lowest paid wage-earners are able to buy very little of these additional foodstuffs and milk is almost unknown among the really poor. In judging of the general level of nutrition amongst the population it should be borne in mind that there has been a considerable influx of refugees into the colony since the outbreak of Sino-Japanese hostilities in 1937. Rickets, pellagra and scurvy are rare, but beri-beri is responsible for a heavy toll of suffering and death. The number of cases and deaths from enteritis in infants is also large and a proportion of these must undoubtedly be attributed to faulty feeding and malnutrition in some form. Oedema found in cholera cases also points to malnutrition, as does also the high incidence of pulmonary tuberculosis and of diseases of the respiratory system. The average daily earnings of members of the labouring classes are low and rentals are high for the standard of accommodation provided.

A Nutrition Research Committee has been set up and has already carried out useful work. Further work is needed, especially field work. Experiments are being planned on the production on a large scale of alfalfa and of spinach, both the true and the Chinese varieties. Other research includes inquiries into housing and labour conditions. Practical measures are being taken including the introduction of new dietaries in prisons and hospitals; the supply of free meals to nursing mothers and young children attending the two welfare centres; broadcast and newspaper propaganda; legislation for the purification of milk supplies; encouragement of milch herds and of the cultivation of vegetables; and experiments in the provision of a cheap anti-beriberi factor.

Ceylon.—Considerable information on Ceylon is available. The main articles of diet are rice and pulses, leafy vegetables and fish. About two-thirds of all foods consumed are imported. The bulk of the rice used is the imported polished variety, unpolished home grown rice being used only in certain country districts. The most serious deficiencies in the diets of the masses are those of animal protein, calcium, vitamin A and vitamin B complex. Nutritional disease is rife and the physical condition of poorer class children compares ill with that of their better fed contemporaries in the richer classes. The high infant mortality is in great part ascribed to maternal undernutrition, and every year large numbers of older children die from a multiple nutrition deficiency whose chief symptoms are stunted growth, wasting, skin eruptions and eye disease which invariably

results in blindness. A prominent and very harmful feature of Ceylon diets is the excessive consumption of condiments and highly spiced curry stuffs. Among the practical measures for improving nutrition special attention is directed to the need for teaching the principles of nutrition with particular reference to local conditions in the Medical College and in all schools. Emphasis is also laid on the urgent need for a greater production and consumption of milk; and a suggestion is made that it might be possible to utilise the vitamin B-rich yeast by-product from the manufacture of the local toddy. It is also proposed that a special Department of Nutrition be set up.

Mauritius.—The economic life of the Colony is dominated by its sugar industry, the staple foodstuffs (rice and pulses) being imported in exchange for exports of sugar. It appears that the earnings of the labouring classes are sufficient under present conditions to provide them with a reasonably adequate diet. The absence of gross deficiency disease and the healthy and well nourished state of the children attending elementary schools supports this view. Fundamentally the standard of nutrition is dependent on the degree of prosperity in the sugar industry and in the present circumstances the answer to the problem of dietary improvement is to be found chiefly in a rise in the level of wages. Any considerable improvement must, it seems, depend upon a rise in the price of sugar.

Seychelles.—The state of nutrition of the majority of the people is poor, low resistance to disease and incapacitating sickness being a constant source of economic loss to employers of labour. Rice is the staple food, the polished variety being used on the main island and unpolished in the outlying islands. The consumption of milk is very low and that of green vegetables almost negligible mainly because the natives have no natural liking for these articles of diet and partly also because praedial larceny is so habitual and widespread as to discourage potential producers. A major problem having a distinct bearing on nutrition is the abuse surrounding the manufacture and consumption of the native beverage known as La Purée. A dietary survey to include analysis of local foods is considered highly desirable.

WEST INDIES AND NEIGHBOURING TERRITORIES.

Bahamas.—The diet of the great majority of the labouring classes who make up the bulk of the population is composed of milled cereals, fish, tinned or salted beef, bread without butter and tea without milk. The consumption of vegetables is low and is confined chiefly to the root varieties. Milk is too expensive for general use. Pellagra is very prevalent and malnutrition accounts for a great deal of illness and debility. The

incidence of dental caries is also exceedingly high. Important among the several measures being taken to improve nutrition is the encouragement of backyard vegetable farming and the intention to review existing tariffs with a view to stimulating an increased consumption of foodstuffs of high nutritive value.

Barbados.—The local Nutrition Committee stress the great shortage of milk and eggs and fresh vegetables in the diets of the working classes. The poor physique of the average labourer, the high incidence of tuberculosis and dental caries, and the prevalence of pellagra provide sufficient evidence that diets are seriously deficient. Low wages and large families are the chief causes of this state of affairs. A scheme to provide free milk to school children, and the encouragement of " backyard " vegetable growing are among the more important measures which have been adopted by Government towards improving conditions.

Bermuda.—Practically every family eats some meat or fish once a day, though much of it is from tins. Salt cod is extensively used and fresh vegetables are eaten in fair quantities. In view of the general healthiness of the people and the absence of gross deficiency disease, malnutrition does not appear to be a pressing problem. Dental caries is, however, prevalent. Where diets are defective this is due as a rule to the raising of too large a family upon the income available. A beginning has been made towards the practice of birth control under the direction of the Health Department.

British Guiana.—With the possible exception of milk, there exists no quantitative shortage of foodstuffs essential to the health of the Colony. The source of nutritional disease—which is especially prevalent among immigrant East Indians—must therefore be looked for in terms of poverty, racial prejudice, restricted availability of certain foods in hinterland or isolated areas, general dietetic ignorance or a combination of two or more of these. The chief difficulty about milk is its most unsatisfactory quality due to adulteration and contamination. Further research is recommended and particulars are submitted of a three years' programme to include dietary and health surveys, and experimental work on food analysis and the feeding of school children. It is considered that the work envisaged will not necessitate the appointment of highly paid experts but may well be undertaken by existing staff if provision is made for the employment of subordinate personnel and for additional equipment.

British Honduras.—There is a wide difference in the dietetic habits of the racial groups. No manifest deficiency disease occurs to any marked extent, although a certain amount of

malnutrition undoubtedly exists. If the people could be persuaded to eat quantities of the easily accessible fruit, doubtless all signs of scurvy and other incipient C avitaminosis would disappear.

The Committee recommend a dietary survey of all sections of the community and detail measures which may be immediately initiated to encourage local production of green foodstuffs, to secure increased nutritional hygiene and education by welfare centres.

Jamaica.—Although there is no lack of variety nor shortage of food, the diet of the poorer classes is undoubtedly deficient in animal protein and fat, and contains much salted fish, polished rice and white flour. The nutritional state of a distressingly large proportion of the labouring classes and of children is considered by some observers to be definitely bad, the chief causes being adverse economic conditions, poverty, low wages, unemployment, illegitimacy and over-large families. Conditions are aggravated by the prevalence of yaws, hookworm infection and malaria. Measures for the improvement of present conditions include the development of animal husbandry as a source of meat supply. Improvement of fisheries and development of poultry farming will receive attention. A scheme has been put into operation for the establishment of lunch kitchens in a number of elementary schools; and the provision of a daily supply of milk to the schoolchildren of Kingston is engaging the attention of the Government.

Antigua (Leeward Islands).—Nutrition is said to be fairly good on the whole among people of working age; children and old people are the chief sufferers. For many children cornmeal " pap " with sugar is almost the sole article of diet and in a recent survey it was found that the great majority of school children get no milk, eggs or meat. The problem is largely an economic one, poverty among working class parents being the chief factor. The Governor suggests as advisable a general nutrition survey of the whole Leeward Islands group. A five-year scheme has already been submitted for improving agriculture in which special provision is made for the development of livestock. The milk situation requires investigation and a greater use of goats' milk is advocated.

Dominica (Leeward Islands).—This report emphasises the improvement in general health which has taken place in recent years, as evidenced by falling death and infant mortality rates, and as a result of an active campaign against yaws and syphilis. Milk, butter and meat are insufficiently available and, in any case, are too expensive for the poorer labouring classes who subsist mainly on imported cereals and salted fish, local root crops, bananas, pigeon peas (*Cajanus indicus*), coconuts and unrefined sugar. Malnutrition is most serious among infants

and pre-school children and is largely due to notoriously bad infant feeding practices. Older children and adults do not apparently suffer from so much malnutrition. This is surprising in view of the nature of the diet available to the poorer classes and the bad start which very young children obviously get.

Montserrat (Leeward Islands).—The problem of nutrition is not a pressing one in this island where the climate is good and where the population largely consists of peasants cultivating their own small holdings. The diet is varied and plentiful and milk and meat are cheap. Nevertheless, there has recently been a tendency to undue concentration on the production of export crops at the expense of production of food for home consumption. Normally the people are robust, energetic and apparently well fed, and it is only among expectant mothers and very young children that malnutrition is seen to any extent.

St. Kitts-Nevis (Leeward Islands).—No detailed study of nutrition has been made in this Presidency. Apparently the problem is not an urgent one, although it is clear that poverty among working class parents results in frequent undernourishment in children. The high cost of beef, mutton and milk restricts their use by the poor.

Virgin Islands (Leeward Islands).—It is stated that the staple food is an abundance of West Indian vegetables and fresh fish, and an unlimited supply of fresh, non-tubercular cow's milk. Nutritional diseases are practically non-existent and the physique of the people in general and children in particular is excellent. Their limbs are straight and sturdy, and their skins healthy and with scarcely a blemish.

Trinidad.—It is well known that the diet of the East Indian labourer who forms a large proportion of the population is grossly deficient in animal protein, fat, and vitamins and that, in consequence, his general physique and capacity for work are definitely inferior to that of the West Indian. Xerophthalmia and a peculiar chest condition ascribed to vitamin B deficiency are general among East Indians and constitute a serious problem the only solution to which lies in educating the East Indian regarding the necessity of adopting a suitable diet. The diet of the West Indian also leaves much to be desired. Accordingly the local Committee are concentrating their efforts on the best practical means to bring about an increased production and consumption of such foods as milk and green vegetables rather than embarking on the scientific and research aspects of the problem. The provision of adequate milk supplies (including goats' milk), the encouragement of vegetable gardening, and the importation of less highly milled flour for bread making are three important measures to which the Committee are giving their attention.

Grenada (Windward Islands).—The general picture seems to be that food crops are easily grown and therefore, despite a certain degree of poverty and a high population per square mile, there is little undernutrition except among infants and young children for whom the milk supply is wholly inadequate. On all matters pertaining to infant feeding, harmful dietetic superstitions are wedded to profound ignorance with the result that " marasmus " in infants is widespread. There is general agreement that the first essential step towards improvement is to train mothers and girls in the elements of domestic economy and child welfare. The publication of a West Indian Cookery Book would be invaluable for educational purposes, and the Trinidad authorities have been approached in regard to its compilation. In the matter of research, too, a close liaison will be maintained with Trinidad, no investigations being in the meantime contemplated in Grenada.

St. Lucia (Windward Islands).—Dietary defects revolve round the insufficient consumption of fresh milk, meat, eggs, green vegetables and fruit. Septic infections are very prevalent and lowered resistance to disease is general, especially among East Indian labourers. Classical deficiency diseases such as beriberi, pellagra, scurvy and rickets are, however, unknown. Malnutrition is apparently very general among children and adolescents. Proof of this is to be found in the fact that youths undergoing training at the Agricultural Cadet School, where regular habits and adequate diets are the rule, improve markedly in physique, intelligence and output of work.

St. Vincent (Windward Islands).—The fact that malnutrition exists, especially among children, is taken for granted. The report contains a straightforward account of the prompt measures which have been taken to cope with a situation regarding the unsatisfactory nature of which nobody seems in doubt. The Administration have successfully organised a novel scheme for supplying milk to school children and have put in train measures to improve and expand maternity and child welfare services and to educate public opinion by means of lectures, leaflets and other forms of publicity.

ISLANDS OF WESTERN PACIFIC.

Fiji.—Both the native Fijians and the East Indians who compose the majority of the population are physically well developed and there is an almost complete absence of the well-known deficiency diseases. Nevertheless, there is some evidence that the customary diet is marginal in protein and vitamins of the A and B groups; and the most outstanding dietary deficiency is certainly that of fresh milk. There have been several occurrences of epidemic dropsy (ascribed in some cases to eating

deteriorated rice), and tropical ulcer is also seen especially when native fruits and fresh coconut milk are discarded in favour of imported European foods. All adult males are required by law to grow sufficient food crops to satisfy their home requirements, and the husbands of pregnant women are temporarily exempt from communal work to enable them to devote attention to family needs. Dietary and health surveys and biochemical research on foods are considered necessary before further attempts can be made to improve local conditions.

Gilbert and Ellice Islands.—The normal diet of the natives consists of coconut toddy, fish, coconuts, pandanus and babai. Fresh milk is never obtainable, and fresh vegetables and meat are practically unknown. The general poverty and the high cost of imported foods prohibit their purchase in any quantity. There is a shortage of fat in the diet and a probable shortage of carbohydrate. Beriberi is common and there is a high incidence of cervical adenitis among children and adolescents. Infant mortality is high, averaging about 200 per 1,000 births. A scientific study of the whole question is desired. It is recommended that measures be taken to place wholemeal flour within the purchasing power of the native in order to make good the shortage of carbohydrate in the diet.

New Hebrides Condominium.—These Islands are administered jointly by British and French authorities and there are no Medical, Agricultural and Education Departments in the usually accepted sense. Neither do facilities exist for research, nor are funds likely to be available for effecting improvements in nutrition, however desirable. The population is mainly composed of bushmen out of contact with civilisation, " salt-water " or coast natives, and plantation labourers. Foods are plentiful and available in considerable variety; and conditions, on the whole, are fairly good. With the exception of a few mild and very occasional cases of beriberi, deficency diseases are practically unknown. Milk is never drunk as a prejudice exists against it.

Solomon Islands.—The Report submitted treats individually with conditions prevailing in the nine largest islands which make up this group. Food is plentiful and diversified in character; but there are deficiencies of fat, protein and vitamin A which give rise to a considerable amount of night blindness and other pathological eye conditions. Tropical ulcer is also prevalent, especially among natives who eat little or no fish. A striking feature is the entire absence of milk from the dietary. From weaning until death the native consumes no milk and no milk products whatever. The practice of betel nut chewing is general throughout these islands. It relieves hunger; but its effect on the gums is disastrous. It is considered that increased provision

for agricultural advice is an essential preliminary to improving conditions. Agricultural and Veterinary Departments do not at present exist.

Tonga.—In general, the diet of a Tongan consists of root crops such as yams, taro and kumaras, fish and a little meat—the tinned variety being preferred. Milk, eggs, fruit and green vegetables, although available, are not usually eaten. As regards diseases attributable to the local diet, medical opinion mentions, in particular, tuberculosis, cutaneous and eye diseases, septic conditions, goitre and anaemia. Practical measures for improvement recommended as desirable are the importation of wholemeal flour duty free; the keeping of goats for milk purposes; and the extended cultivation of green vegetables.

ISLANDS OF THE SOUTH ATLANTIC.

Falkland Islands.—Mutton, tea and bread are staple articles of diet among the Falkland Islanders, and local medical opinion emphasises that in dietary imbalance and monotony lies the answer to the problem of the prevailing high incidence of dental caries, appendicitis, constipation and respiratory infections. General physique is somewhat poor. A scheme has been instituted for the free distribution of milk and cod liver oil to students in schools who show signs of malnutrition. Some 50 students have received a pint of evaporated full cream milk plus 1 c.c. of Radiostoleum each day. Records of the physical condition of the students concerned are being kept. A considerable improvement has been noted in some cases. Researches on anaemia, dental caries and blood calcium content are being undertaken out of local resources, and a dietary survey of Port Stanley is proposed.

Tristan da Cunha.—The staple diet of the Islanders consists of milk, fish, eggs and vegetables. The excellent health prevailing on the Island is shown by the fact that, of 183 persons examined in 1937, 140 were declared to be in perfect health.

A rising incidence of dental caries, gingivitis and pyorrhoea may be correlated with the increasing frequency of visits made by ships bringing wheat flour, jam, sugar, tea and tinned foods as well-intentioned gifts to the Island.

APPENDIX.

Population, Birth Rate, Infant Mortality and Death Rate.

Data marked * refer to certain districts or towns and not to the whole territory.

Note.—The figures given should in most cases be regarded as no more than a rough approximation.

	Population (total).	Birth Rate (per 1,000)	Infant Mortality (per 1,000 live births).	Death Rate (per 1,000)
1. Mediterranean.				
Cyprus	367,000	34	105	12
Gibraltar	19,000	19	62	15
Malta	262,000	34	190	18
Palestine	1,317,000	42	153	19
2. Africa.				
East.				
British Somaliland ...	345,000	—	—	—
Kenya	3,262,000	—	—	—
Tanganyika	5,063,000	—	—	—
Uganda	3,661,000	26	159	20
Zanzibar	235,000	16	—	17
Northern Rhodesia ...	1,378,000	—	—	—
Nyasaland	1,623,000	—	—	—
West.				
Gambia	199,000	25*	370*	31*
Gold Coast	3,617,000	35*	108*	25*
Nigeria	20,224,000	29*	140*	17*
Sierra Leone ...	1,672,000	23*	210*	21*
St. Helena	4,340	32	120	15
South African High Commission Territories.				
Basutoland	664,000	—	—	—
Bechuanaland ...	260,000	—	—	—
Swaziland	156,000	—	—	—
3. Eastern.				
Aden Colony	46,000	32	197	32
Malaya	4,660,000	44*	171*	25*
North Borneo ...	270,000	27*	163*	25*
Sarawak	443,000	33*	233*	25*
Hong Kong	1,029,000	32	361	34
Ceylon	5,631,000	34	166	22
Mauritius	411,000	35	142	26
Seychelles	30,000	27	92	14
4. West Indies and Neighbouring Territories.				
Bahamas	66,000	33	66*	19
Barbados	188,000	32	198	19
Bermuda	31,000	23	71	11
British Guiana ..	328,000	35	120	20
British Honduras ...	56,000	34	153	20
Jamaica	1,139,000	32	118	17

	Population (total).	Birth Rate (per 1,000)	Infant Mortality (per 1,000 live births).	Death Rate (per 1,000).
WEST INDIES AND NEIGHBOURING TERRITORIES—*continued.*				
Leeward Islands—				
Antigua	34,000	37	111	20
Dominica	48,000	32	100	14
Montserrat ...	14,000	39	119	15
St. Kitts-Nevis ...	38,000	36	163	26
Virgin Islands ...	6,165	38	141	18
Trinidad	448,000	33	97	16
Windward Islands—				
Grenada	87,000	32	104	16
St. Lucia	65,000	32	98	15
St. Vincent ...	57,000	39	119	16
5. ISLANDS OF THE WESTERN PACIFIC.				
Fiji	201,000	38	110	20
Gilbert and Ellice Islands	34,000	34	246	41
New Hebrides Condominium	50,000	—	—	—
Solomon Islands ...	94,000	22	—	19
Tonga	33,000	36	101	15
6. ISLANDS OF THE SOUTH ATLANTIC.				
Falkland Islands ...	2,000	19	—	9
Tristan da Cunha ...	183	23	—	—

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