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LEAGUE OF NATIONS

Health Organisation

INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

Preparatory Papers:

NATIONAL REPORTS

I. A Brief Report on Rural Hygiene in the Colony of Hong-Kong.

II. Memorandum on Conditions prevailing in North Borneo.

III. Note on the Medical and Health Services in Sarawak.

IV. Memorandum concerning the Colony of Fiji.

- (a) Note on the Mass Treatment of Ankylostomiasis in Fiji.
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- (c) Note on the Central Medical School in Suva in relation to the Health Problems of the Pacific.
- (d) Note on Sugar-cane Farming on Small-holdings in Fiji.

V. Memorandum on Public Health Organisation of the Gilbert and Ellice Islands Colony.

VI. Note on the Health Organisation of the British Solomon Islands Protectorate.

VII. Report for the New Hebrides Condominium.

VIII. Report for Tonga.

Geneva, 1937.

Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene

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Series of League of Nations Publications

III. HEALTH

1937. III. 14.

INTRODUCTION.

With a view to preparing for the Intergovernmental Conference on Rural Hygiene convened by the Council of the League of Nations on October 10th, 1936, at Bandoeng (Netherlands Indies), on August 3rd, 1937, the various countries invited to send representatives to the Conference have been asked to communicate a national report dealing with the various questions contained in the agenda of the Conference.

Attached herewith are the reports for North Borneo, Sarawak, Fiji, Gilbert and Ellice Islands Colony, British Solomon Islands Protectorate, New Hebrides Condominium and Tonga.

CONTENTS.

S. d. N. 1.405. 5/37. Imp. du J. de G.

INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

(*Bandoeng* (*Java*), *August 3rd*, 1937.)

A BRIEF REPORT ON RURAL HYGIENE IN THE COLONY OF HONG-KONG

By

Dr. D. J. VALENTINE, M.C., Deputy Director of Medical Services, Hong-Kong.

INTRODUCTION.

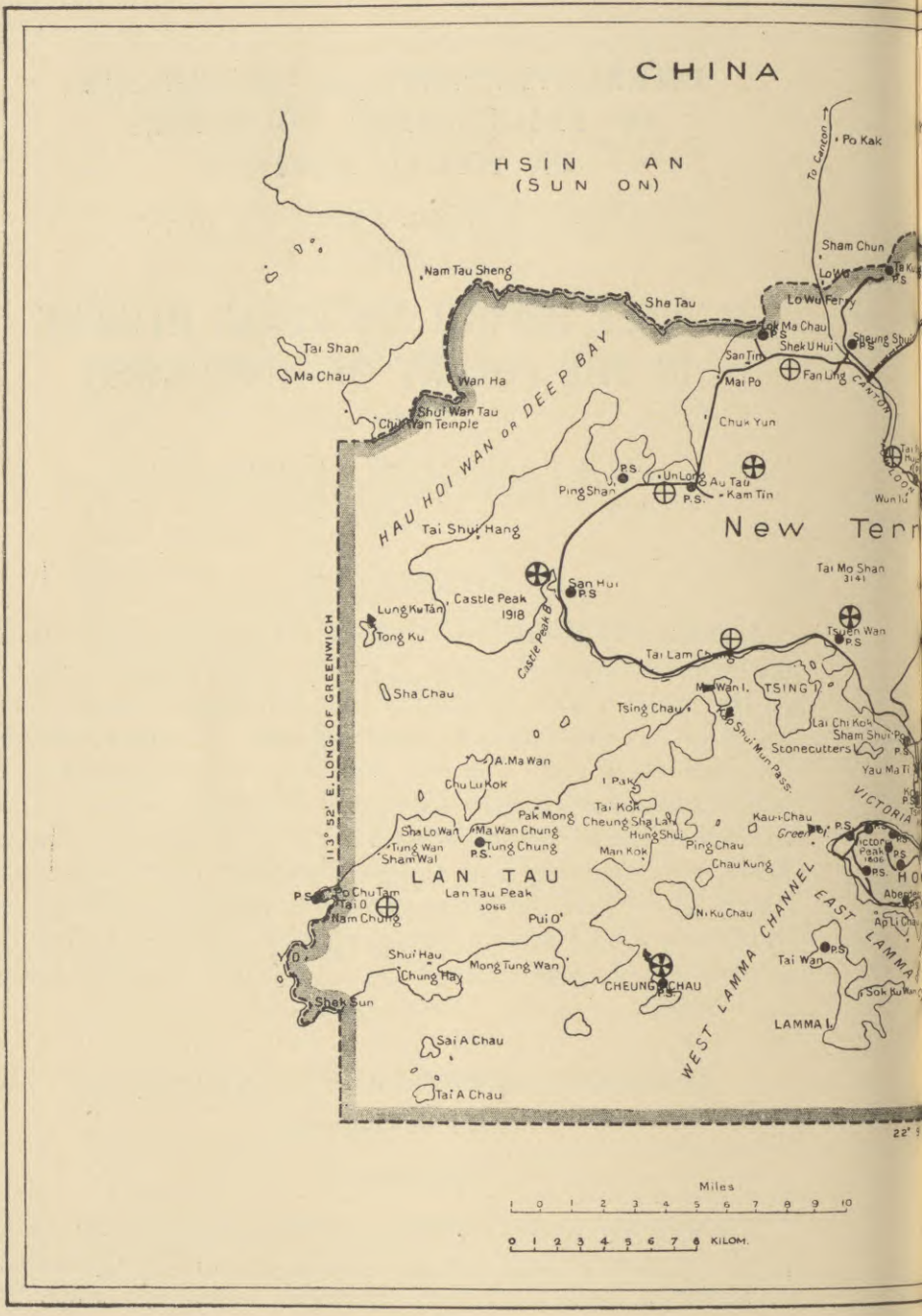
As defined by the Health Committee of the League of Nations, the term rural hygiene covers all matters which have an influence on the health and well-being of the rural population, for good or for ill. It deals with the investigation, the prevention and the cure of disease, and the education and organisation of personnel connected with the same. In order to give a clear account of the situation with regard to rural hygiene in Hong-Kong, it is necessary first to give a general description of the colony as a whole, its geographical and topographical features, its climate and the nature of its population, and then to describe in more detail those areas of the colony that can be regarded as " rural ".

GENERAL DESCRIPTION OF HONG-KONG

(see following map).

Geography.

The territory under British jurisdiction includes the colony proper—namely, the island of Hong-Kong, with the peninsula of Kowloon, and the leased territories adjoining, which are


CHINA
HSIN AN
(SUN ON)
To Canton
Po Kak
Sham Chun
Lo Wu
Lo Wu Ferry
Nam Tau Sheng
Sha Tau
Tai Shan
Ma Chau
Wan Ha
Shui Wan Tau
Chui Wan Temple
HAU HOI WAN OR DEEP BAY
Pak Ma Chau
Shek U Hui
Sheung Shui
San Tin
Fan Ling
Mai Po
CANTON
Chuk Yun
Ping Shan
Un Long
Au Tau
Kam Tin
New Terr
Tai Shui Hang
Tai Mo Shan
3141
San Hui
Castle Peak
1918
Castle Peak R.
Lung Kwu Tan
Tong Ku
Tsuen Wan
Tai Lam Chung
Sha Chau
Ma Wan I.
TSING
Tsing Chau
Lai Chi Kok
Sham Shui Po
Stonecutters I.
Yau Ma Ti
Ap Lei Chau
A. Ma Wan
Chu Lu Kok
I. Pak
Tai Kok
Cheung Sha La
Hung Shui
Pak Mong
Kau-i-Chau
Green Bay
Sha Lo Wan
Ma Wan Chung
Tung Wan
Sham Wat
Tung Chung
Ping Chau
Man Kok
Chau Kung
LAN TAU
Lan Tau Peak
3056
Tai O
Nam Chung
Pui O'
Ni Ku Chau
Shui Hau
Chung Hau
Mong Tung Wan
CHEUNG CHAU
Tai Wan
Shek Sun
LAMMA I.
Sai A Chau
Tai A Chau
WEST LAMMA CHANNEL
EAST LAMMA
113° 52' E. LONG. OF GREENWICH
Shui Mun Pass
VICTORIA
Miles
1 0 1 2 3 4 5 6 7 8 9 10
0 1 2 3 4 5 6 7 8 KILOM.

— REFERENCES —

Main Roads .....

Government Dispensary .....

St John Ambulance Dispensary .....

Railway .....

Light Railway .....

Police Stations ..... P.S.

Navigation Lights .....

known as the New Territories. The area of the island is 32 square miles and that of Kowloon $2^2/_3$ square miles, while the leased territories cover approximately 300 square miles.

Climate.

Though situated just within the northern limits of the tropics (22° 9′ E. and 22° 37′ N.), Hong-Kong enjoys a cool winter, the mean temperature falling from 82° F. in August to 59° F. in February. Temperatures under 40° F. and over 90° F. occur occasionally.

The mean annual rainfall is 85 inches (67 inches from May to September).

The relative humidity is very high in the spring, frequently reaching 98%. In the winter, it occasionally falls as low as 20%.

The prevalent wind is from the east-north-east in the winter, with a mean velocity of 15 miles per hour in March, when the north-east monsoon is at its height. During the summer months, the wind is very variable, both in direction and velocity.

Topography.

The island of Hong-Kong and the peninsula of Kowloon may be described as a series of granite ridges separated by narrow valleys and having here and there limited areas of flat land facing the sea and composed of accumulations of soil washed down from the hills. The New Territories are of similar formation with some fairly wide valleys towards the north and west. On the island, the only level area of any extent is that on which the city of Victoria stands, and this does not cover more than one square mile. With regard to Kowloon, not more than one-half is flat or convenient for street formation.

Population.

The total population of the colony is estimated to approach 1,000,000, of whom 400,000 reside in the city of Victoria, 350,000 in the town of Kowloon, over 100,000 on boats in the waters of the colony, and about 150,000 in the villages; 97%

of the population is Chinese. The population is grouped in villages which are situated almost entirely on the lower levels —viz., the plains near the coast or the valleys leading up to and between the hills. Some of the villages are easy of access by rail or road, but some are only reached by walking across country. Others, again, are only easily accessible by boat. The majority of the population is engaged in agriculture some in fishing, and a few in commerce and industry.

RURAL AREAS.

Extent.

There are about 330 square miles of territory, of which 30 square miles are the island of Hong-Kong ; 75 square miles constitute the area of the adjacent islands and 225 square miles are that portion of the mainland which is leased territory and commonly known as the New Territories.

By far the greater part of all this area is made up of steep hilly ridges, which are for the most part barren and rocky and devoid of habitation and cultivation. On the islands, including Hong-Kong, small villages have grown up in the valleys near the sea-shore. In the New Territories, the valleys are much wider, opening out in some places into extensive fertile plains, but even here the land is so indented by bays, harbours and coves that no village, however situated, is more than 5 or 6 miles from the sea.

As the New Territories form so large a part of the rural area of the colony of Hong-Kong, an account of rural hygiene in the New Territories will best serve the purpose of this report.

I. HEALTH AND MEDICAL SERVICES.

1. Principles governing their Organisation.

The medico-public health organisation is in the hands of the Government. The Director of Medical Services is directly responsible to the Government for the maintenance of the health and medical services.

For the purposes of medical administration, it has been found convenient to divide the territories into a Western Medical District and an Eastern Medical District, the boundary-line being the range of hills which extends from north to south and separates the waters running east from those going west or south.

The Western District includes the west coast and the south coast, with the hinterlands stretching back to the hills. The circular road crosses the boundary at the third mile and at the thirty-second mile. The islands of Tsing I, Lantau, Cheung Chau and Lamma form part of this district.

The Eastern District includes the whole of the east coast with its hinterlands.

Each medical district has approximately 150 square miles.

Western Medical District.

Mainland :	Population	Total
Tsun Wan	5,335	
Ping Shan	12,660	
Au Tau	12,877	
Lok Ma Chau	4,377	35,249
Islands :		
Lantau	7,409	
Tung Shung	1,713	
Cheung Chau (5,477 island, 7,045 floating)	12,522	21,644
		56,893

Eastern Medical District.

Mainland :		
Sha Tau Kok	8,941	
Sheung Shui	10,208	
Taipo	12,684	
Shatin	4,346	
Saikung	7,585	43,764
Islands :		
Po Toi Group and Cheung Kwan O district		3,100
		46,864

2. Personnel.

Each district is in charge of a Chinese medical officer, who is responsible to the medical officer in charge of the New Territories.

Fully equipped dispensaries are maintained at Sham Tseng, Un Long, Fanling, Taipo, Sai Kung and Tai O. A Government motor-travelling dispensary travels on the circular road connecting all these centres (Figure 1).

Each centre contains a waiting-room, a dispensary, a dressing-room, a consulting-room and living accommodation for the staff.

The staff consists of :

Sham Tseng	2 nurse midwives.
Un Long.	1 Chinese medical officer, 1 dresser and 1 nurse midwife.
Fanling	2 nurse midwives at Lady Ho Tung Welfare Centre.
Taipo	1 Chinese medical officer, 1 dresser and 2 nurse midwives.
Sai Kung	1 nurse midwife.
Tai O.	1 nurse midwife.
Travelling dispensary . .	1 first-grade dresser.

Duties of the District Medical Officer.

The duties of the district medical officer include :

Supervision of the Government dispensaries in his district ;

Domiciliary visits to indigent cases too ill to attend the dispensary ;

Emergency calls for all classes.

Accompanying the travelling dispensary three times a week visiting villages in the district ;

Reconnaissance and propaganda ;

Spleen surveys ;

Periodical visits to police-stations.

Duties of Dispensary Staff.

Cure, investigation and prevention of diseases.

Finance.

All expenses are borne by the Government.

Scope.

The scope of the centres covers cure, investigation and prevention, and includes general medical relief, infant welfare work, school medical work and venereal disease work and propaganda.

The dispensary at Taipo includes a maternity ward of five beds, which has proved to be very popular. Many of the cases come from the boat population, to whom it makes a special appeal.

The rural population, men, women and children, have learnt to appreciate the advantages offered at these dispensaries, which are all well attended. The assistance of the trained Chinese midwives is frequently sought in cases of difficult labour occurring in villages, however remote from the nearest dispensing centre.

Centres of the St. John Ambulance Association.

In addition to the above, the New Territories Medical Benevolent Branch of the St. John Ambulance Association have established centres at Tsun Wan, Tuen Mun, Ha Tsun, Kam Tin, San Tin, Ta Ku Ling, Sha Tau Kok and Shatin. These vary from dressing-centres to dispensaries with a certain number of beds for women and children.

There is one full-time Chinese medical officer, and also a number of voluntary medical officers. All are fully qualified in Western medicine.

At each centre there is one (sometime two) certified midwives, who act, in addition, as nurses.

The necessary funds are raised by voluntary subscription.

The scope of the centres includes medical relief, midwifery, vaccination and propaganda.

3. Curative and Preventive Activities.

There are practically no public health laws in force in the rural areas of the New Territories. The Public Health Ordinances of the colony, except the one relating to quarantine and the prevention of disease, do not apply unless the Governor in council directs otherwise by order. The Vaccination Ordinance applies, but there has never been any compulsory vaccination.

In 1910, the question of applying the Births and Deaths Registration Ordinance to the New Territories received attention and a paper on the subject was started. In March 1911, the various police-stations were declared registry offices, and in June of the same year a very large deputation of elders representing all the villages called at the district office petitioning that the Ordinance should not be enforced. It was not until 1932 that the Ordinance was enforced, and not until 1935 that death registration became sufficiently universal to warrant death rates being calculated. Assuming that all deaths were registered in that year, the death rates for the different districts were as follows :

Western Medical District.

	Death rate per mille
Tsun Wan	33.05
Ping Shan	19.90
Au Tau	21.25
Lok Ma Chau	15.99
Lantau island	24.70
Cheung Chau island	15.44

Eastern Medical District.

Shau Tau Kok	13.08
Sheung Shui	17.43
Taipo	21.28
Shatin	23.93
Saikung	22.01

Figures for disease incidence during the years the New Territories have been under British jurisdiction are not available, so that incident rates for particular diseases cannot be calculated. Such being the case, the health conditions of the people can only be gauged by death rates and by general inspection and deduction. Some sick can be found, but they are few compared with the number of healthy-looking men, women and children one sees going about their various occupations.

Near the hills there is a considerable amount of malaria ; but, judging from the appearance of the people, the number of chubby children and the lowness of the spleen rates, the ravages of this disease are mild when compared with other tropical countries.

Abnormalities and accidents in connection with pregnancy and child-birth occur, but from all accounts they are few in proportion to the number of normal cases.

Skin diseases, judging from the returns of the dispensaries and travelling dispensary, are not very prevalent.

Trachoma varies with the village. In some it is common, in others it is not.

Taking everything into consideration there is no evidence that the population of the New Territories is an unhealthy one.

4. Budget.

(Extract from Medical Department estimates, 1937.)

	Hong-Kong dollars[1]
One medical officer	14,027
Two Chinese medical officers	11,228
Ten midwives	6,152
Two boy dressers	720
Four coolies	768
Eight amahs	1,409
One charge dresser	1,370
Other charges	8,572
Total	44,246

In round figures, this is approximately equivalent to an annual expenditure of 5*d*. per head of the rural population.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

The rural areas in the colony of Hong-Kong can be regarded for all practical purposes as a portion of China which is now under British jurisdiction.

---

[1] One Hong-Kong dollar = £0.064 (average rate of exchange in 1936). — *Editor.*

FIGURES 1 TO 10

Figure 1. — Travelling Dispensary.

Figure 2. — Squatters' shacks.

Figure 3. — The village of Tai O.

Figure 4. — A typical village.

Figure 5. — Houses in a more modern village.

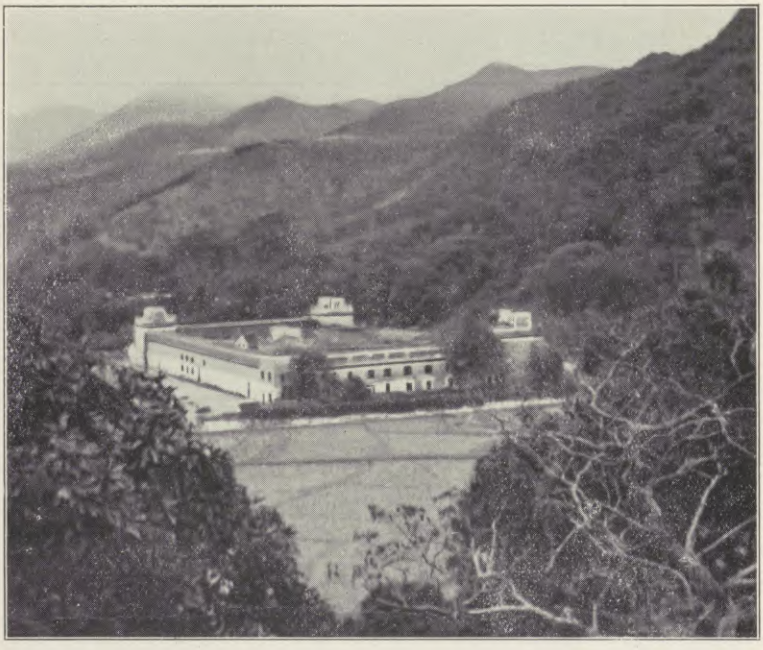


Figure 6. — An old walled village.

Figure 7. — A water-boat.

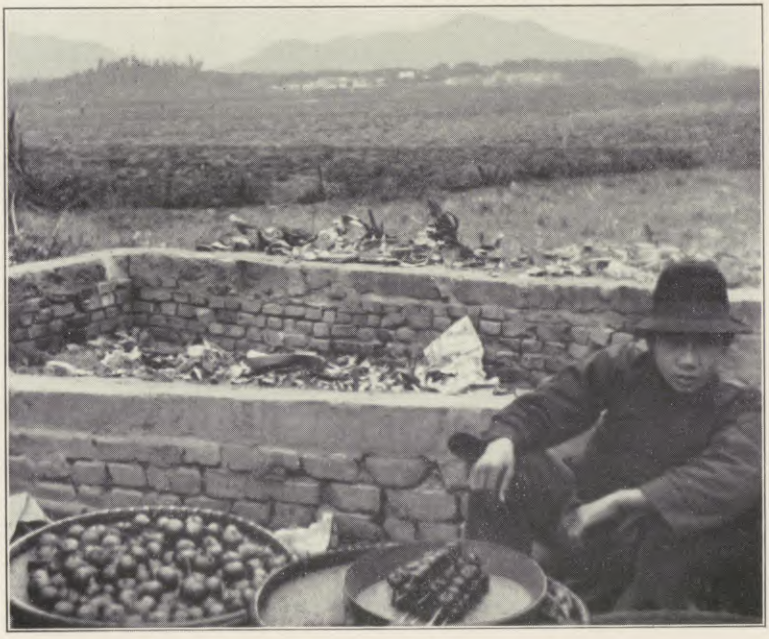


Figure 8. — A public refuse bin at Un Long.

Figure 9. — A rocky stream.

Figure 10. — Anti-malaria drainage.

The policy adopted is to leave the people alone as much as possible, and to refrain as far as is compatible with good government from forcing on them any measure which might be repugnant to them. The villagers carry on as usual, and continue to elect elders to guide them.

Under the old Chinese custom, everybody was responsible to someone higher up. Each village was divided into sections, sub-sections and houses. Responsible for each section was a head, who was in turn responsible to the head of the village; much the same system prevails throughout the Republic of China to-day.

When the Colonial Government took charge, it abolished the system of fixing responsibility on individuals, and the heads of the villages and the heads of the sections in them ceased to have any official powers or any official recognition. Nevertheless, from 1898 up to the present, it has been the custom to obtain the opinion of the elders whenever proposals are made to enforce the provisions of any ordinance, and to postpone action if that opinion proved unfavourable.

For the purpose of administration, the New Territories are divided into two main districts, the northern and the southern, each in charge of a district officer who performs the duties of land officer and magistrate and is authorised to hold a small debts court.

Law and Order.

No progress in rural reconstruction is possible unless the country people can be sure of at least some degree of security against raids and robberies.

Police-stations have been established at most of the larger villages, such as Tsun Wan, Castle Peak, Ping Shan, Au Tau, Lok Ma Chau, Sheung Shui, Sha Tau Kok, Sha Tin, Sai Kung, Tai O and Cheung Chau.

Communications.

In the New Territories, there are over 70 miles of excellent motor-roads.

A service of motor-buses connects up the main villages.

A railway was completed in 1910 from Kowloon to the Chinese frontier, where it joins the line from Canton.

Telephone communication is available to all the police-stations.

Market gardeners make use of motor-lorries for bringing their produce into the market towns and into Kowloon.

Electric power has been extended from Kowloon to the New Territories. Many houses, and especially shops in the villages, are lit by electricity.

A start has been made with broadcasting as a means of educating the people. Loud speakers are fixed in the market place on special occasions and short talks on village hygiene are broadcast from Z.B.W.

Social State of the People.

The people are primitive and for the most part illiterate, and they have habits and customs which are centuries old and which they are reluctant to change. They are superstitious and have a firm belief in necromancy. They are suspicious of strangers and resent meddlesome interference, but they are not antagonistic to measures taken for their welfare when these are understood.

The traditional beliefs of these uneducated Chinese as to the causes of disease, the means by which it is spread and the factors which affect its development, are so greatly at variance with modern teaching that there is little chance of promoting voluntary co-operation between them and the authorities in the matter of prevention and control of disease until they can be brought to understand the true nature of the problems and are conscious of the benefits of the measures advocated.

The rules and regulations governing village life are nowhere laid down in print, but have been handed down from generation to generation. There are no heads of villages appointed by and responsible to Government for the conduct of village affairs, but there are " village elders " who are accepted as arbiters in petty disputes and who have acquired their position through age, experience, wealth or family rank. These elders

have no executive power and are regarded by the villagers and by the Government as advisers only.

From time to time, co-operative efforts are made for the good of the community, some contributing money, some materials and some labour. In this way, the paving of streets or paths, the construction of a bridge, or the digging of a village well is brought about.

As is usual in dealing with primitive populations, the Government began by introducing medical relief, hoping thereby to gain the confidence of the people and educate them gradually to recognise the benefits of hygiene and welcome the adoption of sanitary measures.

In 1900, a small dispensary was established at Taipo and a Chinese doctor of the Medical Department placed in charge. His duties included periodical visits to the other villages for the purpose of vaccinating and treating such of the sick as desired to avail themselves of his services.

In 1904, the cases treated by the Chinese medical officer numbered 2,464, and sixty-six children were vaccinated. In 1906, he treated 799 cases of malaria, thus proving that the people took kindly to Western medicine.

In 1923, a certain lot in Cheung Chau was declared a cemetery, and it was forbidden to bury or deposit any human remains elsewhere than in that cemetery.

There are food markets at Taipo, Cheung Chau, Tai O and Un Long.

NOTE SUBMITTED BY THE DIRECTOR OF EDUCATION, HONG-KONG.

The Government rural schools, including the normal school for training rural teachers, give simple talks on hygiene. An endeavour is made to enforce practical hygiene in the private rural schools through the medium of ambulatory inspectors.

The necessity of using mosquito-nets as a precaution against malaria is no less appreciated in the New Territories than in China proper.

The rule " no vaccination, no school " is readily accepted by the Chinese, who appreciate the value of both, but are not prepared to pay highly for the former. In point of fact, facilities exist to enable children to get vaccinated free.

Although the people are still very poor in some parts of the territories, in others the increased prosperity during the last quarter of a century or so is demonstrable and is thought to be reflected in the physique of the school-children.

In the comments appended to the agenda of the Conference, the question is asked, under " Rural reconstruction and collaboration of the population ": " How best can lasting results be secured ? "

The view of the Education Department is that lasting results can only be secured by obtaining the willing collaboration of the teachers and inspectors. It may be a lengthy undertaking to convince them of the reasonableness of the principles involved ; it is, indeed, quite possible that they, for their part, may on occasion be able to show the contrary. But time will not be wasted if in the end they are won over by patient persuasion.

III. SANITATION AND SANITARY ENGINEERING.

1. Housing.

In the rural areas can be found houses of every description, from the large, well-built, modern residence standing in its own grounds and owned by the more wealthy classes, both European and Chinese, to the untidy squatters' shacks made of bits of wood and pieces of tin (Figure 2).

The bulk of the rural population, however, live in villages scattered here and there, some in the fertile plains, some on the lower slopes of the hills and some on the coast (Figure 3).

The houses in the smaller villages are rather diminutive, but are strongly built of brick and mortar and roofed with tiles ; they are usually of only one story. There are no windows in the ordinary sense. Their place is taken by small, square, barred openings, high up in the outside walls, usually two in number, one on each side of the doorway (Figures 4 and 5).

These serve for lighting and ventilation, which are both very inadequate. The houses are irregularly placed and no pretension is made to form streets or lanes.

There are still many examples of the old-fashioned walled fortress-like village (Figure 6), built over a hundred years ago, long before the New Territories came under British jurisdiction. These villages are built within a wall made of stone and brick in the form of a square, surrounded by a moat. On one side of the square is situated the main gateway, which forms the entrance to the village and which can be strongly barred at night. In the larger villages, of which a few are fast growing into small towns, there is evidence of some authority with town-planning ideas. In these villages, the houses are larger, consisting of two or more stories, and built on the lines of those in the urban areas.

2. Water Supplies.

The water supply of the villages is almost entirely obtained from shallow wells, but in some instances from streams and mountain springs. There is a Government water supply in the small towns of Taipo and Un Long. In some villages near the coast, water is imported by boat during the dry season (Figure 7).

3. Disposal of House Refuse and Other Wastes.

The Chinese race is noted for its thrift and economy. Nothing of any value is ever wasted (Figure 8). What they cannot use themselves is either burnt as fuel or given to the animals, especially the ducks and the pigs. The latter eat up all edible refuse and constitute one of the main scavenging agencies in the village.

There is at present no proper system of scavenging and refuse disposal applicable to all villages. In Taipo, scavenging is done by a contractor who is responsible to the district officer. On the island of Cheung Chau, this work is carried out by the local firemen, who are paid out of dues collected at the market and from local funds ; the rubbish is dumped in the sea. Villagers

are, as a rule, opposed to incineration because of the nuisance caused by smoke.

As human excrement, both fæcal matter and urine, is used as manure for the fields, it is carefully conserved.

4. Campaign against Flies.

Nil.

IV. NUTRITION.

1. Composition of Food and Methods of its Preparation.

Rice forms the basis of the diet of the southern Chinese. Red rice is rice which retains its red-brown pericarp; white or polished rice is rice which has had the pericarp removed by milling. The white variety is preferred to the red by all classes of Chinese because it has a better appearance, both in the raw and the cooked state, and also because it is more palatable and more digestible.

The New Territories have extensive cultivable land, on which are grown rice, sugar, vegetables, lichees, pineapples, etc. All the plains are divided up into numerous irregularly shaped paddy fields which give a peculiarly patchwork appearance. There are two crops of rice in the year—one in the summer and one in the winter. This home-grown rice is of a high quality. The farmer prefers to sell it for the making of Chinese wine or for exportation and to buy imported white rice for his own consumption. This rice diet is supplemented by other articles of food, the nature of which varies with the means of the consumer. The vast majority of the population, however, has to be content with the addition of beans in various preparations, sweet potatoes, green vegetables, salted vegetables and a small portion of either fish (salted or fresh) or pork. Chicken and duck are rare luxuries for the common people. Fresh milk is beyond the means of the ordinary villager, even for infant feeding. It is estimated that the average person requires one pound of rice daily, which, at the price now ruling in Hong-Kong, costs seven cents—about one penny in English money.

Usually there are only two meals a day, one in the morning and one in the evening. The experience of many generations has taught the Chinese that it is unwise to partake of anything uncooked. Fresh water is never drunk. A weak infusion of tea takes its place. The main articles of diet are prepared for consumption by boiling or steaming. The only foods that are eaten in the raw state are fruits, such as oranges, pineapples, lichees, persimmons, sugar-cane, etc.

2. Nutritive Value of the Principal Foods peculiar to the East.

Experience has shown that the simple supplemented rice diet of the Chinese rustic is sufficient to keep the individual in health, even when performing hard manual labour. Despite this fact, it is apparent that the ordinary diet contains a preponderance of carbohydrate and a lack of protein and fat. With regard to rice, from the nutritional point of view, so much research work has been carried out by bacteriologists and physiologists in Malaya, the Dutch East Indies, French Indo-China, the Philippine Islands and Japan that the subject would appear to be almost, if not completely, exhausted.

From the agricultural point of view, the methods of rice cultivation employed in the New Territories are the same as those employed in the neighbouring provinces of China, which in turn are similar to those generally employed throughout the rice-growing countries of tropical Asia. These methods have reached their present state through centuries of trial and elimination of error and there would appear to be little need for research, in so far as actual yields are concerned.

With regard to the production of agricultural commodities, the farmers are being encouraged and assisted by the Hong-Kong Agricultural Society in promoting (*a*) the growth of rice under conditions which would reduce to a minimum the breeding of mosquitoes and the consequent spread of malaria, (*b*) the growth of garden vegetables under conditions which would obviate the risks now existing of disseminating the germs of intestinal diseases, and (*c*) the production of soya-bean milk for infant feeding.

3. Minimum Cost of Adequate Nutrition, and Allowance for Food in Family Budgets.

It has been estimated that the cost per diem of food for an ordinary Chinese farm labourer is about ten to fifteen cents (Hong-Kong currency).

4. Diet and Health. Deficiency Diseases.

Generally speaking, the dietary of the rural population is wholesome and well prepared, and, provided that the consumer has the means wherewith to purchase a bare sufficiency, there is very little likelihood of disease resulting from avitaminosis, such as beriberi. Dental caries is moderately prevalent. Very few of the country people have their full quota of hæmoglobin in the blood. In many cases, the anæmia is the result of past malaria. In some cases, it can be attributed to hookworm disease, but, in a certain number, it is due to a deficiency of iron in the diet.

5. Plans for a Co-ordinated Nutrition Policy based on the Collaboration of the Health, Educational and Agricultural Services.

So far, no plans have been formulated.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

1. Malaria.

This disease exists to a considerable extent in the rural areas of both the island and mainland.

Investigations have proved that swamps, ponds and other collections of water in the open plains are more or less harmless and that the real danger lies within mosquito-flight distance of the feet of hills and of valleys, where collections of spring water in pockets, pools, swamps and streams (Figure 9) form the breeding places of *A. maculatus*, *A. minimus* and *A. jeyporiensis*.

It used to be thought that the chief vector in the New Territories was *A. maculatus*. The researches of Dr. JACKSON, the well-known malariologist in Hong-Kong, have proved this to be incorrect. *A. maculatus* is a carrier, but is of far less importance in the spread of malaria than *A. minimus* and *A. jeyporiensis*.

It appears that species of mosquitoes, like races of men, can, under different conditions of climate and surroundings, develop differences in habits and tastes for food. In Hong-Kong, where malaria is very prevalent, *A. maculatus* seems to prefer animals to human beings, and its importance as a vector or malaria is much less pronounced.

Though paddy swamps on the open plains are factors of little importance in the spread of malaria, the same cannot be said of the irrigated terraces which form the rice-fields of the rural areas. These have been shown to be, under certain conditions, prolific breeding-places for those most powerful carriers, *A. jeyporiensis* and *A. minimus*.

The most malarious areas are therefore those in or near the hills. Unless carefully watched, and carefully controlled (Figure 10), works in the vicinity of the hills, which involve disturbance of the soil, such as roads, railways or waterworks, are nearly always attended by high sickness and death rates among the labour forces employed.

Malaria not being a notifiable disease, few figures are available to measure the actual extent of incidence throughout the New Territories.

Many of the police-stations are screened, and every man is provided with a mosquito-net. Prophylactic quinine is issued and the living rooms are regularly sprayed with an insecticide in an endeavour to kill any adult mosquitoes that may be present.

2. PLAGUE.

For the last six years no cases of plague have been reported in Hong-Kong. The disappearance of this disease, not only from this colony, but from the greater part of China, and its decline throughout the world are due to factors which are not understood.

3. Ankylostomiasis.

The microscopical examination of the stools of the inhabitants of the rural areas would show a high percentage of infection with hookworm ova, but extreme degrees of anæmia due to this disease are uncommon among the inhabitants. No special measures are undertaken to combat this infection.

4. Tuberculosis.

The population is mostly engaged in agriculture or fishing. The people as a whole live an open-air life and tuberculosis cases are not common.

5. Pneumonia.

No special incidence of this disease has been noticed.

6. Yaws.

No cases have been reported. This disease appears to be non-existent.

7. Leprosy.

Though leprosy is a notifiable disease, very few cases are notified. The number of lepers in the colony is not known; but, assuming that the incidence rate is the same as that of the neighbouring countries, the total number cannot be less than 500.

In 1935, a new Lepers Ordinance was passed, which repealed that of 1910. The new ordinance looks upon leprosy less harshly than its predecessor. The unfortunate individual who has contracted the loathsome affliction, through no fault of his own, is now regarded as a human case of disease who has a claim to receive the same sympathetic treatment as is accorded to anyone suffering from any other disease of a contagious nature.

It is the intention of the Government to establish a proper leper settlement in a suitable situation which will not only

be a place of segregation, but also a centre for in-patient treatment and retreat for those who are unable to provide for themselves.

8. Mental Diseases and Drug Addictions.

No statistical figures are available to show any special incidence of lunacy. As is often the case among rural populations, the village idiot can be found in some villages.

Opium-smoking is not universal throughout the rural areas. Certain villages have a reputation for being centres where this habit occurs. The extent of addiction is, however, not very great.

II. MEMORANDUM ON CONDITIONS PREVAILING IN NORTH BORNEO

By

Dr. Percival A. DINGLE, C.B.E.,

Principal Medical Officer, Sandakan, North Borneo.

I. HEALTH AND MEDICAL SERVICES.

1. Principles governing their Organisation.

Medical care and health work among the native population in rural areas are carried out by the same staff. A scheme, however, is at present under consideration for the training of natives as sanitary inspectors by a European officer qualified to undertake such work.

2. Personnel.

(a) *Doctors.*

There are six European medical officers in the service of the Government—one principal medical officer and five district surgeons.

(b) *Auxiliary Staff.*

The auxiliary staff at the present time consists of two European nursing sisters, seven locally trained nurses, two village nurses who are certified midwives, two village nurses under training and forty-four male dressers. Twelve of these dressers have charge of dispensaries maintained by the Government in rural areas.

3. Curative and Preventive Activities.

In rural areas, the difficulty of transport renders the establishment of a central hospital impossible; a system of dispensaries has therefore been devised under the charge of

Chinese or native dressers. There are at present twelve of these dispensaries in selected centres and it is hoped to increase this number year by year. Seven of these dispensaries have sick rest houses attached to them for the treatment of natives unable to return to their homes.

Closer contact with the natives in their own villages is obtained by regulated tours by the dressers in charge of dispensaries, and also by the district surgeons, stationed at Tenom in the interior and at Beaufort and Kudat. The district surgeon, interior, makes it his endeavour to cover the whole of his district once a year ; he is accompanied by two dressers and follows a set itinerary. Treatment centres are arranged, which may be attended by as many as 1,000 natives. Such a tour may last as long as two months and involve a journey of 250 miles on foot.

During the year 1936, 143,181 out-patients were treated at the twelve dispensaries.

The North Borneo native has no fear of Western medicine, and there is little doubt that his desire for examination and treatment has been engendered by the success obtained in the treatment of yaws.

4. Budgets.

For the year 1937, the approved expenditure on the Medical Department amounts to $191,780 ;[1] of this amount, $113,507 occurs under the heading Personal Emoluments and $78,273 under Other Charges (annually recurrent).

The estimated population of North Borneo on December 31st, 1936, was 290,599 ; the expenditure per head of population on public health and medical care is therefore 66 cents. This figure is the amount to be expended by the Government on public health and medical care. No information is available as to the amount to be expended by commercial companies on the medical care of their employees.

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[1] Straits Settlements dollars. — *Editor.*

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

A step towards rural reconstruction has been taken by increasing the number of vernacular schools and the institution of physical exercises for all boys attending these schools. Pamphlets regarding the importance of a properly balanced diet have been issued, together with charts, prepared by Professor ROSEDALE, showing how such a diet may easily be constructed. School gardens are also being opened at all vernacular schools. With the collaboration of the Agricultural Department, a notice has been drawn up showing how such gardens may best be prepared, with special reference to selection of site, preliminary operations, such as lay-out of plots, nursery, orchard for fruit trees, fencing and preparation of the soil. In conjunction with this notice, a chart has been prepared giving the names of various crops that may be planted and showing means of propagation, season of planting, method of sowing, transplantation, distance required between each plant, manure to be used, how often to be cultivated, time to mature, watering and harvesting. By such means it is hoped :

(*a*) To teach school-children the correct way to cultivate crops ;

(*b*) To train children for pursuits which will be of future benefit ;

(*c*) To teach them to be producers and not merely consumers ;

(*d*) To secure for them a balanced diet which will provide better health and greater energy ;

(*e*) To inculcate the idea that plants are living things which also require food, water and air as do human beings ;

(*f*) To provide healthy outdoor exercise after tedious work in the classroom.

During 1936, an investigation was made on native health by Dr. J. O. SHIRCORE, C.M.G., late Director of Medical and Sanitary Services, Tanganyika Territory. A number of important

recommendations have been made regarding future work and expansion of the Medical Department, and it is hoped that these recommendations, when carried into effect, will considerably benefit native health.

III. SANITATION AND SANITARY ENGINEERING.

1. Housing.

The lowland Dusuns have their separate dwelling-places. These are usually found clustered together, but occasionally a single house may be seen sourrounded by fruit trees on a hill above the rice-fields. These houses are often well made with hardwood posts, plank or bamboo walls, and roofs thatched with sago leaves. In certain districts, such as Maudu, the long house still survives, two or three buildings, more rarely one, containing the whole community.

The standard hill Murut house, a communal building often as much as 200 feet long, containing the whole village, is built with two rows of cubicles separated by a passage down the middle. This passage opens out in the centre of the house on to the dancing floor, which is made to sway by means of springing timbers, Entry to the house is effected by climbing up a notched log of wood. There are small windows in the outer walls and numerous other openings. Sometimes movable sections of the roof over a hearth are propped up to allow for ventilation or to let the smoke out. These long houses are built on a hill, and all water has to be carried up in bamboo cylinders from the stream at the foot of the hill, which is often at least half an hour's climb.

The ground under these houses is usually rather dirty; pigs, fowls, dogs and babies roam everywhere, and probably outside the door of the house, in a hive made of tree bark, is a swarm of bees.

2. Water Supply.

In rural areas, all water for domestic purposes is obtained from rivers and streams. The water-vessel in all North Bornean houses is a length of bamboo, the body of the vessel being a

long single internode, and the bottom an adjacent node. In the morning, women carry down a number of these to the river on their shoulders and bring them back to the houses. Occasionally, water may be seen piped to a house from the nearest spring by means of an aqueduct of bamboos split in half. Surface wells, which are seldom protected from surrounding contamination, are the main source of supply in coastal villages.

3. Disposal of House Refuse and Other Wastes.

The interior of native houses is usually fairly clean, but refuse from cooking and stale rice, etc., are thrown through a hole in the floor and the ground in the vicinity, especially in wet weather, may in many cases resemble an expanse of mud, consisting partly of refuse washed away from below the houses and partly of the ordure of domestic animals. Lying about in this are pigs of all sizes ; pieces of bamboo and leaves add to the general air of untidiness. Every effort is made by means of propaganda and visits by medical officers, executive officers and dressers to persuade natives to collect and burn all rubbish, construct fences round their houses and provide separate accommodation for domestic animals away from the houses. Sanitary latrines are being constructed in all villages.

4. Campaign against Flies.

Apart from propaganda relating to the proper disposal of refuse in native villages, no special steps are at present taken against flies. In interior villages, flies are few in number.

IV. NUTRITION.

1. Composition of Food and Methods of its Preparation.

Wet rice may be regarded as the staple diet of the native at Tambunan in the interior and in the districts of the west coast, with sago in certain parts of the coast ; tapioca and dry rice form the staple food among the hill natives. Other crops, such as vegetables and fruit, maize, sweet potatoes,

marrows, gourds, cucumber, egg-plant, bananas, papaia, pommeloes, limes, oranges, pineapple, mango, durian, keladi, chillies, bamboo shoots and fern tops are more or less common to most districts. Certain wild fruits, roots and green leaves may be used during periods of shortage.

Method of Preparation.

Native rice or padi is pounded in a large wooden mortar, with wooden pestles. When sufficiently pounded, it is taken out and put into a large circular winnowing tray of basket-work and the chaff separated from the grain. Rice before being cooked by natives is not usually washed. The grain is placed in the cooking-pot, sufficient water is added just to cover it, and then the pot is put on a slow fire until the water has all been evaporated and the rice next the inside of the vessel has begun to cake and brown.

Tapioca as prepared by the Dusuns.

The skin is first removed and the root then boiled in a pot with water. When the tapioca has become sufficiently soft, the water is poured off and the pot replaced on the fire until the tapioca is dry. Muruts pound the tapioca or grate it on a piece of perforated tin into small pieces, These pieces are squeezed in water to separate the tapioca from the fibrous matter, and the former is then boiled in water.

Vegetables are boiled in water with salt. Fish, if available, may be boiled with the vegetables.

Other foodstuffs are boiled, stewed or roasted ; quite large animals are roasted whole in their skins, sometimes even without the intestines being removed. Small fish or bits of meat are often roasted by putting them into the cleft of a stick which is sharpened at the other end for fixing into the ground.

Muruts and some hill Dusuns use a kind of potted meat for seasoning their food. The basis of it is raw salted fish, wild pig, deer or buffalo, treated with powdered seeds of the tree which the Dusuns call " pangi ". This is put away in jars or bamboo cylinders and left until far advanced in decomposition, when it is considered ready for use.

2. Nutritive Value of the Principal Foods peculiar to the East.

An attempt has been made to calculate the nutritive value of the Murut and Dusun diets. In both cases, the investigation was over a period of one week and all food cooked or eaten was carefully weighed before each meal.

The food in the Murut diet consisted of rice, tapioca, sweet potatoes, fresh fish, vegetables, and salt and fish, wild pigs, or deer meat "jaruk". The food values were taken from Professor Rosedale's "Chemical Analyses of Malayan Foods", and the following figures, shown in ounces, were obtained :

Average weight of food eaten per person per day (before cooking)	Water	Mineral	Protein	Fat	Fibre	Carbo-hydrates	Calories
64.3	28.5	2.7	4.3	0.6	0.2	28	3,993

The food value of the Dusun diet was also investigated over a period of one week. The food consisted of taro, unmilled rice, sweet potatoes, cucumber, red pumpkin, jack fruit, and 9.3 ounces of salt divided between nine persons. The following figures, shown in ounces, were obtained :

Average weight of food eaten per person per day (before cooking)	Water	Mineral	Protein	Fat	Fibre	Carbo-hydrates	Calories
87.8	55.3	0.8	2	0.7	0.8	28.2	3,699

From these figures it would seem that, in both the Murut and Dusun diets, calorie requirements are sufficient, but that animal protein and fat are deficient and the amount of carbohydrates more than necessary for normal requirements.

3. Minimum Cost of Adequate Nutrition and Allowance for Food in Family Budgets.

No information on this point is available, for almost without exception all foodstuffs are grown by the natives themselves on their own land and small luxuries are obtained by means of barter at native markets.

4. Diet and Health : Deficiency Diseases.

Beriberi.

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.

Endemic Goitre.

Endemic goitre occurs in certain of the hilly regions of the interior. In the Bokan country, 33.6% of 1,014 natives examined were found to be affected ; at Ulu Tomani, fourteen out of twenty women examined were similarly affected ; and, of twenty-two natives examined from two small villages at Mansack, all had goitre. The question of making available a supply of iodised salt for the natives inhabiting these regions is at present under consideration.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

1. Malaria.

This disease is hyperendemic throughout the interior of North Borneo. The native is well aware of the efficacy of quinine, and treatment is given at the various dispensaries and during the periodic tours of the medical officers and dressers. It is hoped to extend the chain of dispensaries, year by year, in order that there may be greater opportunity afforded for prompt treatment of serious cases, especially among infants and small children.

2. Plague.

There was a small outbreak of bubonic plague in the town of Sandakan in 1920. No plague has occurred in the rural districts of the territory.

3. Ankylostomiasis.

Mass hookworm treatment is administered to natives at all treatment centres visited by the district surgeon, interior, and at all villages visited by dressers when on tour. In addition, all Government servants, the constabulary and all vernacular schoolboys at the headquarters of districts are examined twice yearly and treated, if found infected.

4. Tuberculosis.

This disease is not apparently a serious problem in rural districts. Dr. Tregarthen, District Surgeon, interior, in the course of his tours during the years 1935 and 1936, examined 10,164 natives and found only twenty-six cases of pulmonary tuberculosis. Dr. J. O. Shircore, C.M.G., late Director of Medical and Sanitary Services, Tanganyika Territory, who during 1936 made an investigation into the health of the North Borneo native with special reference to the sociological and economic factors bearing on the depopulation problem of the interior and west coast, stated in his report that, during the course of his investigations, seven cases of pulmonary tuberculosis were seen, distributed in the Bokan, Tenom, Keningau and Tambunan districts. These were all advanced cases of phthisis, and, though some were resident in long houses, they appeared to be isolated examples. This is all the more remarkable in that the native, when in the house, spits promiscuously anywhere.

5. Pneumonia.

Apart from providing accommodation and treatment at the various hospitals and sick rest houses attached to dispensaries, no special measures are taken.

6. Yaws.

This disease was prevalent among the natives of the interior of North Borneo and also amongst the Rungus and Marudu Dusuns and the Tempasuk Labuk and Sugut districts, It is less frequently seen among the native population inhabiting

the coastal villages. In 1924, a campaign against this disease was inaugurated by Dr. G. G. CAMPBELL, and since then the following cases have been treated.

	Cases
1924.	251
1925.	1,012
1926.	2,585
1927.	1,593
1928.	2,266
1929.	3,656
1930.	5,161
1931.	6,861
1932.	6,861
1933.	8,685
1934.	7,340
1935.	6,725
Total	52,996

It is hoped that this disease, the incidence of which has already been reduced very considerably, will disappear within the next few years.

7. LEPROSY.

This disease does not at the present time form a serious problem among the native population of rural districts. A settlement for sufferers is provided on the island of Berhala, about three miles from Sandakan, and segregation of lepers is compulsory. Of seventy patients remaining under treatment at the settlement on December 31st, 1935, twenty, or 28.6%, were natives of North Borneo, and the majority of these came from the districts of Penampang and Kota Belud, where Chinese have intermarried with the native population.

8. MENTAL DISEASES AND DRUG ADDICTIONS.

A mental hospital, with accommodation for 120 patients, is provided at Sandakan. On December, 31st, 1936, 102 patients remained under treatment. Of these, forty, or 39.2%, were natives of North Borneo.

So far as I am aware, no cases of drug addiction have occurred among the rural population of North Borneo.

III. NOTE ON THE MEDICAL AND HEALTH SERVICES IN SARAWAK [1]

By

Dr. William HUTCHISON, Acting Principal Medical Officer.

1. Principles governing the Organisation.

At present, both medical and health work is carried out by the same staff, but this arrangement is not felt to be completely satisfactory and was only adopted because of financial stringency. Formerly, there was a separate Health Department. The feeling of the present staff is that, while collaboration between the two branches is most desirable, health officers should devote themselvs entirely to their branch and, as far as possible, be relieved from medical duties.

Apart from nomadic tribes, who present no serious health problem, it may be said that most of the population live in towns, on the sea-coast or on the banks of rivers and their tributaries. Effective health organisations exist in the towns, set up and controlled from headquarters in Kuching (the capital), and the situation of the remainder of the population makes relatively easy such problems as sewage disposal, etc. Roads of various lengths and surfaces radiate from the towns, but most of the country is covered by forests ; few roads exist and communication is mostly by water.

All towns and special areas, such as the gold-mining community at Bau, have a sanitary board under the chairmanship of an administrative officer, and include members of the local native races. Sanitary inspectors do duty in all such towns, and wherever possible the provisions of the municipal regulations are applied.

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[1] Area of Sarawak : 109,000 square kilometres.
Population (approximate) : 442,000. — *Editor.*

2. Personnel.

(a) *Doctors.*

The personnel in 1936 was as follows :

Principal Medical Officer and Chief Health Officer ;
Pathologist ;
Chief Assistant Medical Officer ;
Divisional Medical Officer (Sibu) ;
Assistant Medical Officer (vacant).

At Miri, the work is carried out by the European medical officers of the Sarawak Oilfields, Ltd., a retaining fee being paid by the Government.

In 1927, two Indian doctors were recruited, but the experiment has not been repeated. Better results have been obtained by filling posts equivalent to house surgeon by men locally born and trained who have reached the highest grades in the dresser's service. These men are usually well known in the community and enjoy to a marked degree the confidence of the people.

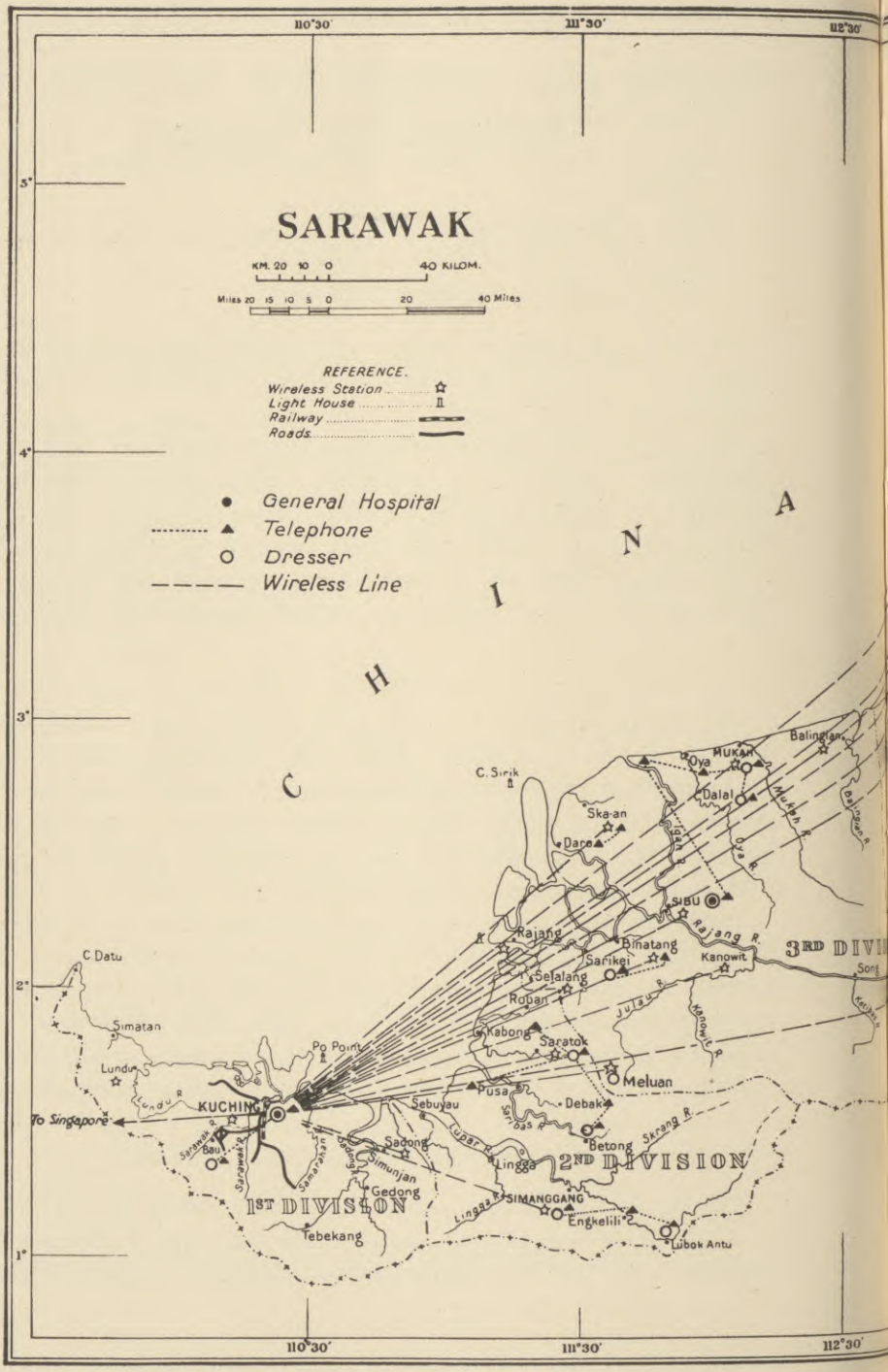
(b) *Auxiliary Staff.*

The staffs of dressers and sanitary inspectors, numbering fifty-three and fourteen respectively, although under one authority, are separately administered. At the same time, a system is in use under which dressers do duty in the Health Department, and sanitary inspectors gain some insight into the duties of a dresser in the General Hospital, Kuching.

There are eleven nurses and probationers, but these are all stationed in Kuching. Nurses and dressers are trained at the General Hospital, selected nurses being sent from time to time to Singapore for diplomas, such as the C.M.B. One sanitary inspector is also sent there each year for a course at the Royal Sanitary Institute, followed by an examination for the certificate.

3. Curative and Preventive Activities.

The headquarters of medical and health work for the State is in Kuching (population 30,000). In the town, it consists of medical and health administrative offices, a pathological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REFERENCE.
Wireless Station
Light House
Railway
Roads
General Hospital
Telephone
Dresser
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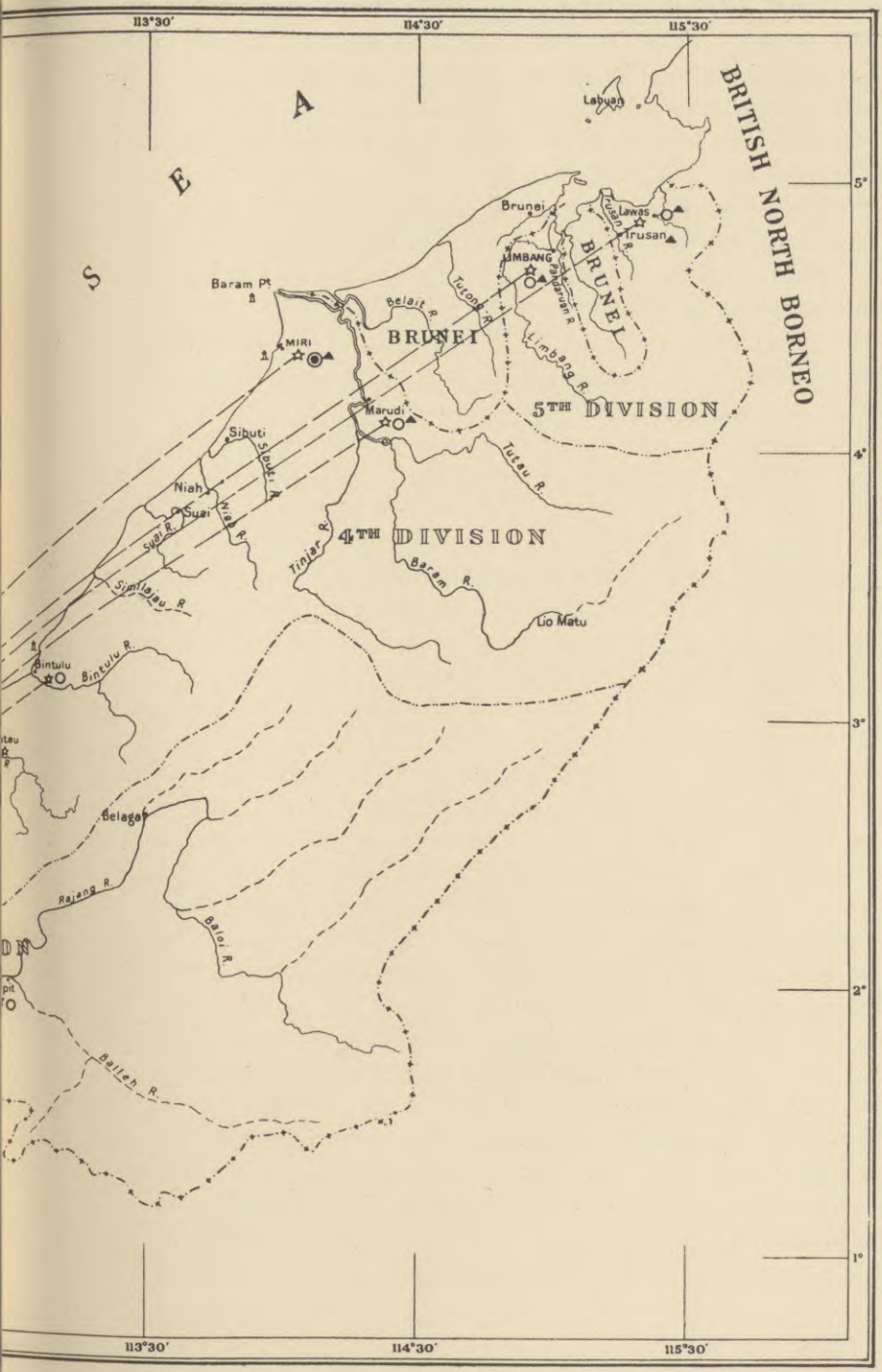
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S E A
BRITISH NORTH BORNEO
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Brunei
Lawas
Trusan
Tutoh R.
BRUNEI
LIMBANG
Pandaruan R.
Limbang R.
Baram Pt.
MIRI
Belait R.
BRUNEI
5TH DIVISION
Marudi
Sibuti
Sibuti R.
Niah
Suai
Suai R.
Wrai R.
4TH DIVISION
Tinjar R.
Tutau R.
Baram R.
Simlalau R.
Lio Matu
Bintulu
Bintulu R.
Belaga
Rajang R.
Balui R.
Balleh R.

laboratory, dispensary and store, out-patient department and health museum. The General Hospital is situated one mile from the centre of the town, and has 300 beds, two modern operating-theatres, up-to-date X-ray plant, and a well-equipped electro-therapeutic clinic with diathermy, ultra-violet (Alpine-sun and Kromayer) and infra-red therapy. Special attention is paid to midwifery, and the number of confinements has risen from fifteen in 1927 to 300 in 1936. This is considered most important, as a satisfied mother is one of our best propagandists in a country where direct propaganda is viewed with suspicion.

The other large hospital, under the charge of the Divisional Medical Officer, is at Sibu, and the Sarawak Oilfields, Ltd., maintain a well-equipped institution at Miri.

Dressing-posts, usually with limited accommodation for in-patients, are distributed at strategic points throughout the country and are in wireless communication with the capital. (See map.) They are run by dressers trained in the General Hospital, Kuching, and the dresser also accompanies the local administrative officer on his tours of the area. Opportunity is thus given to administer N.A.B. for yaws and give free vaccination. As most of the dressers have served in the Health Department, they are able to advise on local health problems, and, with the authority of the administrative officer, to see that such work as they advise is carried out. This system, and the distribution of the population, ensures that a large proportion of the inhabitants have access to medical and sanitary advice. Therefore, so far as we can see, a central authority with a network of dispensaries appears to be satisfactory under the conditions obtaining in Sarawak. The country is fortunate in having had no major epidemics in recent years. Plague, cholera and serious outbreaks of smallpox have been unknown for many years. In part, this is due to the efficient filter of the sanitary organisation at Singapore ; sea-borne traffic to Sarawak comes mostly from that port, and two to three days elapse on the voyage. Anything which might by chance have escaped the authorities in Singapore has time to develop *en route*, and the ships are examined in quarantine on arrival. Vaccination is performed on all passengers who do not possess a certificate or evidence of recent vaccination.

4. Budgets.

The Government alone provides the funds for medical and health work. For a population of approximately 442,000, the estimated figures for 1936 were :

	$[1]
Total revenue	4,655,784
Medical Department	203,201
Health Department	59,117

5. General Comments.

Persuasion and example are considered of more use than active propaganda, of which the people are suspicious. The use of N.A.B. for yaws was the most potent factor in opening up the way for Western medicine, as the results were obvious and often dramatic.

Such minor epidemics as occur are usually easily dealt with by a special party sent from headquarters. Wireless communication in this respect is very important.

Little work has been done locally on nutrition, but the diets and foodstuffs are substantially the same as in the Straits and Federated Malay States.

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[1] Straits Settlements dollars. — *Editor.*

IV. MEMORANDUM CONCERNING THE COLONY OF FIJI

Submitted by the

HEALTH AUTHORITIES OF THE COLONY.

I. HEALTH AND MEDICAL SERVICES.

1. Principles governing their Organisation.

There are roughly 150 inhabited islands in the Fiji group with a total population of approximately 200,000, and a population density of 28.1 per square mile. There are 98,000 Fijians, 85,000 Indians, 4,500 half-castes, 4,000 Europeans and 1,750 Chinese and other small groups.

In Fiji, there is a system of State medicine and there are also private practitioners in various centres.

For practical purposes, the community is divisible into two groups—namely, a communal group comprising the native Fijian, and an individualistic group to which the entire immigrant population belongs. The Fijians live in villages scattered throughout the colony ; the other sections are either agriculturists living in scattered holdings or persons dependent on commerce who are grouped around the ports and the sugar centres. The medical service is modified to meet these conditions.

The Fijians are provided with a medical organisation which extends into their homes, and includes native medical practitioners, with provincial hospitals and dispensaries at convenient points. The rest of the community is grouped more or less around the larger Government hospitals.

2. Personnel.

(a) *Medical Practitioners.*

These are divisible into three classes.

(*i*) Government medical officers, who are members of the Colonial Medical Service ;

(*ii*) Private practitioners, European and Indian ;

(*iii*) Native and Indian medical practitioners trained in a special school, the Central Medical School, which will be the subject of a paper.

(b) *Auxiliary Staff.*

A. *Sanitary Staff.*

There is one full-time medical officer of health whose duties are confined to the port of Suva and its environs.

There are three classes of full-time sanitary officers—namely :

Qualified sanitary inspectors, of whom there are four ;
Sanitary overseers, of whom there are two ; and
Sanitary assistants, Indian and Fijian, whose number varies from time to time.

The sanitary organisation of the communally-living natives is principally carried out under the direction of the native medical practitioners, assisted by native officials and rural police.

B. *Nursing System.*

This has been affiliated with the New Zealand Government Health Department and is subject to its inspection. There is at present a training-school for European nurses in connection with the Colonial War Memorial Hospital, and there is also a school for Fijian obstetric nurses, but the training of the latter class is not advanced. A beginning has now been made with a scheme which it is hoped will improve the facilities for the training of non-European nurses. It is also hoped that facilities may be made available for paying the expenses of providing nursing training in New Zealand for deserving European girls from Fiji.

3. Curative and Preventive Activities.

Gross conditions such as ankylostomiasis, yaws and diseases resulting from soil-pollution have been attacked by campaigns, with the result that the community has received valuable education and is becoming receptive to public health measures. Hitherto, the principal defect of the native nurse as an effective assistant has been her lack of preliminary education. The principal defect in the native medical practitioner is the very definite curative bias in his training. A *health centre* is soon to be opened at the Colonial War Memorial Hospital, Suva, where practical training in public health and preventive medicine will be provided for medical and nursing students, the benefits of which will ultimately be carried into the homes of a population already made receptive. With yaws and ankylostomiasis under control and a marked improvement in soil sanitation, the most urgent of the remaining health problems are pulmonary tuberculosis and the very high infant and child mortality among the Fijians.

From the better co-ordination of all health services, added to the intelligent co-operation of the community, a great increase in general efficiency is confidently anticipated.

4. Budgets.

With the exception of generous help that has been given from time to time in connection with special services by the Colonial Sugar Refining Company, the Rockefeller Foundation and members of the public, the Government provides the full cost of its medical and health services. In 1935, the Government spent 9.2% of its revenue, or £67,672 net, on these services.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Formerly, the rural population suffered from all the physical and mental defects of prolonged, or frequent, infection by hookworm and yaws and of its own ignorance of the fundamental

principles of disease prevention. As a natural consequence of the general improvement in public health, there has been a marked advance in the social and economic state of the people, which is most evident in the case of the Indians. Indeed, it is generally admitted that improved public health played the largest part in fitting the Indians in Fiji for the change in their condition from that of labourers on sugar plantations to growers, a change which enabled the Colonial Sugar Refining Company to overcome, with marked success, the difficulties with which it was confronted when India was finally closed as a source of agricultural labourers.[1]

In the Fijian villages, changes that are taking place are in the direction of individualism, with a determination on the part of the hitherto unambitious Fijian to take his place in the economic life of the colony. In these circumstances, there is a natural drift from village to town, and the constant vigilance of the Government is necessary to prevent harmful results to the race during the transition period. In this most important development, the Fijian has been largely stimulated by the industry of the Indian. It is, indeed, impossible to estimate the extent to which Fijian society is becoming modified by Indian individualism, or, conversely, Indian society by Fijian communalism.

The health problems that arise in Fiji are infinitely less complicated than those of countries where the population is more dense. It has been found by us, as elsewhere, that attempts to impose public health by force are wasteful and often ineffectual, but that intensive campaigns directed against very apparent diseases, and employing the elementary principles of public health, such as soil sanitation and improved water supplies, are understood even by the most primitive sections of the community, and do lead, sooner or later, to a permanent raising of the standard of public health. Thus, in Fiji, a well-organised hookworm campaign, begun in 1916 and 1917 and carried out intensively in 1922-1925, has greatly simplified the public health problems in this colony, and very little compulsion is now needed in our dealings with the general public. It is,

[1] See note IV (d). — *Editor.*

however, necessary to remember that, once the preliminary education has been given in a campaign like that of soil sanitation, no permanent results will be accomplished unless the population has access to proper latrines either by persuasion or by compulsion. Campaign work, to obtain its maximum effects, must also possess the goodwill of every branch in the medical organisation of a country.

III. SANITATION AND SANITARY ENGINEERING.

1. Housing.

European houses are almost universally constructed of wood and iron. The native Fijian, however, faced by hurricanes, has become, of necessity, one of the best builders of the native type of house in the world. The Indian, too, with the great improvement that has taken place in his physical and mental condition, has voluntarily improved the standard of his physical environment.

2. Water Supply.

Fiji, with its 60 to 150 inches of rain, has no scarcity of water. The supply as regards Fijians is generally good, but that of the Indian agriculturist is often drawn from surface wells, and is liable to be impure.

3. Disposal of House Refuse and Other Wastes.

In the main centres, there is a proper garbage service. In Fijian villages and Indian settlements, the burial of refuse is taught and is well practised.

Suva, the principal port, is sewered. Elsewhere the septic-tank system is commonly found in better-class houses. For the Fijians and Indians, bored-hole latrines, or modifications thereof, have been installed for almost every house on the main island of Viti Levu, and the system is slowly being extended to other islands. With a growing population and closer settlement, there is an increasing need for the services of an engineer with special training in the matter of water supplies, sewerage and surface drainage as these problems occur in tropical countries.

4. Campaign against Flies.

Flies are fairly prevalent throughout the warm season.

IV. NUTRITION.

Little has as yet been done to study the diet of the Fijians, chiefly owing to lack of equipment and of personnel. The colony now possesses excellent modern laboratory facilities and, when sufficient trained personnel are available, it will be possible to undertake the necessary work.

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 the vitamin A and the B groups, is short in protein, and vegetables and milk here are known to be deficient in mineral ash. Fijians on a European diet, wholly or in part, suffer from dental caries, which is unknown to those using entirely native foods. There are also skin reactions to infections that suggest dietary deficiency, both with the native diet and the so-called European diet of natives.

There is some evidence that the Indian diet is deficient in calcium. Of the well-known deficiency diseases, there is an almost complete absence in Fiji, although there have been several occurrences of epidemic dropsy.

Plans for a Co-ordinated Nutrition Policy based on the Collaboration of the Health, Educational and Agricultural Services.

This policy, suggested early in 1936 by the Colonial Office, has not been attempted as yet. A member of the Education Department has received training in public health under a Rockefeller Foundation Fellowship with the intention that he should be a liaison officer between the Education and Medical Departments.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

1 and 2. Malaria and Plague.

There is no malaria and there is no plague in the colony.

3. Ankylostomiasis.

Formerly a principal cause in Fiji, directly and indirectly, of human misery, morbidity and death, this disease has been brought under control, and vigilance in this particular aspect of public health work, which includes the important question of soil sanitation, combined with improved living standards, are reacting against any serious recrudescence of this disease.

4. Tuberculosis.

This disease, introduced into the groups by their early immigrant population, at one time gave rise to the gravest anxiety regarding its possible effect on the non-immune native, and is still reported as the cause of from 25 to 34% of deaths in all hospitals. Although there is evidence that the native populations of Fiji and the other island groups are gradually acquiring a resistance to tuberculosis, there are yet more deaths among Fijians from this disease than there are among Indians in Fiji from all causes. Tuberculin tests indicate that in early adult life well over 90% of the Fijians are infected.

5. Pneumonia.

Pneumonia may be considered one of the greatest scourges in the Pacific, and even in 1935 it was credited with causing 18% of deaths in hospital. The control of yaws and hookworm has undoubtedly increased the resistance of the native peoples and of Indians to pneumonia.

6. Yaws.

Yaws, which was formerly universal among all native inhabitants of the islands included in this memorandum, is now being satisfactorily controlled by the free use of organic arsenicals. It is a rare event nowadays to find a Fijian suffering from yaws, and the morbidity of this disease has become a minor problem.

7. Leprosy.

As a problem of public health, leprosy is treated by the isolation of cases at the island of Makongai, where a very efficient institution provides for their care and treatment in a manner that is not surpassed in institutions of its kind elsewhere. A number of the other Pacific administrations co-operate with Fiji in maintaining this Central Leper Hospital. Until more knowledge is acquired of the ætiology of leprosy, the treatment of cases in isolation would seem to be the most reasonable way to deal with the problem.

8. Mental Diseases and Drug Addictions.

The incidence of mental disorders is small in proportion to the size of the population. The occurrence on occasions of general paralysis of the insane in Fijians appears to establish the connection between that disease and yaws, as syphilis is unknown among the Fijians.

Fiji rigidly controls its drug imports, and drug addiction, etc., is in no sense a medical issue.

IV(a). NOTE ON THE MASS TREATMENT OF ANKYLOSTOMIASIS IN FIJI

By

Dr. V. W. T. McGUSTY, O.B.E.,

Secretary for Native Affairs and Inspecting Medical Officer, Suva.

1. Geography and Population.

Fiji, which comprises approximately 250 islands, of which ninety-one are inhabited, is intersected by the 180th meridian, and lies between the 15th and 22nd parallel of south latitude. The total area of the group is 7,055.5 square miles, of which 4,113 square miles are contained in the island of Viti Levu and 2,163 square miles in the island of Vanua Levu. The total population by races, according to the figures of the 1936 census, is as follows :

Europeans	4,028
Fijians	97,651
Other Polynesians	1,616
Other Melanesians	3,553
Indians	95,002
Half-castes	4,574
Chinese	1,751
Others	204
Total	208,379

The great bulk of the population is concentrated in the islands of Viti Levu and Vanua Levu, where there are well-marked wet and dry zones.

2. Origin of Ankylostomiasis in Fiji.

It has been assumed that ankylostomiasis was introduced by the first batch of plantation labourers from India, because its presence was not recognised before their arrival in the colony in 1879. Darling, however, when working in 1916 for the

Uncinariasis Commission to the Orient, found some of the Fijian hill tribesmen infected with *Necator americanus*, and, because there had been very little communication between these natives and the Indian immigrants, his observation was suggestive of the infection of Fiji before the arrival of Indians.

Between 1879 and 1916, a total of 60,553 East Indian labourers were introduced into the colony, who were more or less heavily infected with hookworm and other intestinal parasites, and they are undoubtedly responsible for the serious proportions that were attained by hookworm disease. The vast majority of these Indians was employed on the sugar estates, which were then chiefly in the wet zone. Soon after their arrival in the colony, the prevalence among them of a very severe form of anæmia was noted, accompanied by other symptoms which were confused at the time with beriberi, but which we now know to have been attributable to ankylostomiasis.

The first hookworm to be demonstrated in the colony was found in the intestine of an East Indian by Dr. B. G. Corny in 1889. The great mass of infection is carried by the *Necator americanus*, but *Ankylostomiasis duodenale* is sometimes found.

The steady development of the sugar industry caused the opening up of large tracts of land in the dry zone, to which Indians were drafted on their arrival in the colony. Owing to lack of communications and other factors, there has been little mixing between the Indian populations of the wet and dry belts until very recent years. As climate has an important influence on the prevalence of intestinal parasites, an interesting contrast has been provided in Fiji of the effects of hookworm infection on large groups of the population living respectively in the wet and dry zones.

3. First Control Efforts.

The clinical use of thymol as an anthelmintic was begun in Fiji in 1889, but the treatment as then carried out of individual cases recognised by their grosser lesions had very little effect, including the spread of hookworm disease. By 1911, it had assumed the proportions of a serious economic problem, infecting the general population and incapacitating a large

proportion of the plantation labourers, especially in the districts of Rewa and Navua, which are situated in the wet belt. Wholesale treatment was then instituted for the first time, beginning on the plantations of the Navua district, where it was carried out on the following plan . All labourers were first clinically examined and those who showed obvious signs of hookworm infection were evacuated to hospital. Thymol was then administered both to the labourers and their families, while those who had been sent to hospital were given similar treatment under observation. This form of treatment, known as the " week-end " method, was repeated on three successive week-ends on each plantation, and was accompanied by strict attention to sanitation, particularly as regards the provision of latrines. It was markedly successful as a means of dealing with the hookworm problem on plantations, but it failed to meet the needs of the general population, which now included a large number of Indians who had completed their terms of industrial service and which was not subject to the firm medical control which was exercised over all plantation labour.

No general anti-hookworm measures had, at that time, been instituted outside the plantations.

4. The First General Campaign.

In 1915, Dr. Victor G. Heiser, of the International Health Division of the Rockefeller Foundation, visited Fiji in order to arrange the preliminaries of an anti-hookworm campaign with the Government, and in March 1917 the first campaign to deal with the community as a whole was instituted by Dr. George P. Paul, of the Foundation. He introduced into Fiji the propaganda method of lectures, demonstrations and newspaper articles to obtain public co-operation in the campaign of mass treatment and intensive soil sanitation. He examined a total of 6,624 persons living in the wet zone, and found that 93.8% of Indians and 85.3% of Fijians were infected with hookworm. In this campaign, oil of chenopodium was the only vermifuge used, and, with two treatments given at intervals of not less than one week, 70% of cures were obtained. The great war was unfortunately responsible for the withdrawal of

Dr. Paul early in 1918, when his work was still in an early stage.

In spite of the control work of the Government medical and sanitary staffs which followed the 1917 campaign, hookworm infection continued to spread during the succeeding years with alarming consequences to the public health, which were particularly noticeable in the case of East Indians.

5. The Second General Campaign.

In 1922, Dr. S. M. Lambert, of the International Health Division of the Rockefeller Foundation, arrived in the colony for the special purpose of assisting the Government on a share and share basis to combat the hookworm problem in Fiji. His work was carried out under the authority of the Chief Medical Officer. After he had surveyed the situation, Dr. Lambert made the observation that the problem was much more difficult in the case of the East Indians than in that of the Fijians, because of the efficient social and administrative organisation of the latter and of their more liberal habits of diet, which enabled them to combat many of the ill-effects of hookworm infection. It was also observed that the ill-effects of the disease were greatest in groups with low standards of living.

Dr. Lambert described the objects of his campaign as follows :

(1) To establish rates of infection for intestinal parasites ;

(2) To reduce the infection by mass treatment where possible ;

(3) By education, to stimulate higher sanitary ideals ;

(4) To secure the installation of suitable latrines and their use.

The staff in this second campaign consisted of the Director, a European assistant, a treatment squad of from five to nine native and Indian assistants, and a sanitary squad of two Indians. All Government medical and health authorities were instructed to co-operate in the work. The treatment squad worked from a

central point, and, when examination revealed high rates of infection, mass treatment of the population was undertaken after sufficient propaganda work had been done. The treatment squad was followed by a sanitary squad, whose duty it was to instal adequate latrines. As the work progressed, it was greatly facilitated by the intelligent co-operation of the populace, and particularly by the assistance rendered by the larger employers of labour.

6. Rainfall and Intestinal Parasitic Infection.

It was noted at an early stage in the campaign that, whereas the infection rate in the wet zone ranged from 85 to 90%, that in the dry zone was as low as 38%. The all-round infection rate by races was as follows :

	Number examined	Percentage infected
Europeans	160	3
Indians	4,143	61
Fijians	3,784	52
Chinese	25	50

7. The Method of Treatment.

Carbon tetrachloride in conjunction with magnesium sulphate was the principal drug used in mass treatment. A mixture of oil of chenopodium and tetrachloride was used in the proportion of 1 to 3 in areas where co-existing round work infestation was suspected. The dosage of carbon tetrachloride was 3 minims for each year of age up to a maximum of 60 minims. In the treatment of young children of East Indian origin, on account of their great susceptibility to toxic symptoms, oil of chenopodium was used instead of carbon tetrachloride.

Between 1922 and 1926, 180,000 treatments were administered, accompanied by intensive soil sanitation and the spreading of health propaganda by means of lectures, films and demonstrations. The reduction of infection produced an all-round improvement in health which was almost dramatic in the heavily infested areas. The campaign played a very important part in

educating the populace in public health, an aspect of it which was introduced with the definite intention of making its results permanent, and which has been highly successful.

8. The Problem of Re-infection.

The examination of 1,000 individuals in the first instance showed an infection rate of 90%. Treatment of the infected with carbon tetrachloride produced 90.8% of cures. A re-examination of 200 of these cured people was made twenty-one months after treatment and revealed the fact that 43.5% of them had become reinfected, but that the degree of infection was in every case light and gave rise to no clinical manifestations. However, climatic and other conditions in the wet zones of Fiji are so favourable to the propagation of hookworm diseases that any relaxation of preventive measures would almost inevitably lead, sooner or later, to the return of the conditions that existed before the method of mass treatment, combined with soil sanitation, was adopted.

9. Arrangements for Control in the Future.

Owing to the valuable lessons that have been taught by the anti-hookworm campaign, the sanitary division of the Fiji Government has been strengthened and prepared to undertake the control of this disease. Periodic surveys are made in suspected areas, and everything is in readiness for the introduction of mass treatment should the present measures, which include free treatment of cases at all hospitals and dispensaries and concentration on soil sanitation, prove ineffectual. It seems, however, justifiable to surmise that the danger of a serious outbreak in the future has been greatly reduced by the following principal factors :

(1) The higher sanitary ideals acquired by the community as the result of the educational work of the campaign ;

(2) The closing of the main source of new infection—namely, India—through the reduction of immigration, and

the requirement that all new Indian immigrants shall have been subjected to anti-hookworm treatment ;

(3) The installation of efficient latrines throughout the colony, which is steadily progressing ;

(4) The more intensive inspections that are being carried out by officers of the sanitary division.

IV(b). THE PROBLEM OF SOIL SANITATION IN FIJI

By

Dr. V. W. T. McGUSTY, O.B.E.

Fiji became a Crown Colony when it was voluntarily handed over to the United Kingdom by its chiefs and people by the Deed of Cession, which was signed in October 1874.

The Fijians, whose social system is communal, lived in villages, where the use of latrines was unknown. After the assumption of control by the United Kingdom, communal latrines were gradually introduced into every village as a means of controlling the severe epidemics of dysentery, which recurred annually at that time.

Meanwhile, East Indians began to come to Fiji as plantation labourers in 1879, and, as long as they remained under the control of their estate owners, moderately efficient measures were adopted to dispose of their excreta ; but, as soon as they began to settle independently in the colony and their numbers increased, conditions around their homes became deplorable. Latrines were few in number and were most inefficient, and their drinking-water was obtained from open surface wells, which, owing to the heavy rainfall, were constantly subjected to pollution from the highly infective surrounding soil. These conditions were responsible for frequent epidemics of dysentery

and typhoid and for the constant prevalence of hookworm infection.

In 1922, when the anti-hookworm co-operative campaign of the Fiji Government and the Rockefeller Foundation was begun, special attention had to be paid to the sanitation of the East Indians, who showed in the heavy burden of hookworm which they harboured much more of the ill-effects of soil pollution than any other section of the community. Progress in this branch was slow at first because the public lacked interest and because no type of latrine that was at once efficient and within the means of the poor man had as yet been devised. As the campaign advanced, its propaganda methods, combined with its striking success in curing hookworm, began to arouse public interest, and, between the years 1922 and 1927, many thousands of latrines were installed.

In spite of the advantages derived from a great addition to the number of latrines in the colony, the latrine-tops, which were mostly constructed of bush timbers or boxwood, were unsatisfactory.

In 1928 and 1929, Dr. V. G. Heiser, Director for the East of the Rockefeller Foundation, visited Fiji and persuaded the chief medical officer to make a trial of the new bored-hole type of latrine, which was first introduced in Java. Experiments were then conducted which confirmed the efficiency of this type of latrine under most conditions, and which also evolved a suitable cement top. A three years' co-operative soil sanitation campaign by the Fiji Government and the Rockefeller Foundation was commenced in 1932, and on its conclusion in 1935 the Government undertook to carry it on to completion.

The type of latrine in use varies to meet the different structural conditions of the ground as well as the habits of the people. Thus, the ordinary bored hole as used in Java fulfils all the requirements of the East Indian, but not of the Fijian, who is a much greater eater, and who uses coconut husks, grass, sticks and reeds for his toilet purposes. The modified form of latrine that is being installed for the use principally of Fijians consists of a hole 12 feet to 15 feet deep covered by layers of green bush timber so as to have an aperture corresponding with the opening in the cement slab or cover. The timber is covered with

puddled clay and the earth is built up so as to form a mound one foot or more above the ground level. The use of green timber ensures durability. When the slab is placed in its correct position on the mound, the latrine is fly-proof.

The bored-hole type of latrine that is in use in the colony is based, as elsewhere, on the idea of the ordinary post-hole borers which are in common use. In Fiji, the standard diameter of the hole is 18 inches, and its depth ranges from 18 to 25 feet. The boring apparatus consists of an auger 18 inches in diameter, to which is attached for its shaft a 1½ inch galvanised pipe 25 feet long. A specially designed handle is used for turning the auger. This apparatus is, in fact, a very slightly modified form of that described by Clarke H. YEAGER and published by the Government of the Philippine Islands, Department of Agriculture and Commerce, *Manila Popular Bulletin*, on July 14th, 1934, under the title "Bored-hole Latrine Construction".

In order to prevent the sides of the hole from caving, cement drums with the ends knocked out are placed end to end to act as a lining.

If in boring or sinking a latrine hole the water table is reached and it is not too close to the surface, this is considered a great advantage.

The type of latrine cover or slab that is now in general use throughout Fiji is made of reinforced concrete; it is octagonal in shape, is 3 feet 2 inches in diameter, about 2 inches thick and weighs 170 lb. It has a rectangular hole at its centre 5 ¾ inches wide by 13 inches long, and it has slightly raised footprints. The edge of the hole slopes backwards to prevent soiling. Each slab is provided with a wooden plug fitted with a handle and fits tightly into the aperture. The advantage of the octagonal slab is that it can be rolled easily over the ground.

All material used in the making of slabs is purchased from the Government stores, duty free. The slabs are manufactured by the soil sanitation campaign and are sold to the public at a very small profit at 6*s*. and 7*s*. The variation in the price is to allow for differences in transport costs.

A more expensive and elaborate latrine-top is also manufactured by the campaign for the use of Europeans and

others who are prepared to pay the price, which amounts to 35*s*. This consists of a reinforced concrete slab 3 feet 2 inches square, with a circular hole 14 inches in diameter at its centre. A concrete pedestal attached to the slab rises to a height of 14 inches above floor-level. The top of the pedestal is fitted with a lacquered seat and hinged cover.

Between 1928 and 1936, 18,000 latrines of the new type have been installed, and the work of extending the principle of one latrine to every home is proceeding steadily among all sections of the rural community.

Conclusions.

It is difficult to change habits that are long established, and the success of the soil sanitation campaign among more or less primitive people has been the more remarkable on that account.

In Fiji's latrine campaign, the cover or slab is regarded as the keystone of the system, because it provides the essentials of being easily washed, easily installed, and, when properly placed, of securing the efficient isolation of fæcal matter. It possesses the further advantage that its cost makes its owner value it as a part of his personal property, and of his household furniture.

The type of latrine building is variable, being often constructed of timber and iron in the case of East Indians, and often of grass and bush timber in the case of Fijian villages.

The installation of latrines had a marked effect in reducing the incidence of ankylostomiasis in the campaign against that disease. The present campaign provides a latrine of a better type, and is confidently expected to lead to its establishment in all rural areas throughout the colony, resulting in the control of the diseases spread by soil pollution, and, of perhaps even greater importance, leading to the more complete understanding by the colony's agriculturists of the value of efficient sanitation.

The work of the campaign obtains legal assistance under the Public Health Regulations, which require every rural home to be provided with a latrine fitted with a cement slab.

It has been found in practice that one of the greatest advantages of the concrete slab type of latrine is that it can

be erected close to the home. Its use is therefore assured and the danger of soil pollution around dwellings, always present in the case of distant latrines, is avoided.

IV(c). NOTE ON THE CENTRAL MEDICAL SCHOOL IN SUVA IN RELATION TO THE HEALTH PROBLEMS OF THE PACIFIC

By

Dr. V. W. T. McGUSTY, O.B.E.,
Secretary for Native Affairs and Inspecting Medical Officer, Suva.

There is in Suva an institution known as the Central Medical School, where young natives from Fiji and other Pacific islands receive a four years' course in medicine followed by a qualifying examination which entitles them to practise as *Native Medical Practitioners*, and assures them of medical careers in the service of their respective administrations.

To the Colony of Fiji belongs the credit of instituting the native medical practitioner system, the other participating administrations with their approximate populations being as follows :

British Solomon Islands Protectorate (United Kingdom).	94,000
Gilbert and Ellice Islands (United Kingdom).	33,700
Tonga (Kingdom)	29,000
Western Samoa (New Zealand)	47,000
Eastern Samoa (United States of America)	10,000
Cook Islands (New Zealand).	11,500
Niue (New Zealand)	4,000
New Hebrides (Condominium).	55,000
Nauru (Australia)	1,600
	285,800
Fiji (native population).	97,000
	382,800

The Native Peoples of the Southern Pacific.

The administrations participating in the native medical practitioner scheme contain representatives of each of the three main subdivisions of the Pacific islanders—namely, Polynesians, Micronesians and Melanesians; and, while there exists as between Polynesian and Micronesian, on the one hand, and Melanesian, on the other, marked differences both in physical characteristics and mental capacity, all of the three peoples, prior to European intervention, were in the neolithic stage of civilisation. Similarities in diet and climate, and the diffusion of culture which resulted from the great Polynesian migrations that are said to have taken places in spite of primitive craft and vast ocean distances, have tended further towards the creation of affinities and the obliteration of differences in the form of their social systems. Since the communal form of society is found to be more or less universal in its distribution, it is a factor of great importance in preparing a form of government suited to the character and requirements of the Pacific islanders, and the ultimate success of any public health undertaking depends on the extent to which it can be moulded into the framework of their society. In the realm of disease, affinities are taken a step further, because, with the exception of malaria, which is confined to the New Hebrides and Solomon Islands, identical problems arise everywhere as regards both indigenous diseases and those which have been introduced with European colonisation.

The Inception of the Native Medical Practitioner.

The native medical practitioner service owes its being to Dr. B. G. Corney, an early Chief Medical Officer of Fiji, who seems, in the first instance, to have conceived the idea of using young natives as public vaccinators and dispensers, and, later, encouraged by their success in these capacities, to have determined upon giving them a more comprehensive training and much more responsible duties in the capacity of native medical practitioners.

The first eight students to qualify as native medical practitioners received their certificates in January 1889. The health situation at that time in Fiji can only be described as most precarious. The colony had been under British rule for but fifteen years, and the natives, under the influence of the Christian missions, were only just emerging from a state of savagery. To the many indigenous diseases there had been added a host of others which were introduced by the European colonists with tragic results to the non-immune natives ; and public health work was obstructed on all sides by prejudice and superstition. In the absence of sufficient revenue to provide for an adequate health service, it was necessary, if the United Kingdom was to discharge her responsibilities, to find a solution at once cheap, rapid and conforming with native custom to deal with the very serious problem of disease in these very susceptible people. These were the actual circumstances in which Dr. CORNEY inspired the creation of the native medical practitioner service.

THE CENTRAL MEDICAL SCHOOL.

The earliest students, limited in number to eight, learned their profession in the wards of the old Colonial Hospital, where they worked as dressers and male nurses and received clinical instruction at the hands of the Resident Medical Officer. In 1901, the amenities of the school were improved by the provision of better housing for students, a lecture theatre and rudimentary teaching equipment. During succeeding years, theoretical teaching was incorporated in the syllabus, while the practical side of the course also improved with the steady increase in the volume of work at the Colonial Hospital.

Until 1927, the Medical School was purely an institution of the Fiji Government, but changes in its constitution were already in the course of preparation, for the International Health Division of the Rockfeller Foundation, seeking an economic and effective means to make permanent the result of its health campaign among the native peoples of the other southern Pacific islands, found the solution of its problem in

the native medical practitioner system, which had then been in successful operation in Fiji over a period of more than thirty years. As a result of negotiations conducted between the Foundation and the Government of Fiji, and of generous financial assistance from the Foundation, the buildings and equipment of the Suva Medical School were extended and improved in time for it to be opened in 1928 as the Central Medical School, with forty students in residence, who were drawn from seven separate Pacific administrations.

Coincident with these events, the system of teaching was expanded and reorganised. A full-time tutor, whose title has now been changed to principal, was appointed to take charge of the school, and lectureships in the subjects of a course similar to that of an ordinary medical college were distributed among local doctors and other persons, who willingly undertook the duties of honorary lecturers. In 1931, the period of studentship was increased from three to four years, and in 1935 the teaching facilities were further enhanced by the addition of a well-equipped pathological laboratory and the appointment to take charge of it of a highly qualified pathologist.

English has to be used as the medium of instruction to overcome the difficulty of teaching students whose mother tongues differ widely from each other. The careful selection of candidates, including an entrance examination, ensures, as far as possible, that the students are competent to take the course. As the school contains students of East Indian, Polynesian, Micronesian and Melanesian origin, differences in educational standards and intellectual capacity throw a serious burden on the principal.

The Central Medical School is essentially a Government institution and is financed by the contributions of the participating administrations, such contributions being proportionate to each administration's quota of students. The full cost of maintaining a student at the school was £73 (Fiji) in 1934, so that the cost to his Government of each student's full course of training amounts to approximately £300 (Fiji).

From its inception until the end of 1936, 195 native medical practitioners have graduated from the Central Medical School.

Preservation of Native Character in Native Medical Practitioner Service.

Reference has been made to the fact that all natives from the administrations participating in the Central Medical School scheme observe communal habits of living. *The aim of the Central Medical School* is to fit its graduates for the normal responsibilities of medical practitioners and health officers without removing them from their native environment. The success of the native medical practitioner service depends on its conforming with native society, and its maintenance at an economic level that is within the capacity of each administration. Students at the Central Medical School are, therefore, encouraged to dress themselves after the manner of well-born natives, and to retain as many of their native habits of living as it is possible under conditions of studentship. When the young graduates return to their homes with a wholesome respect for the manners and customs of their own people, they regain their proper place in native society, whence they can most readily spread the knowledge they have acquired, and where they do not tend to covet living standards above those of their tribal chiefs. On the other hand, any attempt to raise the status of the school to the level of a European medical college would inevitably result in the graduates leaving their native environment and, in consequence, to an increase in the cost of the native medical practitioner service that would defeat the object for which the Central Medical School was created.

The Indian Medical Practitioner.

With the increase of the East Indian population of Fiji, the Government decided to train Indians to be medical practitioners on the same lines as Fijians. The first East Indian graduates received their certificates in 1925; but, owing to the individualistic habits of Indians, the service, while of undoubted value, is less suited to their requirements than to those of the Fijians, and the number of Indian medical practitioners has been restricted for the present to ten.

The Native Medical Practitioner in Practice.

The distribution of native medical practitioners among the administrations where they are now serving is as follows :

Fiji	62	
British Solomon Islands Protectorate	4	(including one Fijian)
Gilbert and Ellice Islands	10	(including one Fijian)
New Hebrides	1	(a Fijian)
Eastern Samoa	Nil	(in training)
Western Samoa	10	
Cook Islands	3	
Nauru	Nil	(in training)
Tonga	7	

As a rule, each native medical practitioner is assigned a medical district where he controls the health of the native population, and in some cases of all other sections of the community as well. Every native medical practitioner is nominally controlled by a European medical officer, but the degree of his responsibilities is in practice fixed by the extent to which communications are available. It is extremely important that the work of native medical practitioners should be subject to regular inspection ; but, as this is not always practicable outside of Fiji, it has been satisfactory to find that graduates of the school are, in the main, capable of dealing on their own initiative with the great majority of medical and health problem.

The native medical practitioner is essentially a State servant who has been accustomed from studentship to a system of State medicine. As rigid control by Government is regarded as essential to the efficient maintenance of this service, no private students are accepted at the Central Medical School, and the right to practise is restricted as closely as possible to the holders of Government appointments.

The course of training emphasises operative surgery and fits most of the graduates to contend with ordinary surgical emergencies. It also stresses public health and preventive medicine, and it is in this sphere that the value of the native medical practitioner is highest. The conditions are very similar

in all the Southern Pacific territories, and the native medical practitioner is competent to deal with ordinary epidemics, such as dysentery and enteric, to carry out the mass treatment of ankylostomiasis, yaws and ringworm, and to conduct preventive measures, such as soil sanitation, and infant welfare. It would be difficult to devise a better solution of the health problems of the Pacific islanders under the conditions that now prevail.

Conclusions.

None of the administrations participating in the native medical practitioner scheme could afford to embark on expensive medical services ; but, by a pooling of resources in the Central Medical School undertaking, it is believed that they will be able to elaborate a common form of health organisation that will meet the requirements of their native populations. The system is still in an experimental stage in most places, but the success that has been obtained in Fiji justifies the hope that the results will prove favourable in other places.

While the scheme was evolved to meet the special circumstances of communally living South Sea islanders, experience with the individualistic Indians, although less successful, has also proved it capable of modification to meet other conditions.

Its main essentials are cheapness and the maintenance of the native medical practitioners as closely as possible to the economic level of the people amongst whom they work, and these considerations are liable to be overlooked by over-enthusiastic supporters, as well as by destructive critics.

IV(d). NOTE ON SUGAR-CANE FARMING ON SMALL-HOLDINGS IN FIJI.

1. Introduction.

Since Fiji became a Crown Colony in 1874, its prosperity has been chiefly dependent on the production of sugar. In the years which immediately followed the war, labour difficulties,

added to the slump in world prices, threatened to exterminate the local sugar industry. This situation was met by a bold experiment on the part of the Colonial Sugar-refining Company, who subdivided their large plantations into small-holdings of eight to ten acres, which they leased to East Indians as individual cultivators. This enterprise saved the industry, and at the same time it raised the status of the East Indian from that of labourer to independent producer.

2. Geography, Meteorology and Population.[1]

There are well-marked dry and wet zones throughout Fiji, and the average annual rainfall ranges from about 60 inches in the dry zone to about 150 inches in the wet zone. The average mean temperature is 77° F.

3. The Fijians.

The native people of Fiji spring from the Melanesian branch of the three main divisions of the native peoples of the Southern Pacific Islands, but the frequent Polynesian invasions of prehistoric days have resulted in a mixture of the two races, the Polynesians' traits being particularly evident in the chiefly families and in the inhabitants of the islands to the East of the main group, and the Melanesian in the mountain tribes. The society of these people is communal, and they live in scattered villages. Their land-owning rights are well safeguarded; their needs are simple and, in their fertile and sparsely populated country, they are generally able to obtain a comfortable livelihood without hiring themselves out as labourers.

4. Industries.

The principal industries of Fiji have been the production of sugar, copra and bananas, and the values of these products exported in the six-year period 1931-1936 indicate the

[1] As regards the geography and the population, see IV(*a*). — *Editor.*

outstanding importance to the Colony of its sugar industry. The figures are :

	Sugar		*Copra*		*Bananas*	
	Cwt	Values £	Tons	Values £	Bunches	Values £
1931	1,358,740	624,310	16,917	177,786	194,875	57,368
1932	2,626,040	1,289,239	15,076	170,240	346,968	67,237
1933	2,276,720	1,180,782	22,597	195,788	326,422	69,243
1934	2,077,258	1,069,049	23,520	127,941	324,494	67,845
1935	2,712,659	1,314,128	26,081	220,478	303,127	66,863
1936	2,807,280	1,331,701	34,582	405,393	320,143	84,548

The low output in 1931 was due to a hurricane.

5. The Sugar Industry.

The production of sugar in Fiji dates from the early seventies of the nineteenth century. The Colonial Sugar-refining Company commenced its operations in 1880, and, when most of the small undertakings succumbed to the crisis in 1884, the re-establishment of the industry was chiefly due to the efforts of that Company. They are the sole producers of sugar on a commercial scale in Fiji to-day, and their operations are carried out in their entirety in the two largest islands of the group.

6. Labour.

In the conditions already referred to, the Fijians have not hitherto been regarded as a source upon which the Colony could draw with any certainty for its labour requirements and, in the early days of European settlement, plantation labourers were recruited in the neighbouring Pacific Islands. In 1879, East Indians were first brought to the Colony under a system which included their indenture to the plantations for a period of five years. These immigrants, and their families, were conceded the right to free return passages to India, but, in order to encourage permanent settlement, that right could not be exercised until an immigrant had lived in the Colony for a minimum period of ten years. Between 1879 and 1916, 60,553 East Indians were introduced into Fiji under the indenture system and, while a large number of them settled permanently,

they, like the native Fijians, found it so easy to obtain their livelihood in an independent state that they have contributed to the Colony's supply of agricultural labourers to a much smaller extent than was anticipated.

7. The Post-War Crisis.

The last batch of plantation labourers of the indenture system arrived in the Colony in 1916 and, on January 1st, 1920, all remaining indentures were cancelled. The situation with regard to the Colony's principal agricultural industries at once became critical. The cessation from 1916 onwards of the usual annual consignments from India had already caused what was regarded as an acute shortage of labour. India was permanently closed as a source of future supplies, and local sources were totally inadequate. The sugar industry was faced with the dual catastrophe of a shortage of labour and a slump in world prices, and its position seemed hopeless. The extermination of the sugar industry at that time would have entailed very serious consequences both to the Government and people of Fiji. It was in this crisis that the Colonial Sugar-refining Company decided to resort to the cultivation of their estates in small-holdings by independent farmers.

8. The Tenant Farmer.

The Colonial Sugar-refining Company had encouraged European planters to the extent of leasing to them Company-owned estates, and East Indians, from an early stage of their existence in Fiji, had farmed sugar-cane on land which they leased from the Fijians or otherwise held. In 1913, the Company commenced to experiment in the matter of leasing their land to be farmed on an independent basis by East Indians. In the first instance, areas of 10 to 12 acres were leased to former labourers of the Company, who continued to live in the Company's labour houses, and not adjacent to their holdings. In this case, the Company undertook all horse work, and the tenants were paid for their cane, less working expenses. This scheme failed because the tenants devoted themselves to the making of quick profits, and neglected cultivation and the

farming of their holdings on a permanent basis. The next two experiments were tried out concurrently. In the one, areas of 40 to 80 acres, and, in the other, small-holdings of 8 to 12 acres, were leased to selected tenants. In both of these cases, the tenants lived adjacent to their farms and carried out all the work of cultivating and reaping, the Company advancing them live-stock when necessary. The experiment involving the larger areas had to be abandoned because the tenants were incapable of controlling large farms, and resorted secretly to sub-leasing in small-holdings, but the other scheme has survived as the *tenant-farmer system* of to-day. Under the present system, the farms are leased for a period of ten years, subject to renewal, and rents vary from 7/6 to £1 per acre according to the class of land and to such improvements as might have been effected before the tenant entered into occupancy. Efficient farming and the general well-being of the scheme are assured by specially trained officers of the Company, who assist and advise the farmers, not only on matters concerned with cultivation, but on all questions affecting their welfare and that of their families. Encouragement is given, as far as possible, to settlement by married men with families, and the close and sympathetic personal touch which has been maintained by the Company's officers with their different groups of farmers has contributed, possibly more than any other factor, to the general success that has been attained.

9. The Public Health Aspect of the Tenant-Farmer System.

The tenant-farmer system of the Colonial Sugar-refining Company has played a very important part in raising the standard of health among East Indian agriculturists. After the termination of their labour contracts, the control of these people, from a public health point of view, relaxed, and the incidence of diseases that are usually spread by soil pollution increased to an extent which at one time seemed alarming. The situation was met by intensive public health work directed chiefly against ankylostomiasis, and it is both interesting and important to observe that the intensive work of the Colonial

Sugar-refining Company in establishing East Indians as independent sugar-cane farmers coincided with the marked improvement in the health of the Indian community as a whole, which resulted from these intensive health campaigns. The marked raising of the general standard of the health of Indians undoubtedly made an important contribution to the success of the tenant-farmer scheme. On the other hand, the Colonial Sugar-refining Company had made a valuable contribution to the success of the Government's public health undertakings by affording their co-operation and assistance in all possible ways. It seems particularly fitting that there should have been healthy prospective farmers available when the Company and the sugar industry were in need of them!

10. In the *tenant-farmer system*, much stress is laid on health matters. House sites are made available at nominal rentals on elevated ground in the neighbourhood of the farms, and building materials, which include rain-water tanks, are provided to tenants at cheap rates. Efficient latrines are insisted upon, and the keeping of domestic cattle and the growing of vegetables and fruit are encouraged. Schools are made available as much as possible for the education of the children of tenants, and medical attendance can be obtained without charge at Government and Company's hospitals and dispensaries. Cases of illness are quickly brought to light through the Company's officers, and in this manner early treatment and, in the case of infectious disease, isolation are ensured. Not the least important of the measures adopted by the Company to encourage a high standard of health among their farmers is the donation at their annual agricultural shows of special prizes for the best-kept farms, in which connection the marking takes full account of cleanliness and sanitation around the home. By these various means, a high standard of health is maintained among the Company's agriculturists, which has contributed to their general contentment as well as their efficiency.

11. Conclusion.

The tenant farmer has successfully replaced the plantation labourer in the sugar industry of Fiji, and by doing so he rescued that industry at a critical juncture. Under the guidance

of the Company, he has proved to be an efficient cultivator and, since the crisis, when he began to play an important part, the sugar industry has steadily recovered and to some extent expanded. The scheme obtained immediate popularity and the number of tenant farmers increased from 654 in 1925 to 3,000 in 1930, while the number had risen to over 4,000 by the end of 1936. The last figure includes some 125 Fijian tenants who show signs of becoming attracted into the scheme. More than 90% of all sugar grown in the Colony is produced by Indian and Fijian growers, chiefly the former, and the Company now only maintain an area sufficient for experimental purposes and for the training of staff. The farmer is assured of a reasonable income which he earns in a state of comparative independence, in a congenial environment, and the scheme, which has been evolving for over twenty years, appears now from all viewpoints to be established on a permanent basis.

V. MEMORANDUM ON THE PUBLIC HEALTH ORGANISATION OF THE GILBERT AND ELLICE ISLANDS COLONY [1]

By

Dr. F. E. MONTAGUE, Senior Medical Officer.

I. HEALTH AND MEDICAL SERVICES.

The principle governing these services in the Gilbert and Ellice Islands Colony is to provide facilities for ordinary medical treatment for all the inhabitants of the colony. In addition, and at various times, this is supplemented by special efforts along campaign lines against such specific diseases as yaws, hookworm, etc.

The establishment makes provision for the appointment of three whole-time European qualified medical practitioners and one part-time appointment. These officers are located on different islands of the group with a view to facilitating the control of the auxiliary staff and the superintendence of the main hospitals.

The auxiliary staff consists of nine native medical practitioners, trained at the Central Medical School in Suva, Fiji, and permitted by law to practise medicine within the colony only. These officers circulate through the twenty-five islands of the group and assist and supervise the staff of fifty-one locally trained native dressers. One to four of the latter are stationed on each island, and the balance make up the nursing and dresser staff of the two central hospitals.

There are two main central and moderately well-equipped hospitals in the group, staffed by native dressers and native medical practitioners and under the immediate control of a European medical officer. On each island is a small hospital

[1] Area : 180 sq. miles.
Population : 33.504. — *Editor.*

of native construction, with some equipment, in charge of one or more native dressers. At all these institutions, the in habitants of the colony can obtain general medical, surgical and obstetrical treatment. Special attention has for some years been directed to the control of yaws.

The cost of maintaining these services forms a charge against the general revenue of the colony, and special provision is accordingly made therefrom, and varies from year to year according to requirements.

II. RURAL RECONSTRUCTION.

There has as yet been no call for activities in this direction.

III. SANITATION AND SANITARY ENGINEERING.

The question of housing is not a problem, as the houses habitually built by the natives of the colony are hygienic, cheap and, generally speaking, satisfactory. There is no congestion.

Water is usually obtained from surface wells. The water so obtained is occasionally somewhat brackish and is open to contamination. In a few islands, church roofs of iron or cement are used as catchment for communal rain-water cisterns.

The disposal of refuse and other wastes is, by regulation, made at a point below high-tide mark. As the sea is nowhere more distant than a very few hundred yards away, this question does not present any difficulty.

Flies are plentiful, but as yet no campaign measures against them have been instituted. It is doubtful, however, if any appreciable co-operation on the part of the natives could be looked for in this respect.

IV. NUTRITION.

The normal diet of the natives consists of coconut, pandanus (fresh and dried), fish and yeast "toddy" (unfermented). To these, as special delicacies eaten at more or less rare intervals,

may be added pork and taro. The general poverty and the high cost of imported foods prohibits their purchase in any quantity. These staple articles of diet are cooked in various ways and combinations. The composition and nutritive value of these materials have never, so far as I know, been accurately ascertained.

As the nutritive value of native diet (which is grown and prepared individually) is unknown, it would be impossible to say what the minimum cost of an adequate diet would be, or, indeed, what articles of diet it would be necessary for them to purchase.

Beyond the known dietetic shortage of animal fats common to the Pacific island races and purely conjectural shortages in the local diet, nothing is accurately known regarding the relationship of diet to health in this colony. Beriberi, however, exists, and cases of apparent shortage of the anti-beriberi factor without frank symptoms occur. A high prevalence of a form of adenitis (usually cervical) in children and young adults, unknown to other parts of the Pacific, also occurs, the possible cause of which, it has been suggested, may be a dietetic deficiency. Infantile mortality is high (averaging about 200 per 1,000 births) and is very probably connected with diet.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

Malaria does not exist in the colony. Certain precautionary measures (not including fumigation of ships) are taken to prevent the introduction of the mosquito vector of the disease.

Plague is unknown in the colony.

Ankylostomiasis is common in the Ellice Group, but its incidence in the Gilberts is not known. The disease is kept fairly well controlled by systematic examination of stools and appropriate treatment.

Tuberculosis other than that of glands is not unduly prevalent. There is no specific measure in force at the present time for combating the disease, nor does any such measure appear called for.

Pneumonia is a comparatively uncommon condition, probably for climatic reasons.

The incidence of yaws has steadily declined since the introduction of arsenical therapy, and more particularly during the last few years, owing to the adoption of campaign methods. The number of injections of arsenicals during the last three years are as follows ; 1933, 9,194 ; 1934, 7,239 ; 1935, 16,965.

For some years, lepers were congregated in isolation on an islet of this group, but it was found impracticable to continue with the plan, and arrangements were accordingly made for their removal to the Makogai Leper Asylum in Fiji. The scheme came into effect in 1935 when forty-eight cases were transferred. The exact incidence of the disease in the colony is unknown.

Cases of drug addiction do not occur. All persons of unsound mind are cared for in the public lunatic asylum.

VI. NOTE ON THE HEALTH ORGANISATION OF THE BRITISH SOLOMON ISLANDS PROTECTORATE

By

Dr. HETHERINGTON, Senior Medical Officer.

INTRODUCTION.

The British Solomon Islands are situated in the Pacific Ocean between the parallels of 5° and 12° 30′ south of the equator and the meridians of 155° and 170° of east longitude. They extend in a north-west and south-east direction from Bougainville Straits to Mitre Island for a distance of 900 miles and north and south from Lord Howe Island to Rennell Island for about 430 miles.

The total area is approximately 11,000 square miles.

The group consists of a double row of islands, all volcanic and mountainous with the exception of certain atolls and islands (Lord Howe, Rennell, Santa Anna, Sikaiana, Tucopia).

The Protectorate is divided into eight districts for administrative purposes—viz :

1. Malayta.
2. Guadalcanar.
3. Isabel.
4. Gizo.
5. Eastern Solomons.
6. Santa Cruz.
7. N'ggela.
8. Shortlands.

The officer administrating the Government is the Resident Commissioner, who reports to the High Commissioner of the Western Pacific High Commission at Suva, Fiji.

The seat of Government is at Tulagi, a small island situated off N'ggela. Here are stationed the Resident Commissioner and all heads of departments, also the Government Hospital.

Population.

The population of the Protectorate at the last census taken in 1931 was as follows :

Natives	93,415
Europeans	478
Asiatics	173

No very great change in the population has taken place since this census, but the native population is showing a slight increase within recent years.

The natives of the Protectorate are for the most part of Papua-Melanesian stock, with variations in skin, colour, texture of hair and general physical characteristics. In certain outlying islands, such as Lord Howe, Rennell, Santa Catalina, Sikaiana and Tucopia, the natives are of Polynesian stock.

The natives are a heterogeneous people of varying races, cultures, religious and standards of living, and, until contact with Europeans, were in the neolithic stage of civilisation.

The population of the Protectorate is entirely rural. There are no cities or towns and characteristically native villages are small, consisting in most cases of a few huts only in a village.

The people live on the products of their gardens supplemented by fish caught by themselves and various edible roots, leaves, nuts, etc., which grow wild in the bush.

There are no markets.

Communication, even between districts on the same island, is by water. There are no roads suitable for vehicular traffic. The seas between the islands are frequently rough.

I. HEALTH AND MEDICAL SERVICES.

Medical care and health work are carried out by the same staff. In the present condition of the Protectorate's resources, no other system is possible owing to the small number of the available personnel for the work.

Personnel.

The Protectorate staff consists of :

(*a*) Two medical officers ;
(*b*) Four native medical practitioners (graduates of the Central Medical School, Suva, Fiji).
(*c*) One European yaws and hookworm officer ;
(*d*) One European dispenser and clerk ;
(*e*) Two European nurses ;
(*f*) Native orderlies, attendants, dressers, servants, etc.

In addition to the Government medical staff, there are two medical practitioners working under the auspices of mission bodies, two medical officers in the employ of companies and a number of trained nurses also employed by the missions, who do excellent medical and public health work among the native population.

The Protectorate Government is co-operating in the scheme for the training of native medical practitioners at the Central Medical School at Suva, Fiji, and contributes to the upkeep of the school.

The Protectorate has four studentships in the school and it is anticipated that ulitmately a body of native medical practitioners numbering about twenty will be built up to work in the group.

Non-medical sanitary officers are appointed in each district, officers in charge of districts become *ipso facto* sanitary officers with the powers conferred by King's Regulation No. 8 of 1918.

Village dressers, who have been trained in the use of simple medicines and surgical dressings, carry out their duties in various villages, medicines and dressings being supplied free by the Medical Department.

With regard to collaboration between various departments, there is little to report, as there are no agricultural, veterinary or education departments.

Drainage scheme and reclamation work is carried out by the Medical Department in collaboration with the Public Works Department and with the aid of prison labour. This

work is mainly performed at Tulagi and the results have been excellent, as the island has been rendered comparatively healthy.

Health, Curative and Preventive Activities.

The main Government hospital is situated at Tulagi, and a European medical officer is always on duty. The hospital has separate wards for Europeans, Asiatics and natives and has accommodation for twelve Europeans, twelve Asiatics and approximately a hundred natives.

The hospital staff consists of :

(1) Medical Officer in Charge ;
(2) European nurses (two) ;
(3) Dispenser and clerk ;
(4) Native attendants, dressers, servants, etc.

The Medical Department normally maintains a vessel in which the travelling medical officer visits the various districts, carrying out examinations and treatment of the native population and transporting cases to Tulagi Hospital as required.

Native medical practitioners are engaged in district work, and, as their number increases, they are becoming, and will further become, a most important agency for improvement in public health.

At present, each is in charge of a small hospital situated at district headquarters, where he may observe and treat his cases. Cases beyond his abilities are sent to Tulagi Hospital. Each district has a vessel under charge of the district officer, who co-operates in this matter.

The travelling medical officer visits the various districts and district hospitals and keeps in touch with the work of the native medical practitioners, giving advice and supervision as required. The work of the travelling medical officer is at present largely in abeyance owing to the recent loss of the medical vessel and pending its replacement.

One field unit in charge of the European yaws and hookworm officer operates in the field, carrying out mass treatments of

the natives for these diseases and treating other morbid conditions among them.

Novarsenobillon (N.A.B.) is mainly used in the treatment of yaws. " Sobita " (sodium bismuthyl tartrate, neutral) is used for small children in whom intravenous injection is difficult.

Carbontetrachloride followed by magnesium sulphate is used for the treatment of hookworm.

The administration distributes medicines and surgical supplies to approved missionaries, who have some medical knowledge ; such supplies are used in the treatment of natives without cost to the patient.

(A list of the medicines and surgical supplies normally provided is appended to the present report see page 101.)

A subsidy is paid to mission hospitals in charge of qualified medical practitioners.

Natives who have taken a course of training at Tulagi Hospital and are familiar with the use of simple medicines and have been instructed in the proper performance of surgical dressing are employed as dressers in the various villages. They do good work, not only in the treatment of minor ailments, but also in sending patients to hospital and supervising the sanitary conditions in the villages. They also form a point of contact between the administration and the villages.

In addition to the work of the Medical Department, the various mission bodies are keenly interested in health problems, and each mission has a number of trained nurses among its personnel who do much valuable work. The administration aids all such activities by supplying free medicines and dressings for the work.

Native patients are treated without charge in Government hospitals, dispensaries and subsidised mission hospitals.

Health propaganda is carried out to the limit of the staff's abilities by :

(1) The travelling medical officer ;

(2) The yaws and hookworm officer (lectures and demonstrations) ;

(3) Native medical practitioners.

All these agencies come into close contact with the native in their villages, and every opportunity is taken for teaching improvement in health conditions.

Coercion is possible where conditions are unsatisfactory under the provisions of King's Regulation No. 8 of 1918 (Public Health Regulation), but is used as little as possible.

Among further preventive measures may be mentioned the Quarantine (Local Traffic) Rules of 1932, made under the Quarantine Regulation of 1930, designed to allow quarantine measures being enforced between various islands and districts within the Protectorate.

There is also a " closed district " regulation, which is being brought in to protect certain natives of isolated islands who, as experience has shown, are unable to withstand the repeated introduction of infections and whose numbers in consequence of intensive contact with visitors from outside are rapidly declining.

Budgets.

The work done for promoting the health of the population has already been detailed. There are no local health committees. The total medical and sanitary expenditure for the past five years was as follows :

Financial year	Total expenditure			Expenditure per head of population		Percentage to total revenue of Protectorate
	£	s.	d.	s.	d.	
1931/32 . . .	10,008	17	4	2	2	17.6
1932/33 . . .	9,970	6	5	2	1½	17.2
1933/34 . . .	10,306	6	4	2	3	19.4
1934/35 . . .	9,280	5	7	2	0½	19.0
1935/36 . . .	8,804	5	9	1	10½	15.06

(For details of expenditure, see *Annual Medical and Sanitary Report for 1935*. This may be taken as typical.)

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

The Solomon islanders are a primitive people and much time and effort are required, and will be required, to educate them in the simplest principles of hygiene.

The efforts which are being made in this direction have been briefly stated in the previous section.

It may here be said that the dramatic results of our treatment of yaws have proved probably the most potent means of conversion which the European has among these suspicious and conservative people.

However, the administration has actually brought about many changes in village life, all making for the health and well-being of the population.

For many years, the population was a decreasing one, but this decline has now ceased, and such vital statistics as are now available show that the tide has turned and the population is now slowly increasing.

Among the measures which have brought this about may be mentioned :

(1) Establishment of law and order.

(*a*) Formerly, the whole population was split intos mall tribes by endless feuds and wars. Hereditary tribal enmities led to constant raiding, in which villagers were murdered and their gardens destroyed. The sole concern of the men was war and defence ; cultivation was in the hands of the women and was of a most primitive character.

Now the men have lost their occupation and are expected to assist in maintaining the family. As a result, larger gardens are being cultivated and more varied crops produced, resulting in improved nutrition and an increase in the general welfare.

(*b*) Tenure of land is now on a permanent basis and natives are encouraged to plant fruit trees and perennials, the fruits from which they may hope later to enjoy.

(2) Constant supervision of the natives' welfare and food supply is maintained by district officers as they patrol their respective districts.

Where it is found, as is frequently the case, that apathy or want of foresight on the part of the natives has caused them to plant insufficient gardens, the matter is adjusted forthwith, and in this way a situation which in former times frequently

kept the population on the verge of starvation is now entirely avoided.

(3) The vexed question of the pig has been dealt with at length, and the measures considered most appropriate have been applied to the various districts.

Pigs and gardens are incompatible. Either pigs must be fenced in to keep them out of the gardens, or gardens must be fenced to keep out the pigs. In the former case, the pigs' owner must build the fence and feed his pigs. In the latter case he does nothing. But native fences are haphazard affairs and the pigs break through and the gardens suffer.

It may be stated here that persuasion is first tried in all cases where health matters are concerned, and only when it has failed is coercion employed.

In any case, the personnel is too small to enforce compulsory health measures successfully, and it appears that the only hope of improvement lies in education and persuasion.

III. SANITATION AND SANITARY ENGINEERING.

So far as the general native population is concerned there is little to report under this heading. Native housing, water supplies and methods of disposal of house refuse and other wastes still follow traditional lines, and, apart from general inspections and the insistence on a reasonable standard of accommodation and cleanliness in the villages, the natives' habits have not been interfered with.

1. Housing.

The houses of the natives are similar in all the islands. They are constructed with leaf (leaves from the sago palm) roof, leaf or bamboo walls and earth floor, with very little ventilation.

In the Shortlands, the natives were persuaded to build houses on piles with split palm flooring, but they very seldom slept in these houses and prefer to sleep in their kitchens. They have now reverted to the old style of houses.

In some islands where the natives are nomadic, the houses are very crude and consist of temporary shelters.

As seen in the above-mentioned Shortlands case, it will be difficult to persuade the natives to build better types of houses.

2. Water Supply.

The water supply in the Protectorate is derived from :

(1) Rain-water caught in tanks from the roof (the most common method for European houses) ;
(2) Streams and rivers ;
(3) Springs ;
(4) Wells.

River water is hard.

The water supply is satisfactory, as there is little or no pollution.

3. Sewage Disposal and the Disposal of House Refuse and Other Wastes.

Sewage Disposal.

Fly-proof pan or pit latrines are in general use for European houses.

Houses are being gradually equipped with individual septic tanks. Buildings near the sea have sewage drains emptying directly into the sea.

Coastal natives use the sea. Natives in the interior set apart certain areas for this purpose.

Scavenging and Refuse Disposal.

At Tulagi, refuse is collected in covered garbage bins, which are taken daily to public incinerators, where the contents are suitably disposed of.

In the districts, they are disposed of by being buried or dumped into the sea.

4. Campaign against Flies.

Flies are present but relatively are not numerous. Apart from careful disposal of garbage, no measures against flies are in operation.

IV. NUTRITION.

1. Composition of Food and Methods of its Preparation.

Summarising the native dietary, which is similar in all the islands, we find the following foodstuffs generally eaten :

Staple foods :

(1) Taro, yams, panna, sweet potatoes ;
(2) Bananas, plantain, breadfruit, sago, cassava ;
(3) Native cabbage and spinach ;
(4) Ngali nuts and coconuts ;
(5) Fish (staple on many islands and coastal villages).

Supplementary (only occasionally eaten) :

(1) Maize and sugar-cane (only on a few islands) ;
(2) Pineapples, pawpaw, mango, oranges ;
(3) Pork and beef (pork eaten only on ceremonial occasions, beef rarely) ;
(4) Wild animals—wild pigs, opossum, flying-fox ;
(5) Crabs, shell-fish, eels, turtles ;
(6) Fowls, pigeons and certain seabirds ;
(7) Eggs of fowl, megapode and turtle.

Imported foods, such as rice, biscuits, tinned meat and fish are negligible, as they are only eaten occasionally by natives who can afford to purchase them. They form, however, ths main rations issued to plantation labourers.

The supplementary items are of no value from a nutritional point of view, as they are only eaten occasionally by the natives.

With the possible exception of Malayta, there is no actual shortage of food, as when the staple crops fail there is a plentiful supply of wild yams, wild taro and wild bananas.

Method of Preparation.

The method of preparing meals is the same in all the islands ; they are either (1) cooked in hot stones or (2) boiled in saucepans.

Pork is wrapped in banana leaves and then cooked in hot stones.

Meals are taken generally twice daily.

2. Nutritive Value of the Principal Foods.

Analysis and Composition with Vitamin Contents.

	Proteins in grammes	Fats in grammes	Carbo-hydrates in grammes	Calories per oz.	Vitamins			
					A	B	C	D
Taro	0.50	0.06	6.30	28	—	+	+	—
Yams	0.51	0.06	6.31	28	—	+	+	—
Panna	0.51	0.03	6.31	28	—	+	+	—
Sweet potato	0.45	0.05	5.31	23	+	++	++	—
Bananas or plantain	0.45	0.03	2.26	11	v.l.	+	+	—
Cassava	0.31	0.05	5.51	24	—	+	+	—
Breadfruit	0.70	0.04	8.15	36	v.l.	+	+ to ++	
Maize	2.13	0.48	20.80	96	++	++	o	—
Sugar-cane	0.42	0.16	6.20	28	—	+	+	—
Sago	2.18	0.04	22.00	97	—	o	o	—
Coconuts	1.61	14.31	7.90	167	++	++	o	—
Pineapple	0.11	0.09	2.75	12	—	—	++	—
Mango	0.04	0.22	5.20	23	+	—	++	—
Pawpaw (papaya)	0.16	—	0.10	1	+	+	++	—
Spinach	0.51	0.06	0.82	6	+++	+++	+++	—

+++ = rich in. ++ = moderately rich in. + = poor in.
o = none. v.l. = very little. — = doubtful or not investigated.
(From McCarrisons' "Food", published in 1929.)

It is seen that the native dietary is mainly a vegetarian one with a high proportion of carbohydrates and low in fats and protein, with a deficiency in vitamins A and D.

The natives in all the islands make a "pudding", which supplies, not only carbohydrates, but also protein and fat. This pudding is made as follows : One of the staple foods, taro or yam (generally taro) is cooked. It is then put into a mortar, shelled ngali nuts added, and pounded to a pulpy mass. The

mass is taken out and formed into " puddings ". Then the milk from grated coconuts it poured over the puddings, which are sometimes put into native " kaikai " (feeding) bowls and heated over the fire.

These puddings are made only during feasts and on special occasions, such as visits from other natives.

The natives are very fond of these puddings.

Diet has always had a marked influence on human progress and evolution.

The native dietary is largely determined by climatic and local conditions and by native customs and habits. There is no doubt that climate influences diet. For instance, in cold countries proteins and fats are eaten for heat production, whereas in hot climates vegetables form the main source of energy and carbohydrates are used instead of protein and fat. This may have some influence on the native dietary.

Habit and custom also play a part. The native is very conservative and it is difficult to make him change his habits and customs. From time immemorial, the native has been accustomed to eat the same staple foods and he now finds it difficult to accustom himself to other foodstuffs, however good they may be for him. Although there are plenty of edible birds and animals, he eats very little of them, as he dislikes them. He does not appreciate fowl and duck eggs, although he likes megapode eggs. He is very fond of pork and fish, as he has been accustomed to eating these, but he does not like fresh beef much, although he appreciates tinned meat. It would therefore appear that taste also is a factor in racial dietary.

However, it is certain that changes in the dietary can be brought about. This is well shown by the fact that rice now forms the basis of the ration issue to native labourers. The labourers now demand rice and do not consider themselves properly fed unless they get it.

Rice is not one of their traditional foods and none is grown in the Protectorate, although it has been successfully cultivated.

The same applies to tinned meat.

The use of imported foodstuffs, rice and tinned meat, is increasing among the general native population.

Use and Non-use of Certain Specific Articles of Food.

The purpose of this section of the report is to outline briefly the situation in regard to certain foods which are generally considered as of major importance from a public health point of view.

(1) *Milk and Milk Products (Butter, Cheese, Cream, etc.).*

It is literally true of the majority of the native population that from the time of being weaned until death they consume no milk and no milk products whatever.

Fresh milk is unobtainable and tinned milk is expensive. The natives have never known the use of milk and do not want it.

The same is true of milk products.

(2) *Eggs and Poultry.*

Apart from the megapode eggs, eggs (fowl and duck) are not much appreciated by the natives, and this important food item, which could make a valuable addition to the dietary, is neglected to a great extent. Most villages have fowls running about and eggs are available for those who desire them.

Poultry is eaten occasionally, but is not appreciated much either, and is not an important article of diet among the native population.

(3) *Meat and Fish.*

Meat does not assume the importance in the native dietary that it does in most countries, and, while certain potential sources of supply have been pointed out, it is generally true that meat is consumed on ceremonial occasions only and as a luxury. The frequency of such occasions naturally varies within wide limits, and natives may go for weeks together without eating any meat.

It may be noted that the natives prefer tinned meat, to which they have become accustomed on plantations, to fresh meat.

Fish is an important item of diet throughout the group, and all natives, whether living on the coast or inland, obtain

fish at times. On some of the coral atolls and the artificial islands of Malayta, sea food is the staple diet of the people, supplemented by coconuts or native vegetables.

The importance of fish in the dietary can scarcely be over-estimated, as it undoubtedly forms the main source of certain food factors which are otherwise lacking in the native dietary.

(4) *Cereals.*

Cereals have no place in the native dietary. Maize and rice have been successfully cultivated but are not grown to any appreciable extent. Maize is eaten on a few islands only. It is not converted into mealie but eaten in the cobs.

Rice is the basis of the rations of plantation labourers. All such rice is imported and is in the polished state. The labourers refuse to eat unpolished or undermilled rice. The natives like it, and it is probably their good fortune that the general native population is unable to obtain rice, which would unboudtedly be consumed to the neglect of the products of their gardens if this were possible.

(5) *Fruits.*

All the commoner tropical fruits can be grown and are grown in the Protectorate.

Many of the villages have orange, grape-fruit and lime trees and credit must be given to disinterested officials, missionaries, planters and traders who have made young plants and trees available to the villagers who, without such assistance, are unable to obtain them for planting.

Much more can undoubtedly be done in this respect, and there would appear to be no reason why every village should not enjoy an abundance of such fruits in season.

Pawpaws, mangoes, pineapples and bananas can be grown plentifully everywhere if the necessary trouble is taken.

(6) *Common Salt.*

Sea-water is used by the natives to supply salt. The coastal natives have easy access to the sea, but the bush peoples experience considerable difficulty in obtaining sufficient salt.

They are compelled to make long journeys to the ocean to carry back sea-water for its salt content. In olden times, when wars took place between the coastal and inland tribes, conditions were probably still more difficult for them.

No evidence, however, of disease resulting from a deficiency of salt in the diet is available.

(7) *Beverages.*

In general, alcoholic beverages are not used by the native population. Imported drinks are unobtainable on account of the cost and because it is illegal to supply alcohol to natives.

An exception exists among the Polynesian peoples, who make a palm toddy by fermentation of young palm-shoots. The product is intoxicating. Its use is discouraged by the missions, but it is nevertheless still made on occasions, although not so generally as in the post.

The natives are partial to tea, but the general native population cannot obtain it regularly on account of the cost. This is probably fortunate for them, as they make tea badly, boiling it thoroughly and so extracting all the tannin.

Betel-nut Chewing.

Any discussion on nutrition among the native population would be incomplete without mention of the practice of betel-nut chewing.

The ingredients used are the leaves of the Piper betel, the kernel of the areca or betel nut and lime. No spices are used.

The betel-nut contains several alkaloids the effect of which is stimulant and narcotic.

The practice of betel-nut chewing is general throughout the islands. Its importance from a nutritional point of view lies in two factors :

(1) Betel-nut chewing relieves hunger, and a native will journey all day without food with the aid of betel-nut. Also, it is much simpler to chew betel-nut than to prepare food, and chewing is resorted to when otherwise food would be taken. The direct result is that the betel-nut chewer uses the drug

as a substitute for food and consequently is under-nourished. A secondary factor in this aspect of the situation is that the narcotic effect of the nut tends to prevent activity in the way of collecting food and preparing proper meals.

(2) Betel-nut chewing is said to prevent tooth decay, but its effect on the gums is disastrous, and every confirmed betel-nut chewer suffers from pyorrhœa of a severe type. His teeth are loose and the gums receded and painful. Apart from the swallowing of pus from the gums, it is impossible for him to masticate his food properly, and disturbance of digestion follows with resultant under-nourishment and malnutrition.

3. Minimum Cost of Adequate Nutrition and the Allowance for Food in Family Budgets.

These are not ascertainable. Food costs the natives nothing except the work entailed in making gardens and collecting the products.

4. Diet and Health : Deficiency Diseases.

In reporting on the incidence of evidence of dietary deficiencies as shown by disease, it must be pointed out that morbidity and mortality statistics are almost entirely lacking and that the conclusions expressed herein are from the records of the Tulagi Hospital and from the observations and experiences of the medical officers now serving in the Protectorate.

It must also be borne in mind that the native dietary varies through all gradations from that of the " bushmen " on Malayta, the basis of which is taro and similar plants whose food content is almost entirely carbohydrate, to that of the dweller on coral atolls, whose diet is almost entirely fish and coconuts.

Speaking generally, it has been stated that the natives do not suffer from want of food ; but it is our experience, particularly with reference to native recruits, who are medically examined prior to indenture and who are seen later after they have been on the plantations for a time, that they almost

invariably put on weight rapidly and improve in strength and in their general physical condition.

In other words, the native dietary does not suffice to maintain individuals in perfect physical condition. This statement applies only to those populations that depend on the produce of their gardens for their sustenance.

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.

Vitamin Deficiencies.

(1) Occasional cases of night blindness are seen which clear up with cod-liver oil or haliverol and which are attributed to deficiency in vitamin A.

Pathological eye conditions, particularly conjunctivitis, acute and chronic, and corneal ulcer are frequent among natives. To what extent, if any, these conditions are due to vitamin A deficiency in the dietary is a matter of speculation only.

The serious and often disastrous effects on the natives of respiratory infections, which in the European population are mild and negligible, is also suggestive of a high susceptibility to infection such as is known to occur with an inadequate amount of vitamin A in the diet.

On the other hand, cases of urinary calculi must be exceedingly rare among the native population. None have been recorded in Tulagi Hospital in the past ten years.

(2) If the incidence of beriberi and pellagra be taken as a guide to the occurrence of deficiencies in the diet of the vitamin B complex, the general native population does not suffer from any lack of this vitamin in its dietary, nor would one expect any such deficiencies from a study of their diet.

Conditions are different in regard to plantation labourers, whose diet, consisting mainly of rice, biscuits and tinned meat, is low in vitamin B. Two small outbreaks of beriberi have occurred in recent years among plantation labourers.

Pellagra has not been reported in the Protectorate at any time.

(3) The diet of the general native population appears to contain sufficient anti-scorbutic vitamin. No cases of scurvy have been seen or reported.

Here, again, the situation of the plantation labourer is different and his ration is lacking in vitamin C. Nevertheless, no cases of scurvy occur among such labourers, the explanation probably being that they are always able to supplement their rations with fresh foodstuffs and fruit.

(4) Lack of vitamin D is not a problem of native dietary. That the natives' diet is deficient in this principle may be admitted, but the natives wear so little clothing and are so frequently exposed to sunshine that rickets do not occur.

Only one native child showing evidence of rickets has been seen by medical officers at present in the service. This was a child which had been artificially fed and reared by Europeans under abnormal conditions, in that it was more completely clothed and allowed little exposure to sunlight.

(5) There is apparently no evidence of deficiency of vitamin E in the native dietary. Birth rates are comparatively high, as shown by the vital statistics.

Birth and Death Rates per 1,000.

	1933		1934		1935	
	Births	Deaths	Births	Deaths	Births	Deaths
Guadalcanar	35.2	23.0	29.0	21.1	31.6	19.9
Gizo	24.1	13.2	16.1	13.3	30.6	18.0
N'ggela	32.5	14.6	21.4	19.0	19.8	17.8
Isabel	30.1	12.6	24.8	20.0	21.0	11.5
Eastern Solomons	24.7	18.1	20.0	20.8	—	—
Shortlands	19.2	18.4	20.7	19.4	—	—

Tropical Ulcer.

Researches in other parts of the world have shown that, where the dietary consists chiefly of carbohydrates and contains little protein, the incidence of tropical ulcers is high.

Dr. F. W. Clements, of the School of Tropical Medicine and Hygiene of the University of Sydney, Australia, in researches made on the Island of Manus in the Admiralty Islands, situated in the mandated territory of New Britain, noted the following facts :

(1) Villages living almost entirely on native sago had the highest percentage incidence of tropical ulcers (up to 15%).

(2) This high percentage fell considerably if the diet was augmented by fish—that is, it was lower near the coast than farther inland.

(3) The percentage likewise fell in those villages growing and adding a quantity of taro to the diet.

(4) There was a complete absence of cases in fishing villages. In these villages, the diet was 60.7% protein.

(5) Low percentages were found amongst the taro-eating peoples.

(6) These percentages again rose as the distance from the coast and their chief source of protein (fish) increased.

Thus, it was apparent that the eating of sago instead of taro and the amount of fish eaten influenced the incidence of tropical ulcer.

In the British Solomon Islands, the incidence of tropical ulcer is high. During the year 1936, the percentage of cases of tropical ulcer treated in the Tulagi Hospital was 15.5 of the total admissions to hospital.

It is seen that taro is the staple article of diet among these natives, yet the incidence of tropical ulcer among them is high.

The bush natives exist mainly on taro, and certainly the incidence of ulcers among them is lower than among the coastal natives.

Where fish is the staple diet, as on Lord Howe and the artificial islands of Malayta, the incidence of ulcer is low.

It would seem probable that there is a close association between diet and ulcers, but further researches on the subject are required.

5. Plans for a Co-ordinated Nutrition Policy based on the Collaboration of the Health, Educational and Agricultural Services.

Educational and agricultural departments do not exist in the Protectorate.

The following extract from a recently prepared report on nutrition reviews measures which are proposed for the improvement of nutrition among the natives :

" (1) The natives should be encouraged to plant an area (of gardens) sufficient to ensure that a shortage of food does not occur.

" (2) Gifts of seeds and plants to be made to responsible villagers in various villages with a view to increasing the number of food-producing trees, particularly orange trees, breadfruit trees and nut trees.

The necessity for this encouragement lies in the fact that the natives are not foresighted. They do not see the necessity for doing anything which will result in benefits in the distant future, which is essentially the case with fruit-tree planting.

" (3) Apart from the above measures, which may be described as ' general ', it is believed that . . . investigations . . . will indicate specific dietary improvements applicable to special areas and particular sections of the population, and it is considered that the required measures can only be decided on from a study of such findings.

" (4) The nutritional aspect to be stressed in the programme for maternity and infant welfare at present under consideration.

" (5) It has been pointed out that the native standard of agriculture is lamentably low and primitive, and it is believed that improved agricultural methods and the introduction and popularisation of new crops would greatly improve the natives' dietary.

" The administration is suffering from the want of an expert qualified to advise on such matters and it is considered

that an agricultural department is essential for the further development of agriculture in the Protectorate, and as a preliminary measure to any marked improvement in the natives' living conditions.

"(6) Consideration to be given to the possibility of improving the natives' dietary by the introduction of new fauna and flora."

V. MEASURES FOR COMBATING CERTAIN DISEASES.

Malaria.

All the usual anti-larval measures are carried out. On Tulagi, a native sanitary inspector makes a weekly inspection of all premises, houses and grounds. A native oiler oils all streams, drains, pools, etc., working on a schedule by which each part of the island is treated weekly.

A gang of prison labourers is constantly engaged in clearing drains, weeding and underbrushing.

Extensive reclamation work has been carried out in recent years. While more remains to be done, the residents on Tulagi enjoy comparative freedom from malaria.

On Government district stations, measures along the same lines are carried out under the supervision of the district officers.

The larvæ-eating fish (*gambusia affinis*) has been introduced, stock having been kindly supplied by the principal medical officer of the mandated territory of New Britain, and these fish have been supplied to various plantations. Under favourable conditions, they have thriven and have brought about a great improvement in conditions.

All Government and most other houses have screened bedrooms. The Labour Regulation requires that all labourers be supplied with mosquito-nets.

Quinine is distributed free to natives through the agency of Government stations, district and village dressers and missionaries.

During 1935, approximately 100 kilogrammes of the drug were so distributed.

Plague.

Plague does not exist in the Protectorate. Apart from the quarantine examinations of incoming vessels, no measures against the disease are in force.

Ankylostomiasis and Yaws.

Mass treatment of these two diseases was begun in 1928 when, with the financial aid and administrative assistance of the Rockefeller Foundation, two treatment units were placed in the field. The Rockefeller campaign lasted four years, during which period sixty thousand persons received treatment for each disease. In the treatment of yaws, 113,631 injections of neoarsphenamine were given, without taking into account treatment given at hospitals and dispensaries or by missionaries.

Following the campaign, the work has been carried on by the administration, which maintains one field unit.

Drugs and Dosage.

Neoarsphenamine is used in the treatment of yaws in the routine dosage of 0.45 gramme for an adult. Children in whom intravenous injection is not possible are now given "Sobita" intramuscularly, although until recently neoarsphenamine was given.

"Sobita" is so much more satisfactory when intramuscular injections must be given that N.A.B. intramuscularly is now considered unjustifiable.

Two injections at a weekly interval of either drug is the routine.

For hookworm, carbontetrachloride followed by magnesium sulphate is the treatment used.

In addition to the treatments, the yaws and hookworm officer gives lectures and instructions in preventive measures with regard to these diseases.

Results.

From experience gained in the past eight years, two facts emerge. First, that the intensive treatment of these two diseases has resulted in a great improvement in the health

of the native population. This improvement is perfectly obvious to anyone who was familiar with native health conditions before the campaign started and at the present time.

The second fact is that this work cannot now be discontinued without losing the ground that has been gained. Secondary cases are still numerous, and practically all children become infected, so that, to prevent the development of the crippling lesions which were formerly so common, continuous unremitting attack on the disease is essential.

Leprosy.

Plans are now being considered for dealing adequately with this disease, a difficult problem for reasons of finance.

Extensive surveys have been carried out by members of the medical department.

The following are the statistics of lepers discovered :

Malayta	308	
Guadalcanar . .	7	(survey very incomplete)
N'ggela	9	
Isabel	27	

Mental Disease and Drug Addiction.

There is no drug addiction among the native population.

In regard to mental disease, the Tulagi Lunatic Asylum is available for the care of mental cases who are violent or unmanageable ; otherwise, the relatives of the patients care for them.

Agricultural colonies have not been attempted.

Appendix.

Supply of drugs and medicines by the Government for the use of free natives.

The following is a list of drugs and medicines which is supplied to missionaries and others for the use of free natives.

Drugs, etc., not on the list are supplied only at the discretion of the senior medical officer.

Quinine,
Aspirin,
Cough mixture,
Tincture of iodine,
Iodine-salicylic acid for treating ringworm,
Turpentine liniment,
Castor-oil,
Chlorodyne,
Epsom salts,
Cod-liver oil,
Bismuth and soda mixture,
Antiseptics—lysol, white disinfectant, etc.,
Acriflavine solution,
Boracic acid,
Potassium permanganate,
Eye ointment,
Ointment for ulcers (BIPP and BBZ),
Sulphur ointment for scabies,
Chrysophanic ointment,
Hydrocarbon,
Wool, lint and boric lint,
Bandage calico,
Tonic mixture,
Eye-lotion and eye-drops,
Ear-drops,
Yaws treatment (N.A.B. and " Sobita ")—to those qualified to use these drugs.

With the above drugs, most of the ailments common amongst natives can be treated.

VII. REPORT FOR THE NEW HEBRIDES CONDOMINIUM

Prepared jointly by the

BRITISH AND FRENCH AUTHORITIES.

I. HEALTH AND MEDICAL SERVICES.

1. In the New Hebrides there are, properly speaking, no health of medical services financed and controlled by the Condominium Government. There exist the following medical services :

(a) *The French National Medical Service.*

(1) This service is financed and controlled by the French Government. The primary objects of this organisation are to make available to non-natives and natives the services of qualified doctors and medical institutions at certain centres in the islands and to inspect and watch over the health of labourers on French plantations, particularly indentured imported Tonkinese.

(2) Indigent French citizens (if any) and indigent natives are treated free at these centres.

(3) The French Government finances and controls the following medical institutions :

At Vila. — A large modern and splendidly equipped hospital in two sections, one for Europeans, the other for non-Europeans and natives. The accommodation is ample in both sections for present requirements, and the equipment includes apparatus for X-ray and ray therapy. There is also a central depot for medical stores.

At Santo. — A modern and well-equipped hospital in two sections, one for Europeans, the other for non-Europeans and natives. Though at present it possesses no ray equipment, this

institution is capable of supplying most of the medical needs of the rapidly developing South-East Santo district.

At Norsup, Malekula. — A modern hospital organised in two units as at Santo. This hospital was built for the Norsup Cotton Company and destined chiefly to cater for the large numbers of labourers which were expected to be employed. As this number eventually become very much reduced and Norsup is not the centre of a populous native area, this hospital is now little used. It has no ray equipment.

At Port Sandwich, Malekula and Tanna. — An infirmary-dispensary at each, destined for the treatment of natives and (at Port Sandwich) Tonkinese. Non-natives also receive first-aid treatment in urgent cases.

(b) *Presbyterian Mission Medical Service.*

(1) This service is intended primarily for the treatment of natives, but caters also for non-natives. Indigent whites (if any) and indigent natives are treated free of charge. The doctors visit local villages and advise natives on medical and sanitary questions.

(2) The Presbyterian Mission finances and controls the following medical institutions :

At Vila. — A moderate-sized hospital destined for natives, but having two European wards. It has no ray apparatus, but is otherwise well designed and equipped.

At Tanna. — A small hospital destined for natives, but Europeans are not refused if the cases are urgent. It has no ray apparatus, but is well equipped and possesses a particularly good operating-theatre.

(3) Both these hospitals are subsidised by the British Government.

(c) *Melanesian Mission Medical Service.*

(1) This service is, like the Presbyterian, intended primarily for natives, but also treats non-natives in urgent cases. Having as yet no qualified doctor, its scope is limited to simple medicine.

A good deal of village visiting is done with a view to giving medical and sanitary advice.

(2) The Melanesian Mission finances and controls the following medical institutions :

At Lolowai, Aoba. — A medical aid post.

At Tavolavola, Aoba. — A medical aid post.

At Raga, Pentecost. — A medical aid post.

(3) A modern hospital is being built at Lolowai, Aoba, and will replace the medical aid post.

(4) The Melanesian Mission receives a medical subsidy from the British Government.

(d) *Condominium Medical Service.*

(1) This consists of certain members of the French National Medical Service and mission doctors that happen to be in the group. They receive small allowances from the Condominium for certain duties and responsibilities. One of these officers is appointed Chief Condominium Medical Officer and nominally controls the Condominium activities of the rest. The present Chief Condominium Medical Officer is Chief of the French Medical Service.

(2) There is also a Fijian native medical practitioner who is a purely Condominium employee. He is responsible to the Condominium Government, through the Chief Condominium Medical Officer.

(3) Two of these officers (one British and one French) perform the duties of port health officers and one of meat inspector at Vila.

(4) While not fully controlling any of these officers, except the Fijian native medical practitioner, the Condominium is able to obtain their services in matters of common interest and policy.

2. Personnel.

(a) *Doctors.*

(1) *French National Medical Service.*

At Vila : One Chief Medical Officer, also Chief Condominium Medical Officer and Port Health Officer.
One assistant medical officer, also a Condominium medical officer and meat inspector, Vila.
At Santo : One medical officer, also a Condominium medical officer.
At Malekula : One medical officer, also a Condominium medical officer.
At Tanna : One medical officer, also a Condominium medical officer.

(2) *Presbyterian Mission Medical Service.*

At Vila : One doctor, also a Condominium medical officer and port health officer.
At Tanna : One doctor, also a Condominium medical officer.

(3) *Condominium Medical Service.*

At Vila : One Fijian native medical practitioner.

(b) *Auxiliary Staff.*

(1) *French National Medical Service.*

At Vila : Seven sisters (religious) ; one wardrobe keeper (religious sister).
At Santo : Four sisters (religious).
At Norsup : One Tonkinese male nurse.

(2) *Presbyterian Mission Medical Service.*

At Vila : Three qualified nurses.

(3) *Melanesian Mission Medical Service.*

At Raga : Two qualified nurses.
At Lolowai : One qualified nurse.

At Tavolavola : One qualified nurse ; one experienced lay worker (missionary).

Note. — It is expected that a qualified doctor will be employed when the hospital at Lolowai is completed.

(4) In addition, many missionaries practise simple medical work and give treatment for yaws.

3. Curative and Preventive Activities.

(1) The curative activities in the group consist mainly of the treatment of cases which are brought to the medical centres. Lack of funds and personnel has prevented the Condominium undertaking any properly planned and scientifically controlled campaign against the chief native diseases, yaws and malaria. There have been sporadic campaigns, particularly by a representative of the Rockefeller Institute in the years 1928 to 1931. This was insufficient to do more than touch the fringe of the yaws question (as has since been learnt), and it is questionable whether any permanent cures were achieved. The best result was probably the practical demonstration to a very large percentage of the native population of the curative power of the injections, which they now seek freely, when the sores break out. Injections are given by all the medical institutions, doctors and by a number of missionaries, both at medical centres and in the villages ; but lasting results are rarely obtained, owing to the native being incapable of realising that the treatment must be continued after the disease has apparently cleared up.

(2) The most prevalent diseases are malaria among whites and malaria and yaws among natives. Owing to the reasons given above, there have been none but sporadic preventive campaigns. Many employers of labour, however, give their employees quinine as a prophylactic measure. The question, however, as to whether quinine prophylaxis is necessary or desirable in the whole group or in parts thereof has never been finally decided. Medical opinion varies on this point.

4. Budgets.

1937. Condominium Medical Services :

	£
Personnel	578
Material	303
Total	881

1937. French National Medical Services :

	Francs
Personnel	476,718.51
Material	396,281.49
Total	873,000.00

1937/38. British Government subsidies to medical missions, £550.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Non-existent.

III. SANITATION AND SANITARY ENGINEERING.

1. Housing.

Non-natives are generally housed in airy, well-built dwellings of timber and corrugated iron ; coast natives in bamboo mat and leaf thatch huts, airy and generally clean, with mud or coral floors ; bush natives in very low and small grass or leaf huts, badly ventilated and unhygienic, with mud floors. The missions have done, and continue to do, good work in influencing the progressive improvement in native dwellings.

2. Water Supply.

The main water supply of non-natives (and a few natives) is rain-water taken off roofs and stored in tanks and cisterns. This is mainly pure, but is slightly contaminated by dust and

bird droppings. It is lacking in mineral salts. Most natives obtain their water from wells. The water so obtained is in itself excellent, but the mode of construction of the wells is such as to lead to great risk of contamination owing to the habits of the natives in using dirty vessels to draw water and allowing refuse to fall into the wells. These habits probably account for at least some of the epidemics, particularly of bowel complaints, that occasionally occur. Administrative machinery is still too primitive to allow of effective measures to correct such tendencies and the native is not quick to understand the blessings of hygiene on his own account.

3. Disposal of House Refuse and Other Wastes.

In Vila, refuse is collected by a sanitary squad three times a week and burnt. Elsewhere there is no systematic method of disposal, but the majority of coast dwellers dump their rubbish in the sea.

4. Campaign against Flies.

See 3 above ; otherwise, no campaign. Flies are not such a nuisance in the New Hebrides as in some other places, except on plantations (due to the quantity of cattle).

IV. NUTRITION.

1. Composition of Food and its Methods of Preparation.

(*a*) Mention is not made herein of the composition of European foods and their preparation as they are practically the same as in the temperate zone, supplemented, but not supplanted, in a few cases by native vegetable foods. The food of Asiatics in the group also does not appear to require special treatment, as it is much the same as they eat in their own countries, again supplemented, but not supplanted, by native foods.

(*b*) From the point of view of food and the preparation thereof, natives of the New Hebrides may be roughly subdivided into three classes : (*i*) bushmen, (*ii*) salt-water or coast natives and (*iii*) plantation labour.

(*i*) The bushman's diet is mainly vegetarian, consisting of yams, taro, manioc, the juices, oils and milk of the coconut, breadfruit, bananas, sugar-cane, certain nuts, native cabbage and sweet potatoes. In addition, he very occasionally eats pork and birds. He uses no cooking pots. He eats his food in the form of " laplap ". The basis of laplap is grated root vegetables, nuts and green bananas, to which native cabbage and very rarely some form of meat may be added, the whole being seasoned with raw coconut oil. It is wrapped in banana leaves and cooked under the ashes of a fire. The bushman's food is deficient in animal protein. He eats no salt.

(*ii*) The salt-water native eats what the bushman eats. To this may be added more meat, also occasionally fish, shell-fish, turtles and their eggs, pigeons and bush turkeys and their eggs, fowls and their eggs. When times are good and he can afford it he also consumes rice, bread or biscuits, tea, sugar, tinned meat and fish, sweet biscuits and other " white man's luxuries ". In addition, he has commonly available oranges, lemons, limes, shaddocks, passion fruit, pawpaws, mangoes, watermelons and pumpkins. The diet is much better balanced than the bushman's, but is generally (owing to the native's lazy habits) still somewhat deficient in animal protein. The salt-water native prepares and eats laplaps in the same way as the bushman, but he also uses to some extent cooking-pots to cook rice, pumpkin, tea, etc. He, too, eats little or no salt.

(*ii*) The plantation labourer is rationed and the basis of his diet consists of rice, meat and fish (fresh and tinned), bread or biscuits, tea and sugar, supplemented, where available, with yam, taro, manioc and other native products. He also generally has available the fruits mentioned under (*i*) and (*ii*) above. The food is cooked for him in cooking-pots under plantation supervision. The labourer's diet is generally somewhat

deficient in protective foods, but cases of the only deficiency disease known in the group (beriberi) are extremely rare and soon clear up when the labourer returns to his own village.

2. Nutritive Value of the Principal Foods peculiar to the New Hebrides.[1]

Food	Proteins	Carbo-hydrates	Fat	Salts	Water	Vitamins		
						A	B	C
Yams	1.5	18.0	—		78		+	+
Bananas.....	1.2	21.0	0.2		78	+ to ++	++	++
Sweet potatoes	1.5	15.0	—		85	++	+	+
Pawpaw.....	—	6.0	—	—	94	++	+	+++
Taro.....	1.1	24.0	0.17	1.0	73	o to +	++	+
Pumpkin	0.8	5.0				++	+	+
Manioc.....	0.3	88.0	0.2		12.8			
Breadfruit (cooked)....	1.3	27.8	0.31	1.2	67.8	++	+	+
Watermelon ..	—	10.0	—	—	90	o	o	+
Tinned meat .	15.2	—	15.5	1.5 to 2		+	+	o
Pig	12.0	—	29.8			o to +	++	o to +
Tinned salmon	19.5	—	7.5			+	o	o
Fresh fish.....	10.9	—	2.4			+	+	o
Coconuts	5.7	27.9	50.6	1.7	14.1	o	o	+
Rice (white, uncooked) .	6.0	73.0	—		21			
Sugar-cane ...						o	o	o
Mango						++		++to+++
Pineapple						++	o	++
Oranges						+	++	+++

Legend: — / o = None.
Blank = Not known.
\+ = Some vitamin present.
++ = Good supply of vitamin.
+++ = Very good supply.

3. Minimum Cost of Adequate Nutrition and Allowance for Food in Family Budgets.

Cannot be estimated.

4. Diet and Health : Deficiency Diseases.

Deficiency diseases are practically unknown. A few mild cases of beriberi have been observed, but these rapidly cleared up. Natives have, generally speaking, splendid teeth.

[1] *Cf.* Table quoted from McCarrison at page 89. — *Editor.*

5. Plans for a Co-ordinated Nutrition Policy based on Collaboration of the Health, Educational and Agricultural Services.

No educational or agricultural services exist. Nevertheless, the question of nutrition is about to be studied with a view to the possible adoption of such a policy as may be found desirable and practicable.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

1. Malaria.

This disease exists in nearly every island of the group. No action has so far been taken to eliminate mosquitoes. Certain of the wiser settlers oil their water-tanks with kerosene, but among natives preventive measures are unknown. Natives in their own homes do not suffer greatly from malaria in a clinical form, but are far more apt to do so when they leave their islands. They seem to acquire a measure of immunity to their local infections, but this does not appear to protect them from "foreign" infections. Clinical cases of malaria are frequently treated by planters and missionaries, as well as by doctors, in rural districts, by quinine, and some planters give their labour quinine prophylactically. Atebrin and plasmoquine are now being experimented with.

2. Plague.

Non-existent.

3. Hookworm.

No systematic enquiry has yet been made into this disease, which appears not to be widespread. It is treated, *ad hoc*, as cases come to notice.

4. Tuberculosis.

The disease exists among natives, as cases of pulmonary and osseous tuberculosis have been observed and treated. No systematic research has ever been undertaken, but it is thought that the incidence of infection is fairly high. No particular steps have been taken to combat the disease.

5. Pneumonia.

Only sporadic cases, but natives fall easy victims to this disease.

6. Yaws.

This is the only really common native disease in the group (apart perhaps from malaria). Every native may be said to be attacked by it at some moment of his existence. Every form is found—cutaneous, osseous, articular. This disease is found to react best to the arsphenamine group of specifics, but the clearing-up which is obtained is not of long duration, unless the treatment is continued for a lengthy period in expert hands. No really scientific campaign for the elimination of yaws from the group by districts has yet been found practicable, and, unfortunately, natives generally come to be treated only when severe clinical symptoms are showing and depart as soon as these have cleared up.

7. Leprosy.

No census of lepers has been taken, nor is a census practicable under present circumstances. During the last two years, two small leper settlements were started by the Condominium and nine cases were segregated and treated. The disease is not thought to be widespread. The methylene-blue treatment has been found to be a failure. Indeed, the disease appears to get worse when this treatment is discontinued. The best treatment has been found to be injections of chaulmoogra over a prolonged period.

8. Mental Diseases and Drug Addictions.

(*a*) Mental diseases are so rare among natives as to require no special measures.

(*b*) No cases of real drug addictions have been observed. Kava drinking still exists, but in a mild form and only in a few islands. It is by no means universal or widespread and is certainly on the decline. No special measures have been taken to suppress it, but it is strongly discouraged by missionaries and their influence has progressive effect.

REPORT FOR TONGA

Report surveying the Situation in regard to Questions on the Agenda of the Rural Hygiene Conference,

submitted

BY THE HEALTH AUTHORITIES OF TONGA.

Geography.

The Kingdom of Tonga consists of three main groups of islands called respectively Tongatabu, Haapai and Vavau, together with the outlying islands of Niuafoou, Niuatobutabu and Tafahi.

The main groups are situated between the 18th and 22nd degrees of South latitude and the 173rd and 175th degrees of West longitude and extend over an area of approximately 250 square miles.

The islands consist of two parallel chains running north and south. The western chain is volcanic in formation and the eastern coralline.

Population.

The Tongan population is approximately 32,000. Europeans number about 350 and there are about 250 other Pacific Islanders in the group. There are also a few Indian and Japanese traders. Their number is negligible.

Climate.

The climate from May to November is subtropical. The thermometer rarely registers higher than 80 degrees and the humidity during these months is, as a rule, low. From December to April, the temperature rarely rises above 90 degrees, but the humidity, especially when the wind is northerly, is high.

Rainfall.

The rainfall on the three main groups of islands varies from 60 inches in Tongatabu to about 70 inches per annum in Vavau.

I. HEALTH AND MEDICAL SERVICES.

1. Principles governing the Organisations.

Medical care and health work are carried out by the same staff. It would not be practicable, in a small Administration like Tonga, with its limited staff, to divide these two aspects of administration.

Hygiene is taught in the schools ; instruction is rudimentary.

There is no local veterinary staff and no Public Works Department in the accepted sense of the term.

It is felt that development of the education system, with a fuller appreciation of the benefits of a knowledge of simple hygiene, would react favourably on the general work of medical administration. Old beliefs die hard and the medical staff has always to contend with the faith of the people in native treatment. The native looks for immediate results and, if they are not forthcoming, there is a tendency to revert to native medicine. Here the educationist can help.

2. Personnel.

(a) *Doctors.*

The European staff consists of three Medical Officers. One is resident in each of the main groups. The population of these groups is : Tongatabu 15,000, Haapai 7,000 and Vavau 8,000. Medical Officers are recruited from Australia and New Zealand. They have the usual qualifications. The Medical Service is purely a State service and the other points on the agenda do not arise locally.

(b) *Auxiliary Staff.*

The auxiliary staff consists of Tongan medical practitioners who have graduated at the *Central Medical School*, Suva, and locally trained dispensers and dressers. There are now seven Tongan medical practitioners on the staff and four students are at present in training in Suva. Students for the School are selected by competitive examination among the secondary schools. The local dispensers will be superseded, in due course, by graduates of the School.

There are three hospitals in Tonga and there is a Tongan medical practitioner attached to each. The others are stationed in outlying districts.

The nursing staff consists of one European Sister and five Tongan nurses. The latter are attached to the hospitals, where they give general assistance. Development of their services on the lines referred to on the agenda is not contemplated.

The training of nurses presents a difficulty. The Tongan parent is adverse to his daughter's going far afield and it is difficult, for example, to persuade a Tongatabu girl to go from the Nukualofa hospital to a hospital in the northern groups. The only possible local training is in the Central Hospital in Nukualofa, where the European Sister is in residence.

A Central Nursing School in Suva, on the lines of the Central Medical School, is an obvious solution of the training difficulty, but the objection of parents to their girls' going away for training would be exceedingly difficult to overcome.

3. Curative and Preventive Activities.

A type of medical service based on a central hospital in the main groups with outlying dispensaries is in operation and meets local requirements. The system will be extended when more Tongan medical practitioners are available. For its proper working, European Medical Officers, of a patient and sympathetic view towards the natives, and a trained corps of Tongan medical practitioners is essential. A mutual confidence and respect between the European officer and the Tongan medical practitioner is indispensable.

The Tongan practitioner can get " nearer " the people than a European and has a better chance of breaking down the old and still strong faith in the efficiency of native treatment.

4. Budgets.

There is no expenditure locally on public health and medical care, except the amount provided in the annual estimates.

The total expenditure authorised in the budget of the Kingdom during the last five years and the amount spent on Medical Services is as follows :

Year	Total expenditure £	Medical vote £
1932	63,599	8,505
1933	68,583	8,446
1934	57,003	7,550
1935	52,467	7,311
1936	57,231	7,449

This approximates to an expenditure of 5/- per head of population per annum. Stated from another aspect, during the last five years approximately 13% of total expenditure has been devoted to Medical Services.

The following general remarks may be added about the Tongan Medical Service and local conditions. The Tongans receive free medical attention. They also receive free dental treatment in cases of extractions and temporary stoppings from a dentist who is paid a retaining fee by the Government. They are treated freely for pyorrhœa, the incidence of which is heavy.

Tonga is a purely agricultural country and there are no estates in the commonly accepted sense of the term. The basis of the land system is the statutory right of the taxpayer to an allotment of a planting area of 8¼ acres and a town site of 132 square feet. A Tongan becomes liable to tax at the age of 16 years. Any general improvement in health conditions benefits the individual equally with the State. Insurance systems, public enterprises and the other activities referred to in the agenda are unknown in the community.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

Generally speaking, the habits of Tongans are not unhygienic. The standard of life and education is comparatively high for a native people. The villages, while they lack the picturesqueness of the general type of village in Fiji, are, on the whole, cleanly kept. Many small wooden cottages may be seen in most villages. They are poorly maintained and are not so suitable as the native type of thatched house with reed sides. These native houses vary in size ; an average is approximately 20 feet long and 12 feet broad. Legal provision exists for annual inspection of houses and, if a house is in bad repair or badly drained, the Tongan district officer is empowered to order the owner to rebuild or to provide proper drainage.

An inspection is made of town sites every two months, to ensure that the compulsory weeding of the land around the dwelling-houses is properly carried out.

The weeding of the village common is apportioned among the villagers by the town officers. Simple regulations exist for general sanitary inspection by these officers.

On the whole, the system meets adequately local conditions.

Modern health measures—such as the compulsory introduction of new types of latrines—require, in many instances, resource to the Courts for their proper administration. This is understandable in a native community which does not readily grasp the importance or desirability of new health measures. It is abundantly clear that the educationist can help the medical administrator, and the inculcation of a knowledge of simple hygiene in the schools is bound, in time, to react in the village. The Polynesian respects age, and the full benefit of a simple training in hygiene in the schools cannot fully materialise until the generation which is sceptical passes.

In Tonga, woman occupies a high place. The Tongan is a better mother than the Melanesian woman. The Tonga child is, on the whole, well cared for, although native medicines are still used for children's ailments. Infant welfare and ante-natal clinics have been started at the hospitals with encouraging

results. There is room for welfare work in the villages; little has been done locally.

Despite the place of woman in Tongan polity, higher education for women, apart from missionary effort, is undeveloped.

It should be added that the problems of overcrowding, famine and disease are not, however, met with in Tonga, as in the case of many Eastern countries.

III. SANITATION AND SANITARY ENGINEERING.

The question of housing has been briefly referred to above. A housing problem does not exist locally.

The provision of drinking-water supplies is a local problem. There are no rivers or streams in Tonga and the people depend for drinking supply on water conserved in concrete tanks. The difficulty of finding proper catchment areas is considerable. The village churches provide excellent areas, but there has been a repugnance among the Tongans to use the church roof for this purpose. This antipathy has now disappeared. Progress, though slow, is being made in the construction of concrete tanks in the villages. Pollution of water by the insanitary method of lowering buckets through the man-hole when the pump is out of order is not uncommon, especially in privately owned tanks.

The latrines in use are of the deep pit variety with concrete slab and pedestal with wooden seat and cover. The system is satisfactory except near the beach, where there is insufficient depth of soil and coral. These latrines are found to breed cockroaches in large number.

Rubbish is buried in pits. There is no municipal sanitary service.

House flies are not troublesome in Tonga. On the other hand, mosquitoes are abundant. The varieties found are *Culex fatigans, C. sitiens, C. annulirostris, Aëdes ægypti, A. (Finlaya) Kochi var. Samoana,* and *A. Vexans.*

IV. NUTRITION.

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 all ceremonial occasions. These are of frequent occurrence. The diet is deficient in the protective foods—milk, eggs, fruit and green vegetables. The Tongan likes fresh milk, but the trouble of keeping and milking cattle is a fact which has dissuaded him from having cows on his farms. Eggs are plentiful in season, but they are not eaten by the people. The Tongan is not a consistent fruit eater, as the term is understood, and the only green vegetables which he uses are, generally speaking, the leaves of taro and cabbage.

In the southern islands of the group, it is possible, during nine months of the year, to grow nearly every type of vegetable grown in England. In Vavau, the soil is suitable for growing green vegetables, such as cabbage and beans. In the Haapai group, vegetables can be grown with difficulty. This part of Tonga consists of low coral islands with little or no depth of soil.

Pastures in Tongatabu and Vavau are rich and fish is plentiful throughout the group. There is therefore little difficulty in most of the islands in obtaining a proper balanced diet and there is little necessity to import exotic foodstuffs.

There is quantitative superabundance in the daily food of the people and qualitative defect. Deficiency occurs in the protective foods rather than in the energy-giving foods. That deficiency could be cured by a change of dietary habit. Change will be slow and particularly so in a native agricultural community.

It would possibly be convenient if, in the light of the general statement above, reference is made to specific points on the agenda.

It cannot be said that the principal cause of deficient nutrition in Tonga is poverty. It is rather ignorance in adhering to an old-established dietary when a properly balanced diet is available locally or can easily be made available by the sweat of the brow. The soil is remarkably fertile ; cattle and poultry are easily reared.

As regards the daily meal, there is a deficiency in vitamins A and D. There is also a deficiency in some of the salts, such as calcium, iron and iodine. It would be impossible to state the minimum cost of an adequate diet. It can be produced locally

by the people on their individual holdings and by fishing. The question of cost does not arise in a community like Tonga and the conception of a family budget is unknown. The daily food ration varies. Generally speaking, repletion is the standard at which the native aims. Scientific analysis of the nutritive value of the daily ration is not possible locally, but sufficient has been stated to enable the general position to be seen.

As regards diseases attributable to the local diet, medical opinion mentions, in particular, tuberculosis, cutaneous eye diseases, septic conditions, goitre and anæmia.

Practical measures adopted by the Medical Department to implement the diet are the supply of cod-liver oil to desirable cases and of dried milk to infants, when necessary.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

It will perhaps be convenient if reference is made to the particular diseases mentioned and other diseases commonly met with locally.

Malaria is unknown.

Plague.

There is no plague in Tonga.

Ankylostomiasis.

In 1924 and 1925, a campaign against this disease, which was found to be prevalent, was undertaken. The Board of the Rockefeller Foundation lent the services of an expert for preliminary survey and to inaugurate the campaign. The population responded to mass treatment with gratifying results. The late Chief Medical Officer, in his annual reports for the years 1933, 1934, and 1935, states that " hookworm infection is present, but does not present a serious problem ". The number of cases notified in the years referred to was 225, 111 and 99 respectively. *Oleum chonopodii* has been prescribed with satisfactory results.

Tuberculosis.

The number of reported cases during the five years ending December 1935 is as follows :

	1931	1932	1933	1934	1935
Number of cases . .	308	256	230	106	131

In respect of the 1934 figures, the late Chief Medical Officer states : " I do not think the disease is on the decrease, but that in the past many cases were notified on insufficient clinical grounds, their subsequent histories proving that they had not suffered from tuberculosis."

The disease is by far the commonest cause of death ; in the year 1935, out of 203 patients attended by the Medical Department and subsequently dying, 57 died from some form of tuberculosis.

Pneumonia.

The number of reported cases during the five years ending December 1935 is as follows :

	1931	1932	1933	1934	1935
Number of cases . .	97	87	10	41	25

The fatality rate is generally high.

Yaws.

The number of cases notified for the five years ending December 1935 has been as follows :

	1931	1932	1933	1934	1935
Number of cases . .	511	575	663	594	988

The people recognise that the disease can be arrested, if not cured, and they readily present themselves for treatment. Intramuscular injections of bismuth sodium tartarate have been used and the results found to be equally as good as those produced by novarsenobenzol which is also used. The advantage, in the case of the former treatment, lies in the ease of administration and the cost, a dose of N.A.B. averaging 1/- and that of B.S.T. one-sixth of a penny.

Leprosy.

Tonga is a participating administration in the Central Medical Hospital, Makogai, Fiji, and has guaranteed payment in respect of eight units irrespective of whether the number of its patients is below its guarantee. It is difficult to state how many cases actually exist in the group. When discovered, they are transferred by cutter to Makogai. The Tongan population in the hospital is generally about ten.

Typhoid Fever.

This is endemic. The number of reported cases during the five years ending December 1935 is as follows :

	1931	1932	1933	1934	1935
Number of cases . .	158	165	147	142	112

During these years, an average of approximately 2,400 prophylactic inoculations has been given.

Filariasis.

This disease is present throughout the Kingdom and is the cause of much suffering, being the cause of bouts of fever and elephantiasis. There is still no specific treatment. Mosquitoes are abundant throughout the group. The Tongan is careless about breeding-grounds and does not oil his water-tanks.

Dysentery.

The number of reported cases during the five years ending December 1935 is as follows :

	1931	1932	1933	1934	1935
Number of cases . .	24	12	59	56	46

Most of the cases are mild and are bacillary in nature.

Conjunctivitus and Trachoma.

These diseases are comparatively common. The number of reported cases during the five years ending December 1935 is as follows :

	1931	1932	1933	1934	1935
Conjunctivitus . . .	327	304	347	376	638
Trachoma	62	106	116	61	93

No other local diseases call for comment.

Mental Diseases.

The problem of the mentally deranged is not a pressing one locally. There are only a few cases which require to be confined. A separate building is provided in the prison compound. Mild cases are kept in their villages. The question of segregation in an agricultural settlement would not be justified or necessary in local circumstances, as the numbers of mentally deranged are, as stated, negligible.

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