

LEAGUE OF NATIONS

HEALTH ORGANISATION

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**Enquiry into the Quinine  
Requirements of Malarial Countries  
and the World Prevalence  
of Malaria.**

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Geneva, 1932.

Price : 3/- \$0.75

## LEAGUE OF NATIONS

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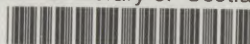
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Shows the important part played by housing in malarial infection, since houses afford the most favourable conditions of contact between the anopheles carrying the disease and the persons liable to be bitten.

The biology of mosquitoes and their habits in regard to malarial infection, the part played by shelters for animals and the protection of dwellings are also dealt with.

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Erratum au document Ch/Malaria/185:

p. 43, 8me ligne de la note, lire 1922 au lieu de 1932.

p. 50, en note au tableau de l'Importation d'écorce et de sulfate de quinine, colonne Sulfate et autres sels,

lire:	Kgs.	au lieu de	Kgs.
	77.556		7.755
	52.740		5.274
	68.133		6.813
	51.827		5.182
	74.201		7.420
	17.812		1.781
	16.578		1.657
	11.467		1.162
	46.389		4.638
	36.513		3.348

Erratum to Document Ch/Malaria/185.

p. 37, line 8 of foot-note, read 1922 instead of 1932.

p. 44, Foot-note, Table showing Imports of Bark and Sulphate of Quinine, column: Sulphate and other salts,

read:	Kgs.	instead of:	Kgs.
	77,556		7,755
	52,740		5,274
	68,133		6,813
	51,827		5,182
	74,201		7,420
	17,812		1,781
	16,578		1,657
	11,467		1,162
	46,389		4,638
	36,513		3,348



## PREFACE.

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The present report is the outcome of a long series of enquiries initiated in 1924 in consequence of a recommendation of the Health Committee relative to the summoning of an International Quinine Conference.

The material which it contains has been carefully studied by a Reporting Committee consisting of Professor B. NOCHT, Professor G. PITTALUGA and Dr. A. T. STANTON, and also by the Alkaloids Sub-Committee of the Malaria Commission. The Health Committee took note of the report at its session in October 1932 and adopted the following resolution :

“ The Health Committee :

“ Expresses its thanks to sanitary administrations and to the experts who were good enough to reply to its request for information on the prevalence of malaria and the amount of quinine necessary for their countries ;

“ Is of opinion that these data may be used to advantage as a basis for a future conference on quinine ;

“ Expresses the hope that such a conference should take place as soon as possible, and

“ Invites its Bureau to consider the date on which that conference can be convened, its agenda and the countries and institutions which should be invited, and to present a report to the Council on the subject.”

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## INTRODUCTION.

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By circular letter, dated January 14th, 1931, the Health Organisation called the attention of the health departments of malarial countries to the expediency of holding a quinine conference, and asked those of them that might be in favour of such a conference to supply it, by way of preliminary information, with certain particulars relating to the following points :

1. Prevalence of malaria (if possible, statistics for the last four or five years).
2. Number of malaria cases treated annually (in dispensaries, in hospitals, through quinine-distributors, etc.).
3. Amount of quinine or secondary alkaloids of cinchona :
  - (a) Imported into the country ;
  - (b) Imported directly by the State ;
  - (c) Bought in the market and distributed free of charge (figures for the last ten years).
4. Annual amount of quinine or secondary alkaloids :
  - (a) Distributed gratuitously ;
  - (b) Sold by the State at reduced prices.
5. Amount of quinine required annually by the Government to meet the needs of the country.
6. Legislation concerning quinine.

Replies have so far been received from 111 health departments.<sup>1</sup> Eighteen of these<sup>2</sup> state that there is no malaria in their territories, or that the disease does not constitute a problem. The data supplied by the other 93, while not always strictly comparable, form a unique collection of material.

Some of these data may be regarded as accurate—those, for example, which concern the number of malaria cases treated and the quantities of quinine imported by Governments, distributed free of charge, or sold at reduced prices—but the accuracy of others is highly problematical. For instance, even in countries where malaria is a notifiable disease, the number of cases is probably much greater than the figures supplied.

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<sup>1</sup> See Annex.

<sup>2</sup> Bermuda, Curaçao, Cyrenaica, Falkland Islands, Fiji, Gibraltar, Gilbert and Ellice Islands, Malta, Montserrat, New Zealand (with Cook Islands and Western Samoa), Poland, St. Helena, St. Pierre and Miquelon, Seychelles, Switzerland, Tonga, Tripoli, Uruguay.

The figure for imports seems to be accurately known in the case of quinine imported by Governments themselves ; but the amount of quinine imported commercially is much less certain, because some of it may be re-exported, and some of the goods declared as quinine are not quinine. In these cases, the figure for imports is exaggerated.

We have endeavoured to group on uniform lines the data received in reply to our questionnaire, and to supplement them by information taken from official reports or medical literature, stating the method we have adopted for estimating the prevalence of the disease and the requirements of quinine, and we have collected in a synoptic table those figures which best answer the requirements of our investigation.

As the data received cover several years, we have calculated the averages for each series, stating whether the trend is upwards or downwards, and giving figures for the last year to show how far they depart from the average. The enquiry continued from January 14th, 1931, to October 12th, 1932, and the five- or ten-year periods considered do not always, therefore, cover the same years. For some countries, the last year is 1929, while, for others, it is 1930 or even 1931. These points are not mentioned in our table, which is intended merely to give a synthetic view of the development of the number of malaria cases treated and the consumption of quinine, and to illustrate the efforts made by malarial countries ; they will be found in the text of the report.

#### PREVALENCE OF MALARIA.

Very few countries replied to our first question regarding the prevalence of the disease. A few health departments stated the number of malaria cases in their territories ; but this figure is only known where malaria is a notifiable disease and, even then, the figures given are undoubtedly always below the real figures. Some countries have given us the number of deaths from malaria, and we have attempted to deduce the number of cases on the basis of the case-fatality rate. Others have informed us of the results of enquiries into splenic and parasitic indices ; and similar data have also been taken from medical literature. Needless to say, the information regarding endemic indices is always confined to certain communities in the malarial zones, which vary widely in number and size.

In brief, since the data regarding the prevalence of malaria in different countries are scarcely comparable, and are generally established on inadequate bases, we have preferred not to include them in our synoptic table.

#### NUMBER OF MALARIA CASES TREATED ANNUALLY.

Most countries have supplied us with these figures, which seem to be much more accurate than those just mentioned.

The number of cases treated during the last year covered by our enquiry was 17,750,760. Of the 65 countries which have given us separate figures for the last year and the previous years, 37 show an increase and 28 a decrease in the number of cases treated. The total number of cases treated in all these countries during the last year was 17,307,724—an increase of 1,289,335 over the average for the previous years (16,018,389).

This is particularly interesting, because, at the beginning of our enquiry, very few countries, as far as we are aware, had shown such an increase in recent years. This, however, does not necessarily mean that malaria is spreading; the increase in the number of cases treated is mainly due to the development of the health service in general and of the network of anti-malaria organisations in particular.

The proportion of malaria cases treated to the population and to the total number of cases of other diseases treated affords a valuable index of the prevalence of malaria in countries with a highly developed medical service.

It is a striking fact that, in certain tropical countries such as Indo-China, Ceylon, the Straits Settlements, the Federated Malay States, etc., malaria alone accounts for from 10 to 56.9 per cent of the total number of cases of infectious diseases treated in hospitals or dispensaries.

In countries where the prevalence of malaria is known, the number of cases treated reflects the extent, and even the intensity, of the anti-malaria work, provided the quantity of quinine used is taken into account. In India, for instance, out of 100 million malaria cases—a moderate estimate—only from 8 to 10 millions are treated, and the quantity of quinine distributed does not exceed 2 grammes per annum per case treated. This demonstrates that the campaign against malaria must be developed if the millions of cases that still escape all treatment are to be reached, and that the treatment itself must be intensified. We have given the example of India because it is the largest of the malarial countries that have given us fairly full particulars; but there are many other countries where the conditions of treatment are similar.

TOTAL AMOUNT OF QUININE OR SECONDARY ALKALOIDS IMPORTED, AND AMOUNT  
DISTRIBUTED ANNUALLY BY HEALTH DEPARTMENTS, EITHER FREE OF CHARGE  
OR AT REDUCED PRICES.

In our questionnaire, quinine imported directly by the State and quinine bought in the market for free distribution were treated separately. Most of the malarial countries import their quinine; those that buy it locally are exceptional. Apart from India, which is a producing country, only Colombia, the Malay States (Federated and Unfederated), Mauritius, Mexico and Transjordan buy the quinine they require partly or wholly on the local market. Apparently, this source of supply is only resorted to when the need is urgent.

There is no doubt that the Governments of most of the malarial countries are paying attention to the importation of quinine, and it will be observed that, in the past



year, imports exceeded the average for previous years in 29 countries and fell below it in 11. In several countries, it was only during the last year that the Government began to import quinine direct. The total amount imported direct by Governments during that year exceeds the average for previous years (generally the average for ten years) by 10,405.585 kilogrammes.<sup>1</sup>

In the United States of America, the Government does not import quinine direct; elsewhere, it only buys and distributes quinine when there is a particularly serious epidemic. This system leaves retailers the widest latitude in fixing the price of quinine, which reaches very high figures. In the United States, the consumer has to pay from 2 dollars to 2.56 dollars per ounce (28 grammes); that is to say, from 70 dollars to 88 dollars per kilogramme.]

Governments have various means of regulating the price of quinine. Some Governments which do not themselves import the quinine they require for the anti-malaria campaign have exempted it from all import duties; others fix maximum prices for sale to the public by chemists.

The methods that have given the best results seem to be *direct import by the Government with a State monopoly*—quinine being exclusively distributed free of charge or sold at a controlled price—and *direct import by the Government* of quinine for distribution free of charge or at reduced prices for the anti-malaria campaign *without any prohibition or restriction of import by private persons*. In this latter case, chemists fix their own prices for quinine in non-malarial areas, but, in malarial areas, they are obliged either to sell "Government quinine" or to sell commercial quinine at a reasonable price.

In some countries, the Government itself distributes quinine free of charge; in others, it sells it at reduced prices to a number of communities, municipalities, local authorities and industrial or agricultural companies, with instructions to distribute it free of charge.

The figures for the free distribution or sale at reduced prices of quinine by the Government are also extremely accurate, which gives great force to our observation that the amount of quinine distributed by the Government, either free of charge or at reduced prices, in the last year exceeds the average for the previous years by 9,475.130 kilogrammes.<sup>2</sup> This increase shows that the treatment of malaria is developing, and that the Governments of malarial countries are giving it due prominence in their anti-malarial programme by increasing the funds allotted for the purchase of quinine. The perusal of our report confirms the fact, already demonstrated

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<sup>1</sup> This refers only to those countries that have given us figures for their imports for each year separately. For all the countries under consideration, the table shows that, during the last year considered, 156,280.885 kilogrammes of quinine were imported direct by the Governments.

<sup>2</sup> Here, again, we have considered only those countries that have given us the figure for their imports for each year separately. According to the totals shown in the synoptic table, the excess would appear to be 19,894.628 kilogrammes.

on a large scale in Italy, that, in a malarial country, an increase in the quantity of quinine used produces a decrease in the malaria death rate.

Notwithstanding the general upward tendency of the quantity of quinine used in the anti-malaria campaign, the figures in our report show that *the world consumption of quinine is still far below the minimum necessary* for the treatment of all malaria cases, and often even for the treatment of those cases shown in the statistics as treated. Except in Greece, Italy, Spain and Turkey, the quantity of quinine used per case treated does not generally exceed 7 grammes, and is sometimes as small as 0.4 gramme per annum. If it is remembered that, in most tropical countries, the cases treated are only a very small proportion of the total cases existing, and that a large proportion of the quinine is used prophylactically by Europeans at the rate of 0.30 grammes a day (109.5 grammes per person per annum),<sup>1</sup> it is plain that there is an under-consumption of quinine in the anti-malaria campaign.

AMOUNT OF QUININE REQUIRED ANNUALLY BY THE GOVERNMENTS  
TO MEET THE NEEDS OF THEIR COUNTRIES.

The health departments did not all reply to this question, and the replies received show that, in many cases, the figures asked for were not available. Some of them stated the average consumption during the last few years, without considering the fact that it was much below the needs of the country ; others merely rounded off the consumption figure for the last year, and others again stated the quantity of quinine that would be adequate to treat all the cases, or all those that can at present be dealt with.

In view of the inadequacy of these data, we have made fresh estimates on the basis of a standard dose of 20 grammes of quinine per case per annum. We have multiplied this quantity by the number of cases, where that figure had been given us by the department itself or was known to us from the estimates of a malariologist belonging to the country (*e.g.*, United States of America, Spain). Where we had no figures at all for the number of cases, we have multiplied the standard dose of 20 grammes by the average number of cases treated during the last few years, or by the number of cases treated in the last year where malaria was steadily increasing (Iraq, Japan). Sometimes, when the number of cases treated was also not known, or did not seem to correspond to the endemic indices, we have estimated the prevalence of malaria on the basis of the latter : mortality and morbidity (British Guiana), 'splenic and parasitic indices (Nigeria). Lastly, considering that figures for the requirements of quinine were essential to our enquiry, even if it were not possible to estimate the number of malaria cases by one of the above-mentioned methods, we have taken

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<sup>1</sup> In the Argentine, for instance, the amount of quinine used prophylactically is nearly half the amount used therapeutically.



as the amount required, in certain cases, the quantity of quinine imported by the Government or distributed free of charge during the last few years or the last year (Bolivia, British Somaliland).

The result is that, according to the statements received from health departments, the annual amount of quinine required is 1,172,184 kg. 869 grm., whereas, according to our estimate, it would be 1,387,411 kg. 670 grm. In computing this latter figure, we have kept the Governments' own estimates when, as in the case of Algeria, they were higher than ours. It should be added that this estimate does not include figures for Australia, China, the Netherlands or any malarial countries not shown in our table.

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## EXPLANATORY NOTE.

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The figures given without reference to any source have been supplied by the health departments concerned in reply to our questionnaire.

All figures from sources other than replies to our questionnaire, whether supplied by the health departments or not, are given in footnotes.

**Quinine** means, unless otherwise stated, any salt of quinine, as the replies do not generally specify which.

**Amount required** means the amount of quinine estimated necessary to cover the needs of the population during one year. When the calculation has been made by the Section, this amount is equal to 20 grammes of quinine multiplied by the number of cases treated or sufferers from malaria.

The sign **+**, as applied to quinine, means that quinine is imported, distributed gratuitously, sold at reduced prices, etc., but that we have no figures.

The abbreviation (S.) means " Note by the Secretariat ".

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### FRENCH EQUATORIAL AFRICA.

POPULATION .. .. .	1929	3,130,000
CASES OF MALARIA .. .. .		—
CASES TREATED (in hospital) .. .. .	Average	
	1927-30	1,051
	1930	910
QUININE :		
Imported by the State (progressive increase, from 34 to 795 kg.)	Average	
	1924-30	212 kg.
	1930	795 kg.
Distributed gratuitously (marked progressive increase) .. .. .	Average	
	1924-30	52 kg. 400 gr. <sup>1</sup>
	1930	198 kg.
Amount required .. .. .		350 kg. <sup>2</sup>

<sup>1</sup> According to the Inspector General of the Health Service of the Colonies, almost all the imported quinine must be considered as distributed gratuitously. The distribution takes place either in the hospitals or in the dispensaries.

<sup>2</sup> This quantity would be sufficient for about 17,500 cases of malaria—that is to say, only 0.5 per cent of the population. In French West Africa, the population of which is about four times as large, twenty times as many cases are treated. (S.)

### FRENCH WEST AFRICA.

POPULATION .. .. .	1929	14,267,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (known cases) ..	Average	
	1926-30	19,228
	1930	27,174
QUININE :		
Imported by the State ..	Average	
	1921-30	1,089 kg. 700 gr.
	1930	1,665 kg.
Imported by private persons	Average	
	1921-30	1,266 kg. 300 gr.
	1930	1,911 kg.

Distributed gratuitously (considerable increase)	progressive .. .. .	Average 1921-30 1929 (maximum) 1930	805 kg. 400 gr. 1,306 kg. 1,164 kg.
Sold at reduced prices	..	Average 1921-30 1930	3 kg. 301 gr. 24 kg. 236 gr.
Amount required	.. .. .		3,000 kg. <sup>2</sup>

<sup>1</sup> It is impossible to establish the proportion between the number of cases known and the total number of cases. Deaths from malaria are so few (104 in 1930, 85 in 1929) that they can hardly be taken into account.

<sup>2</sup> This quantity would be sufficient for 150,000 cases of malaria or about 1 per cent of the population. (S.)

### ALGERIA.

POPULATION	.. .. .	1929 <sup>1</sup>	6,500,000
CASES OF MALARIA	.. .. .		1,000,000 <sup>2</sup>
CASES TREATED	.. .. .		—
QUININE :			
Imported into the State <sup>4</sup>	.. .. .	1930	2,700 kg. <sup>3</sup>
Distributed gratuitously <sup>4</sup>	.. .. .	1930	1,599 kg. <sup>5</sup>
Amount required	.. .. .		25,000 kg. <sup>6</sup>

LEGISLATION : Since 1910, regulations have been issued instituting a kind of sales monopoly for quinine : the price of sugared pills is regulated : the quinine intended for free distribution is purchased direct by the Government.

<sup>1</sup> According to the 1931 census, the population was 6,469,898, distributed as follows :

#### Northern Algeria :

##### Europeans :

Urban population	.. .. .	641,291
Rural population	.. .. .	234,345
		<hr/> 875,636

##### Natives :

Urban population	.. .. .	606,440
Rural population	.. .. .	4,419,943
		<hr/> 5,026,383
		<hr/> 5,902,019

#### Southern Territory :

Europeans	.. .. .	5,948
Natives (principally nomad shepherds immune from malaria and sedentary inhabitants of the oases who are highly subject to it) .. .. .		561,931
		<hr/> 567,879
		<hr/> 6,469,898



<sup>2</sup> These figures are difficult to establish definitely, but a study of 201 malarial districts in each of which at least 100 persons were examined gives an average spleen index of 37 per cent and a plasmodium index of 17 per cent. In the case of adult natives, the latter is about 10 per cent.

The proportion of cases of malaria may be estimated at an average of 20 per cent (883,988) among the native rural population and 10 per cent (23,434) among the European rural population.

<sup>3</sup> In addition, 100 kg. of bark, as to the use of which no information is available.

<sup>4</sup> According to a communication of September 16th, 1932, from the General Inspectorate of Hygiene and Public Health, the average annual quantity of quinine imported into Algeria from January 1st, 1928, to June 30th, 1932, was 2,281 kg. 611 gr., plus 187,417 ampoules of 0.25 to 1.0 gr. (1,231 kg. 611 gr. imported by the general stores of the Algerian Public Relief Department and 1 kg. 50 gr. by private chemists).

For the same period, the average quantity of quinine distributed free or at reduced prices was 583 kg. 800 gr. plus 10,177 ampoules. (These figures are not included in the synoptic table.)

<sup>5</sup> Including 664 kg. for the military authorities.

<sup>6</sup> According to Dr. SERGENT, the amount is calculated at the rate of 25 grm. per treatment.

### ANTIGUA (British West Indies).

POPULATION .. .. .	1929	30,000	
CASES OF MALARIA .. .. .		1	
CASES TREATED (in hospital) ..	Average		
	1926-30	721	
	1930	302	
QUININE :			
Imported by the State.. ..	Average		
	1926-30	10 kg. 886 gr.	
Distributed gratuitously ..	Average		
	1928-30	35,000 tablets of quinine sulphate. <sup>2</sup>	
Amount required .. .. .		2 kg. 226 gr. and approximately 30,000 tablets of quinine sulphate. <sup>3</sup>	

<sup>1</sup> Malaria is especially prevalent in rainy years. Case mortality rate of patients treated in hospital : 3.99 per cent.

<sup>2</sup> The sulphate content is not known. If each tablet contained 5 grains, the amount of sulphate would be 11 kg. 340 gr.

<sup>3</sup> If each tablet contained 5 grains of quinine sulphate, the amount of sulphate would be 9 kg. 720 gr. and the total amount required would be 11 kg. 946 gr. (S.)

# ARGENTINE.

POPULATION .. .. .	1929	11,193,000 <sup>1</sup>
CASES OF MALARIA .. .. .		— <sup>2</sup>
CASES TREATED (progressive decrease) ..	Average	
	1925-29	143,553
	1925	167,439
	1929	113,136 <sup>3</sup>
QUININE :		
Imported by the State .. .. .	1929	3,518 kg. <sup>4</sup>
Distributed gratuitously (in the malaria zones) .. .. .	1929	1,515 kg. 685 gr.
Amount required (treatment and prophylaxis) <sup>5</sup> .. .. .		5,000 kg.
LEGISLATION : Law No. 5,195 and Decree relating thereto. No Customs duties on quinine intended for the anti-malaria campaign.		

<sup>1</sup> The malarial provinces are Jujui, Salta, Tucuman, Catamarca, a part of the Rioja and Santiago del Estero. The area of the territory in which malaria is endemic is 200,000 square kilometres and in epidemic periods reaches 300,000 square kilometres, or one-eighth of the total area ; these districts have a population of about 1,000,000.

<sup>2</sup> During epidemic outbreaks up to 40 per cent of the population of the malarial zones. According to the *Reports of the Malaria Congress at Rome*, 1925, page 325, the number of malaria cases amounts to 250,000. There are 350 deaths or more from malaria per year. According to F. L. HOFFMAN, " Malaria Problems, 1928 ", during the period 1912 to 1915 the morbidity rate in the malarial provinces was 186.7 per 1,000 (521,361 cases out of a population of 2,792,000).

<sup>3</sup> There were 134,749 cases in 1930 according to the *Boletin de la Oficina Sanitaria Panamericana*, January 1932. Malaria is compulsorily notifiable. According to BARBIERI, head of the Malaria Section of the National Health Department (*VIa Reunión de la Sociedad Argentina de Patología Regional del Norte*—Buenos Aires, 1931), epidemics of malaria would appear to recur in cycles of 11-12 years, or less if account is taken of the atypic epidemics : 1879-1889-1901, 1902-1913, 1914-1919-1924-1930.

<sup>4</sup> Including 18 kg. of cinchonin and 3,000 kg. of tablets of quinine hydrochloride.

<sup>5</sup> According to the same *Boletin*, the State in 1928 distributed 880 kg. 977 gr. of quinine for treatment and 410 kg. 448 gr. for prophylaxis. Consequently, the treatment amounted to 6.7 grm. per person. (S.)

## AUSTRALIA.

POPULATION .. .. .	1929	6,414,000
CASES NOTIFIED <sup>1</sup> .. .. .	Average 1924-31	23
QUININE :		
Imported into the country .. ..		3,135 kg. 651 gr. <sup>2</sup>
Distributed gratuitously .. ..		0

<sup>1</sup> It is certain that many cases are not reported.

Deaths, yearly average 1921-30 (according to the official report) : 25.8 (a rate slightly over 4 per million).

In Australia, malaria is confined to a small area in North-West Australia and to two areas in North Queensland ; in these localities, with the exception of Cairns, the disease is almost solely confined to people living and working under very primitive conditions.

In the northern territories, malaria is found along the banks of the rivers running into the Timor Sea and into the Gulf of Carpentaria. If the country were more densely populated, malaria would probably be much more widespread.

In New Guinea, the coloured population does not use quinine for treatment ; Europeans, however, use large quantities both for treatment and prophylaxis.

<sup>2</sup> Quinine imported into Australia (Customs data) : 3,135 kg. 651 grm. during the year from July 1930 to June 1931.

## BAHAMAS.

POPULATION .. .. .	1929	61,000
CASES TREATED (in hospitals, dispensaries, etc.)	Average 1921-30	7 <sup>1</sup>
QUININE :		
Imported by the State .. .. .		0
Imported by private persons .. ..		1 kg. 417 gr.
Distributed gratuitously .. .. .		0
Sold at reduced prices .. .. .		0
Amount required .. .. .		1 kg. 417 gr.

<sup>1</sup> In 1920, 21 cases ; in 1922, 35 cases ; in 1924, 11 cases ; in 1921, 1923 and 1926 : 0 case.

## BARBADOS.

POPULATION .. .. .	1929	170,000
CASES OF MALARIA .. .. .	Since 1930	No cases.

Barbados was always considered immune from malaria until a severe outbreak occurred in 1927. Labourers returning annually from Cuba carried the hæmatozoa (crescentic bodies) and became the focus of infection.

Cases reported :

1927 (from November 17th to December 31st) .. ..	1,164
1928.. .. .	2,951
1929.. .. .	500

During the two years that the epidemic lasted, the following amounts of quinine were distributed free of charge by the Government for prophylactic and therapeutic purposes :

Quinine bihydrochloride .. .. .	130 kg. 200 gr.
Quinine sulphate .. .. .	11 kg. 800 gr.
Quinine bihydrochloride tablets.. .. .	66 kg. 900 gr.
Ampoules, 0.6 grm. .. .. .	1 kg. 660 gr.
Ampoules, 0.3 grm. .. .. .	831 gr.
Plasmoquine compound tablets :	
Quinine sulphate .. .. .	361 gr.
Plasmoquine .. .. .	29 gr.

In addition, a small amount of quinine was sold by chemists and about 3,000 tablets were issued for cases of relapse in 1931.. .. .

972 gr.

212 kg. 753 gr.

The Government has in stock at present :

Quinine bihydrochloride .. .. .	72 kg.
70,000 tablets of quinine bihydrochloride .. .. .	22 kg. 700 gr.
50,000 tablets of quinine bisulphate.. .. .	16 kg. 300 gr.
7,000 ampoules containing 0.6 grm. of quinine .. ..	4 kg. 200 gr.
2,700 ampoules containing 0.3 grm. of quinine .. ..	810 gr.

together with 2,115 tablets of plasmoquine—i.e., 264 grm. of quinine sulphate and 21 grm. of plasmoquine.

As stated above, there is now no active malaria, but there are a few cases of relapse and about 200 individuals on an average who come to Barbados from other places in order to regain their health after attacks of chronic malaria, so that it is still necessary to distribute small quantities of quinine free of charge.

## BECHUANALAND.

POPULATION .. .. .	1929	160,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED (in Government hospitals and dispensaries) ..	Average 1926-30	2,561 <sup>2</sup>
	1930	1,433



QUININE :

Imported by the State .. ..	Average	
	1926-30	11 kg. 80 gr.
	1926	4 kg. 530 gr.
	1930	24 kg. 950 gr.
Distributed gratuitously (pro-		3 kg. 600 gr. (approx.)
gressive increase) <sup>3</sup> .. ..	1926	18 kg. 144 gr.
	1930	
Sold at reduced prices (progres-		907 gr.
sive increase) <sup>3</sup> .. ..	1926	2 kg. 268 gr.
	1930	
Amount required (very variable)		24 kg. 950 gr. <sup>4</sup>

<sup>1</sup> No systematic survey has yet been made ; the only figures available are those in respect of patients actually seeking treatment at the Government dispensaries. These figures do not give a correct idea of the general incidence, as many of the sick do not take the trouble to seek medical aid.

<sup>2</sup> This average includes the epidemic years of 1927 and 1928, in which the number of malaria cases treated was 5,008 and 4,536 respectively.

<sup>3</sup> During the first two years of the quinquennial period under review, very little free distribution was made. After the epidemics in 1927 and 1928, a considerable amount was distributed free ; this has given the native population confidence in the drug as a prophylactic as well as a curative measure, and increasingly large numbers ask for supplies for their families who are too far away to present themselves personally. As far as possible, a small charge is made merely to cover the cost price, but this charge is very frequently not enforced when the party alleges poverty.

Free distribution of quinine is made to all officials and employees of the Administration and their families, while in highly malarious stations the taking of prophylactic quinine is insisted upon for all Government employees. These measures have given very satisfactory results.

<sup>4</sup> The amount of quinine required annually varies according to whether there is an epidemic or not ; this in turn depends on the rainfall. Further, as the natives show increasing confidence in European doctors, the amount of quinine used will increase. At present, the estimated annual amount required is 24 kg. 950 gr.

According to the number of cases treated (average) and at the rate of 20 grm. for each case, the amount required would be 51 kg. 220 gr. (S.)

**BOLIVIA.**

POPULATION .. .. .	1929	3,000,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED .. .. .		—

QUININE :

Imported by the State.. ..	Average	
	1927-31	2,053 kg. 800 grm.
	1930 (maximum)	5,496 kg.
	1931 (minimum)	938 kg.



Distributed gratuitously <sup>2</sup> ..	Average	
	1927-31	2,053 kg. 800 gr.
Amount required .. .. .		— <sup>3</sup>

LEGISLATION : Law of January 13th, 1927, abolishing the Customs duties on imports of quinine sulphate and quinine hydrochloride.

<sup>1</sup> Malaria is endemic in Bolivia ; in some districts 100 per cent of the population is affected ; two-thirds of the entire population suffer from malaria (Dr. BILBAO, Minutes of the meeting of the Malaria Commission, May 1931).

<sup>2</sup> All the quinine purchased by the State.

<sup>3</sup> In the absence of other information, the amount required might be regarded as the average of the years 1927-1931, namely 2,053 kg. 800 gr. (S.)

### BRITISH NORTH BORNEO.

POPULATION .. .. .	1929	294,000
CASES TREATED (only in Government hospitals and hospitals maintained by estates and commercial companies) .. .. .	Average 1926-30	6,431
In hospitals and dispensaries .. .. .	1930	8,625 <sup>1</sup>
QUININE :		
Imported by the State .. .. .	Average 1921-30	52 kg.
Imported by private persons (estates and commercial companies) .. .. .	1921-30	124 kg. 250 gr.
Distributed gratuitously .. .. .		176 kg. 250 gr. <sup>2</sup>
Amount required .. .. .		196 kg. 800 gr.

<sup>1</sup> These 8,625 cases include 4,416 out-patients and 4,209 in-patients ; of the latter, 638 were in Government hospitals and 3,571 in hospitals maintained by estates and commercial companies.

In 1930, the admissions for malaria into Government hospitals represented 18.8 per cent of total admissions. In the estate and commercial companies' hospitals, the rate of malaria admissions was 33 per cent approximately.

<sup>2</sup> Nearly the total amount imported—i.e., about 176 kg. 250 gr., of which 147 kg. was sulphate.

### BULGARIA.<sup>1</sup>

POPULATION .. .. .	1929	5,825,000
CASES OF MALARIA .. .. .		300,000 to 400,000 <sup>2</sup>
CASES TREATED .. .. .		—

QUININE :

Imported by the State .. .. .	Average 1923-30	3,750 kg.
Imported by private persons .. .. .	Average 1923-30	875 kg.
Distributed gratuitously .. .. .	Average 1923-30 1931	875 kg. 1,000 kg.
Sold at fixed prices (Government quinine)		2,875 kg.
Amount required .. .. .		6,000 to 7,000 kg. <sup>3</sup>

LEGISLATION : Quinine is a Government monopoly ; import is only free in the case of quinine bromide.

<sup>1</sup> The following information refers to malaria inspection centres, of which there were fourteen in March 1930. In the other districts, malaria, although it exists, is not endemic ; the population of the malaria districts was 823,292 in 1930.

<sup>2</sup> Malaria is not compulsorily notifiable.

*Deaths* : 84 in 1930, 331 in 1922 (entire country).

*Spleen index* (children of 7 to 14 years) : 25.9 per cent (decreasing).

*Parasite index* : 8.4 per cent in 1930 in the inspection centres of the malaria districts.

*Ratio between tertian and tropical forms* : 3 : 1.

*Blood tests* : 71,113 positive out of 271,612 in 1930.

<sup>3</sup> At the rate of 20 grm. per patient, 7,000 kg. would be required for 350,000 cases. (S.) Dr. MARKOFF, Inspector General of Malaria, states that the average consumption of quinine per patient *per year* is 10 to 15 grm. and that the total amount used—i.e., 4,625 kg. has always been insufficient.

CAMEROON (French Mandate).

POPULATION .. .. .	1929	1,930,000
CASES OF MALARIA .. .. .		—
CASES TREATED (at the Duala Hospital and in dispensaries) .. .. .	Average 1927-30 1930	10,777 9,898

QUININE :

Imported by the State .. .. .	About 240 kg. per year.
Distributed gratuitously .. .. .	„ 240 kg. per year.
Amount required .. .. .	— 1

<sup>1</sup> At the rate of 20 grm. for each case treated, 215 kg. 540 grm. would be required. (S.)

# CEYLON.

POPULATION .. .. .	1929	5,479,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED :		
In hospitals .. .. .	Average 1921-30	34,666
In dispensaries .. .. .	Average 1921-30	1,364,175
		<hr/>
		1,398,841
	1930	1,759,111
QUININE :		
Imported by the State .. .. .	Average 1921-30	6,120 kg.
	1930	9,690 kg. 710 gr.
Imported by private persons .. .. .	Average 1928-30	1,325 kg.
Distributed gratuitously by the State ..	Average 1921-30	6,198 kg.
		(of which about 10 per cent given at cost price to the estates for their hospitals and dis- pensaries).
Sold at reduced prices .. .. .	1930	7,424 kg. 524 gr.
Amount required .. .. .		11,340 kg. <sup>2</sup>
Cinchona cultivation .. .. .		<sup>3</sup>

LEGISLATION : Quinine and its salts are exempt from Customs duty.

## <sup>1</sup> Deaths from malaria :

1928.. .. .	2,239
1929.. .. .	2,326
1930.. .. .	2,387
Average for the past ten years.. .. .	1,796

*Malaria mortality rate* : 32.6 per 100,000. (This rate is approximate, having been calculated on the basis of the 1929 population.) It might be useful to note that, in Ceylon, there is one Government hospital bed for every 500 inhabitants. (S.)

<sup>2</sup> At the rate of 20 grm. per head, this quantity would be sufficient for 567,000 malaria patients or about 10 per cent of the population. (S.)

<sup>3</sup> Experiments in cinchona growing carried out with seeds of *Cinchona ledgeriana* and *Cinchona robusta* obtained from Java and India have not so far given satisfactory results. Although, in the year 1884, 4,530,000 kg. of *Cinchona succirubra* bark was exported from Ceylon, there is now no export trade and only twenty acres are still under cultivation.

## CHINA.

POPULATION (estimated by Chinese Customs, December 1928) .. .. .	458,700,000
CASES OF MALARIA .. .. .	1
QUININE imported in 1930 .. .. .	8,508 kg. 234 gr. <sup>2</sup>

<sup>1</sup> Malaria is endemic and, at times, epidemic in thirteen provinces (Anhwei, Chekiang, Fukien, Honan (southern part), Hunan, Hupeh, Kiangsi, Kiangsu, Kwangsi, Kwangtung, Kweichow, Szechuan and Yunnan) lying south of a line running from the coast roughly along 35° N. lat. to 110° E. long., then along 32.5° N. lat. to 110° E. long.

This zone comprises an area of about 1,153,405 square miles or roughly a quarter of the area of the Republic of China (including Mongolia, Thibet and Chinese Turkestan) or about three-fourths of the area of China proper, excluding Manchuria.

The population of the area in question computed according to the Maritime Customs estimate of 1928, and excluding the population of seaports where the Customs houses are situated, is about 348 millions or three-fourths of the population of China proper, not including Manchuria.

The districts of highest malaria incidence are situated in the basins of the Yangtze-Kiang, the West River and the upper reaches of the Red River.

<sup>2</sup> This figure is probably lower than actual imports. It has been calculated from the Shanghai Customs reports for ten months and from the reports of the Tsientsin and Swatow offices, which only give information covering two months. No data are available from the other Customs offices.

## CYPRUS.

POPULATION .. .. .	1929	349,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in hospitals, dispensaries, etc.)	Average 1926-30 1930	8,624 10,080
QUININE :		
Imported by the State .. .. .	Average 1921-30 1930	280 kg. 527 gr. <sup>2</sup> 460 kg. 284 gr.
Imported by private persons .. .. .	Average 1926-30	299 kg. 765 gr. <sup>3</sup>
Distributed gratuitously .. .. .	Average 1926-30 1930	280 kg. 527 gr. 460 kg. 284 gr.



Sold at reduced prices .. .. .	
Amount required .. .. .	580 kg. 291 gr. <sup>4</sup>

<sup>1</sup> Malaria is very prevalent in rainy years.

<sup>2</sup> Including : Hydrochloride .. .. .	12 kg. 797 gr.
Sulphate .. .. .	266 kg. 398 gr.
Tannate .. .. .	1 kg. 950 gr.

<sup>3</sup> Including : Hydrochloride .. .. .	215 kg. 167 gr.	} 1926-30.
Sulphate .. .. .	1,074 kg. 028 gr.	
Bi-hydrochloride .. .. .	70 kg. 525 gr.	
Bisulphate .. .. .	139 kg. 100 gr.	

<sup>4</sup> This figure represents the average quantity imported annually by the Government and private persons.

## COLOMBIA.

POPULATION .. .. .	1929	8,000,000
CASES OF MALARIA .. .. .		1
CASES TREATED .. .. .		—

### QUININE :

Imported into the country .. ..	Average 1924-26-27-28	69,937 kg.
Purchased by the State (apparently on the spot) .. .. .	1931	118 kg. 330 gr. <sup>2</sup>
Distributed gratuitously .. ..	1931	118 kg. 330 gr. <sup>2</sup>
Amount required .. .. .		70,000 kg. <sup>3</sup>

<sup>1</sup> *Malaria mortality* : The official reply states that there were 3,024 deaths in 1928—i.e., a rate of 37.8 per 100,000 inhabitants and 2,683 deaths in 1929 (33.5 per 100,000 inhabitants).

The fact that 45 deaths from malaria were reported in the Chocó in 1928 and 32 in 1929 shows that the returns are very approximate, at any rate in this district. In the Chocó, according to PAMPANA, the *spleen index* is 85 per cent and the *spleen rate* (total population) 66.4 per cent. (S.)

In 1928, an entomologist sent by the Rockefeller Foundation investigated several departments, together with Dr. Moreno PEREZ, and studied anophelism and the infection index in sixty-five different localities (*Boletín de la Oficina Sanitaria Panamericana*, April 1932).

The spleen indices reported are as follows : Buenaventura 20 per cent, Córdoba 49 per cent, Candelaria 32 per cent.

In the mountain districts, malaria is rare or non-existent.

<sup>2</sup> This figure has been obtained by calculating the tablets, the content of which is not stated, at the rate of 0.30 grm. and the ampoules at the rate of 0.50 grm. (S.)

These figures only relate to the quinine purchased and distributed free of charge by the State during serious epidemics. The Director of the Public Health Department cannot supply information regarding the quantities purchased and distributed by the *départements* and *communes*.

<sup>3</sup> At the rate of 20 grm. per patient, this quantity would be sufficient to treat 3,500,000 malaria patients. (S.)



# BELGIAN CONGO.

POPULATION .. .. .	1929	10,000,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED (including cases of blackwater fever) .. .. .	Average 1925-29	9,034 <sup>2</sup>
	Europeans :	1,433 <sup>3</sup>
	Natives :	7,601
	1929	9,470
QUININE :		
Imported by the State .. .. .	1930	2,500 kg. <sup>4</sup>
Imported by private persons .. .. .	1930	2,500 kg.
Distributed gratuitously (by the State or by firms) .. .. .	1930	About : 3,750 kg.
Amount required .. .. .		For Europeans : 2,500 kg. <sup>5</sup>
		For natives : 100,000 kg.

LEGISLATION : Since October 1st, 1930, the importation of all medicaments, including quinine, has been subject to a Government permit.

<sup>1</sup> Malaria is very prevalent in the Belgian Congo. The figures given are furnished exclusively by the Official Medical Service, which cannot reach the entire population. Among Europeans, the proportion of the population affected is perhaps 50 per cent. Among black children, it is estimated that practically 100 per cent are affected by malaria.

The report of the Public Health Service of the Ministry for the Colonies contains information relating to various years and different centres ; for instance, in 1929, the ratio splenomegalic + (non-splenomegalic but parasitic +) is, on an average, 60 per cent among total of persons examined children—even 53 per cent among infants—and frequently still higher.

According to SCHWETZ, *Rivista di Malarologia*, 1930, No. 5, benign tertian fever is very rare, while quartan fever is fairly frequent.

The parasite index is very high even in the towns ; Stanleyville 85 per cent, Elizabethville 45 per cent, Leopoldville 73 per cent.

<sup>2</sup> It is interesting to note that the cases mentioned as treated relate to patients who have been treated exclusively for this disease. Their number gives no indication of the importance of the disease from the point of view of the Medical Services of the Colony, as malaria frequently constitutes the soil on which other diseases have been able to take root. Nor does this figure indicate the number of quinine treatments given ; quinine is, in fact, given to any patient in whom a relapse of malaria is suspected intercurrently with other diseases.

<sup>3</sup> Out of an estimated number of 10,500 Europeans placed under the supervision of the Official Medical Service, which would represent a malaria morbidity of 14 per cent. In 1929, the cases of blackwater fever among Europeans would represent 5.7 per cent of the cases of malaria ; among the natives, the proportion would be 10 per cent.

<sup>4</sup> Including 1,300 kg. for the Europeans (nine-tenths of this quantity is used for preventive treatment with quinine) and 1,200 kg. for the natives.

<sup>5</sup> In practice, all the natives should be treated. At the rate of 10 grm. per person, the amount required would be so enormous and expensive that it has been suggested that robust species of cinchona should be generally planted.

## COSTA RICA.

POPULATION .. .. .	1929	504,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED .. .. .	1931	5,500
QUININE :		
Imported by the State .. .. .		100 kg. per year
Distributed gratuitously .. .. .		100 kg. per year
Sold at reduced prices .. .. .		0
Amount required .. .. .		100 kg.

LEGISLATION : Decree No. 19, of October 14th, 1931, institutes the sale of quinine at reduced prices by the State.

<sup>1</sup> According to the estimate of the Health Department, malaria morbidity, in relation to mortality, was as follows :

	Deaths from malaria	Estimated cases
1928 .. .. .	402	3,907
1929 .. .. .	342	4,760
1930 .. .. .	389	9,526

According to HOFFMANN, " Malaria Problems ", mortality for the period 1911 to 1915 was 62.6 per 100,000 inhabitants.

According to SALISBURY (United Fruit Company, Medical Department, *Annual Report*, 1930, page 35), tertian and quartan fevers have practically disappeared from the zone of the company since plasmoquine was adopted.

According to a letter from Dr. CONNOR, of March 31st, 1932, the Costa Rica Section of the United Fruit Company reports a rate of infection of about 20 per cent.

## CZECHOSLOVAKIA.

POPULATION .. .. .	1929	14,657,000
CASES OF MALARIA .. .. .	Average 1927-31	596 <sup>1</sup>
	1931	441
CASES TREATED .. .. .		— 2
QUININE :		
Imported into the country .. .. .		— 3
Distributed gratuitously .. .. .		— 4
Amount required .. .. .		— 5

<sup>1</sup> Malaria is subject to compulsory notification.

Year	Cases notified		Deaths	
	Entire country	Slovakia	Sub-Carpathian Ruthenia	Entire country
1919.. .. .	1,592	—	—	—
1920.. .. .	228	—	—	—
1921.. .. .	130	—	—	—
1922.. .. .	76	—	—	—
1923.. .. .	266	—	—	—
1924.. .. .	134	—	—	—
1925.. .. .	201	—	—	24 (average 1921-25)
1926.. .. .	214	—	—	23
1927.. .. .	668	119	544	30
1928.. .. .	1,172	314	849	14
1929.. .. .	435	139	292	19
1930.. .. .	263	52	209	22
1931.. .. .	441	—	—	—

It will be noted that malaria is of some importance only in Slovakia and Sub-Carpathian Ruthenia.

<sup>2</sup> Probably the same as the previous figures.

<sup>3</sup> Impossible to estimate.

<sup>4</sup> Estimated at 1 kg. per year in Slovakia and Sub-Carpathian Ruthenia. In 1927, the Ministry of Public Health placed at the disposal of the provincial administrations at Bratislava and Uzhorod a stock of 18 kg. of quinine tablets which has not yet been exhausted. Former combatants in the world war are supplied with quinine by the "Society for the Assistance of Disabled Soldiers".

<sup>5</sup> Exact information could not be obtained even as a result of an enquiry.

At the rate of 20 grm. per patient (596), 11 kg. 920 gr. would be required. (S.)

### DOMINICA (Leeward Islands).

POPULATION .. .. . 1929 42,000

CASES TREATED (in hospitals, dispensaries, etc.) .. .. . Average 1926-30 2,400

#### QUININE :

Imported by the State.. .. .	10 kg. annually
Imported by private persons .. ..	5 kg. annually
Distributed gratuitously .. .. .	15 kg.
Sold at cost price .. .. .	0
Amount required .. .. .	30 kg. (70 kg. if prophylaxis and treatment are to be properly organised.)

## EGYPT.

POPULATION (not including 35,000 Beduins)	1929	14,493,000
CASES OF MALARIA.. . . .		— <sup>1</sup>
CASES TREATED (in hospitals, dispensaries, etc.) .. . . .	Yearly average	1,770 <sup>2</sup>
QUININE :		
Imported by the State.. . . .		0 <sup>3</sup>
Imported by private persons .. . .	Average 1926-29	2,073 kg.
Distributed gratuitously .. . . .	Average 1921-31 1930-31	551 kg. 600 grm. <sup>4</sup> 721 kg.
Sold at cost price : A certain amount to some administratons and provincial councils.		
Amount required .. . . .		2,000 kg.

<sup>1</sup> The Ministry quotes certain figures, but states that they do not give an exact idea of the prevalence of malaria, since compulsory notification of the disease has only been in force since April 1930. The number of cases of malaria notified since that time has been 1,288 in 1930 and 1,230 in 1931.

<sup>2</sup> This average must not be regarded as a criterion of the number of cases treated in the anti-malaria stations. Thanks to the steps taken by the Health Administration, there is a marked decrease in these cases.

<sup>3</sup> The Ministry of the Wakfs imports and distributes free of charge on an average 40 kg. of quinine and 250 kg. of cinchona bark per year (average for five years).

<sup>4</sup> These 551 kg. 600 gr. represent the annual amount of quinine used by the Health Department both in the hospitals and in the dispensaries and anti-malaria stations ; they include 242 kg. distributed each year free of charge for the anti-malaria campaign.

## ERITREA.

POPULATION .. . . .	1929	510,000
CASES OF MALARIA .. . . .		— <sup>1</sup>
CASES TREATED (in hospitals and infirmaries) .. . .	1930	14,340
QUININE :		
Distributed gratuitously .. . . .		2,450 kg. <sup>2</sup>
Amount required .. . . .		— <sup>3</sup>
CINCHONA PLANTATIONS .. . . .		— <sup>4</sup>



<sup>1</sup> The population of the western plains is the most seriously affected.

<sup>2</sup> Including 450 kg. for treatment in hospitals, dispensaries and infirmaries, and 2,000 kg. (estimated) used for prophylactic purposes.

<sup>3</sup> It may be assumed that the amount required is not less than that distributed free of charge last year, namely 2,450 kg. (S.)

<sup>4</sup> Between 800 and 1,800 metres altitude, plantations of *Cinchona succirubra* and *Cinchona succirubra* grafted with *Cinchona ledgeriana*.

### FERNANDO PO.

POPULATION .. .. .	1920	23,000
CASES OF MALARIA .. .. .		—
CASES TREATED .. .. .		—
QUININE :		
Imported during last year (1931-32) .. .. .		90 kg.

### GAMBIA.

POPULATION .. .. .	1929	210,000
CASES OF MALARIA : Nearly the whole population is affected.		
CASES TREATED (in hospitals, dispensaries, etc.)	Average 1926-30	1,830 <sup>1</sup>
QUININE :		
Imported by the State .. .. .	Average 1928-30 1930	44 kg. 868 gr. 66 kg.
Distributed gratuitously .. .. .	Average 1928-30	44 kg. 868 gr. 66 kg. <sup>2</sup>
Amount required ;. . . . .		

### LEGISLATION.<sup>3</sup>

<sup>1</sup> Most of the inhabitants of Gambia do not seek treatment for malaria, and the number of cases is therefore not recorded.

<sup>2</sup> Present requirements. This quantity will probably increase when the natives learn the efficacy of quinine and are willing to take it.

At the rate of 20 grm. per patient, this amount would be sufficient to treat 3,300 cases, or about 1.5 per cent of the population. (S.)

<sup>3</sup> Quinine is distributed free of charge to schoolchildren, soldiers, etc.—in fact, to any person applying for it—but distribution is not organised, as it is considered most unlikely that the natives would consume the quinine offered ; moreover, it would be too costly a proceeding.

(The reply from Gambia shows that quinine is partly used for prophylactic purposes.) (S.)

# GOLD COAST.

POPULATION .. .. .	1928	2,984,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (steadily increasing) <sup>2</sup> .. ..	Average 1926-31	14,965
QUININE :		
Imported by the State .. .. .	Average 1929-31	556 kg. 562 gr.
Imported by private persons .. .. .	Average 1930-31	611 kg. <sup>3</sup>
Distributed gratuitously : Most of the quinine imported by the Government.		
Sold at reduced prices .. .. .		—
Amount required .. .. .		907 kg. 200 gr. <sup>4</sup>
CINCHONA CULTIVATION <sup>5</sup>		

<sup>1</sup> Intermittent enquiries which have so far been carried out showed a spleen index always superior to 25 per cent.

<sup>2</sup> Cases treated in 1926-27 : 6,436 ; in 1930-31 : 25,593.

This very marked increase is due to the opening of infant welfare clinics and the work of the travelling dispensaries, as well as to the general spread of knowledge of the benefits to be derived from European medicine.

<sup>3</sup> The demand for quinine by Africans is very small, as shown by the amount imported by two drug stores, which was 35 kg. 800 grm. in 1930-31. Of this amount, 12 kg. 700 gr. was in the form of tablets, which are used only by Europeans and advanced Africans.

<sup>4</sup> This amount, at the rate of 20 grm. per patient, would be sufficient for 45,360 cases. (S.) As most of the quinine consumed on the Gold Coast is prescribed by medical practitioners, mostly in Government service, the demand for quinine (a very different thing from the requirements of the Dependency) is roughly proportionate to the number of physicians practising. It is considered that the amount indicated probably represents the maximum annual consumption for the next five years.

The Director of Medical and Sanitary Services is of opinion that the general free issue of quinine would not give good results and that sale at reduced prices, while benefiting the individual during the attack of fever, would not reduce malaria, as it is quite certain that no ordinary African would take a sufficient dose over a sufficiently long period to effect a cure, even though it were at little or no cost to himself. He adds, however, that the retailing of quinine through post offices and postal agencies might be tried.

<sup>5</sup> Trials have been unsuccessful.

# GREECE.

POPULATION .. .. .	1929	6,315,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (in hospital) .. ..	Average 1925-29 1929	19,706 20,488

QUININE :

Imported by the State .. ..	Average	
	1925-30	12,416 kg.
	1930	17,000 kg.
Imported by private persons ..	Average	
	1925-30	23,903 kg. <sup>2</sup>
Distributed gratuitously by the Ministry of Public Health (including quantities distri- buted to the army) .. ..	Average	
	1925-30	4,275 kg. 300 gr. <sup>3</sup>
	1930	to the population : 7,932 kg. to the army : 2,500 kg.
		<hr/> 10,432 kg.
Sold at cost price .. .. .	Average	
	1925-30	8,108 kg.
	1930	6,568 kg.
Amount required .. .. .		40,000 kg. <sup>4</sup>

LEGISLATION : Mixed system until 1931. State Monopoly since 1931 (Law No. 5043, of June 20th, 1931) with sale at cost price plus 3 to 5 per cent for storage and overhead charges. The chemists may increase the price of Government quinine pills by 10 per cent and other preparations by 30 per cent.

<sup>1</sup> Malaria is not subject to compulsory notification. An attempt made from 1927 to 1928 to introduce this system failed. The number of malarial individuals is estimated at 2,000,000 (Cruca, document C.H./Malaria/154). Malaria mortality is as follows :

	Hospitals	The whole country	
		Absolute figures	Rate per 100,000
1925 .. .. .	259	4,619	79.4
1926 .. .. .	221	4,024	68.1
1927 .. .. .	177	4,851*	80.1*
1928 .. .. .	190	5,841*	94.1*
1929 .. .. .	179	6,144	102.4
Average for 5 years .. .. .	205	5,096	

(The total of 205 deaths out of 19,706 cases represents a case mortality rate of about 1 per cent among the patients in hospital. The average number of deaths per year from malaria is 5,096, so that 2,000,000 cases would correspond to a case mortality rate of 0.25 per cent). (S.)

\* The *International Health Year-Book*, Volume V, gives somewhat different figures : 1927, 3,915 deaths (rate, 71); 1928, 4,706 deaths (rate, 80); the information supplied by the Health Department of the Hellenic Republic was not complete at the time the *Year-Book* was published. (S.)

<sup>2</sup> In addition to these quantities, 11,557 kg. 778 gr. was imported by the Red Cross Societies or in lieu of reparations during the period 1924 to 1928, and 5,000 kg. by the Commission for the Establishment of Refugees during the period 1925 to 1930, making a total of 16,557 kg. 778 gr.

<sup>3</sup> The amount of 16,557 kg. 778 gr. mentioned above was distributed free of charge and is not included in the average. It should be added that the annual consumption of quinine in Greece generally amounts to an average of about 30,000 kg. and that the free distribution to needy persons is at present about 6,000 kg. per year.

<sup>4</sup> At the rate of 20 grm. per patient, this quantity would be sufficient for 2,000,000 cases. (S.)

# GRENADA.

POPULATION .. .. .	1929	76,000
CASES OF MALARIA .. .. .		1
CASES TREATED .. .. .	Average	
	1926-30	8,975
	1930	7,617
QUININE :		
Imported by the State .. .. .	Average	
	1926-30	56 kg. 200 gr. <sup>2</sup>
	1930	58 kg. 960 gr.
Distributed gratuitously .. .. .	Average	
	1926-30	45 kg. 210 gr.
Sold at reduced prices (Colony Drug Store)	Average	
	1926-30	11 kg. 200 gr. <sup>3</sup>
Amount required .. .. .		56 kg. 700 gr. <sup>4</sup>

<sup>1</sup> Malaria is endemic in the island. The parasite rate in the colony is 5.1 per cent and the spleen rate 12 per cent.

<sup>2</sup> Principally quinine sulphate and 10 to 12 per cent of bihydrochloride for injections.

<sup>3</sup> About 20 per cent of the total quantity distributed.

<sup>4</sup> At the rate of 20 grm. per patient, this amount would be sufficient for 2,800 patients. For an average of 8,975 cases the amount required would be 179 kg. 500 gr. (S.)

# GUADELOUPE.

POPULATION .. .. .	1929	250,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED (in hospital) .. .. .	Average	
	1928-30	334
	1930	265
QUININE :		
Imported by private persons .. .. .	Average	
	1921-30	14 kg. 500 gr.
Distributed gratuitously .. .. .	Average	
	1921-30	2 kg. 200 gr.
	1930	4 kg.
Amount required .. .. .		12 kg.

<sup>1</sup> According to M. LÉGER (*Bull. Soc. Path. Exot.*, March 9th, 1932) there has been a recrudescence of malaria in this island in the last ten years, possibly brought in from the east (Salonica and Vardar). Plasmodium index at the beginning of the cool season (first fortnight in December) : 5 to 20 per cent.



# BRITISH GUIANA.

POPULATION .. .. .	1929	310,000
CASES OF MALARIA .. .. .		1
CASES TREATED :		
In the Government and estates hospitals	Average	
	1926-30	9,010 <sup>2</sup>
In the dispensaries (including repeated treatments) .. .. .	Average	
	1926-30	13,153
Total .. .. .	1926-30	22,163
Total .. .. .	1930	24,330
QUININE :		
Imported by the State .. .. .	Average	
	1926-30	409 kg.
	1930	396 kg.
Imported by private persons and the managements of estates .. .. .		—
Distributed gratuitously (schools, infant welfare clinics, various Government departments) .. .. .	Average	
	1926-30	30 kg. 200 gr.
	1930	25 kg.
Sold at reduced prices <sup>3</sup> .. .. .	Average	
	1926-30	151 kg.
Distributed practically gratuitously to hospitals, prisons .. .. .	Average	
	1926-30	228 kg.
Amount required <sup>4</sup> .. .. .		409 kg. 200 gr.

<sup>1</sup> Malaria is the principal endemic disease in the colony ; about 10 per cent of the patients admitted to the public hospitals are malaria cases.

Although certain districts appear to be more seriously infected than others, malaria is, on the whole, fairly evenly distributed throughout the coastland and along the three main rivers. The letter from the Government contains an estimate of the endemic distribution.

The prevalent parasite is *Pl. vivax*, *Pl. falciparum* being more restricted to country and hinterland areas away from the coast.

Quartan fever is comparatively uncommon.

Blackwater fever is rare ; 10 to 15 cases are treated annually in the public hospitals, a third of these being fatal.

Malaria mortality varies from 350 to 560 per 100,000 inhabitants. For the period 1926 to 1930, the average number of deaths due to malaria was 1,365 (157.5 to 213.7 per thousand of the total mortality).

Case mortality : the rate of 7 to 8 per cent does not seem to be reliable. In 1930, the rate was 5.9 per cent in the public hospitals and 1.8 per cent in the estates hospitals.

<sup>2</sup> Average calculated according to the data relating to in-patients of the public hospitals, prison infirmaries, Onderneeming School and estates hospitals.

<sup>3</sup> Sold at 50 per cent of the cost price (by the Government Post Offices).

<sup>4</sup> Assuming a case mortality rate of only 1 per cent and an average of 1,365 deaths, the number of malaria cases would be 136,500, for the treatment of which 2,720 kg. of quinine would be required annually. (S.)

# FRENCH GUIANA.

POPULATION .. .. .	1929	50,000
CASES OF MALARIA .. .. .		—
CASES TREATED (in hospital) .. .. .	Average	
	1926-30	1,700
	1930	1,599
QUININE :		
Imported by the State .. .. .	Average	
	1921-30	77 kg. 500 gr.
	1930	73 kg.
Distributed gratuitously .. .. .	Average	
	1921-30	77 kg. 100 gr.
	1930	65 kg.
Sold at reduced prices .. .. .	1930	6 kg.
Amount required .. .. .		90 kg. <sup>1</sup>

<sup>1</sup> At the rate of 20 grm. per patient, this quantity would be sufficient for 4,500 cases or less than 10 per cent of the population and almost three times the number of cases treated in hospital. (S.)

# HAITI.

POPULATION .. .. .	1929	2,500,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED <sup>2</sup> .. .. .	Average	
	1927-29	44,434
	1929	52,351
QUININE :		
Imported by the State .. .. .	Average	
	1921-30	388 kg. 800 gr.
Imported by private persons (quinine sulphate) .. .. .	Average	
	1921-30	34 kg. 830 gr.
Distributed gratuitously .. .. .	Average	
	1921-30	388 kg. 200 gr.
Sold at reduced prices .. .. .	Average	
	1921-30	5 kg. 200 gr.
Amount required .. .. .		About 388 kg. 800 gr

LEGISLATION : The Health Service may sell quinine at cost price through the hospitals and dispensaries.

<sup>1</sup> There is a tendency towards a progressive decrease of malaria in Haiti.

Year	Mortality from malaria for the whole country	Deaths	" Brigade of U.S. Marine "	malaria morbidity( Admission rate)
				Per thousand
1925..	.. .. .	513	1925-26	124.3
1926..	.. .. .	711	1926-27	53.4
1927..	.. .. .	1,097	1927-28	137.4
1928..	.. .. .	929	1928-29	90.9
1929..	.. .. .	894	1929-30	42.6

<sup>2</sup> Public health hospitals, rural clinics and out-patients.

### BRITISH HONDURAS.

POPULATION .. .. .	1929	51,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in hospitals only) .. ..	Average 1926-30	445
QUININE :		
Imported by the State for the hospitals	Average 1928-30	12 kg. 814 gr.
	1930	15 kg. 860 gr.
Imported by private persons .. .. .		+
Distributed gratuitously .. .. .		0 <sup>2</sup>
Sold at reduced prices .. .. .		0
Amount required .. .. .		8

<sup>1</sup> About a quarter of all the cases treated in hospitals. This proportion only represents 1 per cent of the total population.

Malaria mortality 1914-15 : 598.7 per 100,000 (calculated on a total population of 83,268) (HOFFMAN, *Malaria Problems*, page 61).

According to a letter from Dr. W. CONNOR, of March 31st, 1932, the Medical Department of the United Fruit Company gives the following infection rates :

Division of Puerto Castilla, 20 per cent ;  
Division of Puerto Cortès, 15 per cent ;  
Division of Tela about, 10 per cent.

According to NUTTER and McDANIEL (United Fruit Company, Med. Dept., *Annual Report*, 1930) out of 8,125 inhabitants examined, 10.7 per cent were carriers.

<sup>2</sup> There has been no free distribution of quinine up to the present, but 500 oz. (14 kg. 175 gr.) were ordered in 1931 for free distribution.

The public are generally averse to the use of quinine, both for prophylactic and therapeutic purposes. It is possible that the free distribution may decrease this aversion.

<sup>3</sup> Taking as a basis the morbidity rate of 40 per cent given by CONNOR, there would be 20,400 malaria patients, whose treatment would require 408 kg. of quinine. (S.)

## HONG-KONG.

POPULATION .. .. .	1929	1,144,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in Government and Chinese hospitals and dispensaries) .. .. .	Average 1927-30 1930	9,204 11,348
QUININE :		
Imported by the State .. .. .	Average 1925-30 1930	66 kg. 225 grm. <sup>2</sup> 60 kg. 952 grm.
Distributed by the State .. .. .	Average 1925-30 1930	62 kgm. 653 grm. <sup>3</sup> 80 kg.
Distributed gratuitously .. .. .		+
Sold at reduced prices .. .. .	Average 1929-30 1930	35 kg. 132 grm. 34 kg. 388 grm. 76 kg. 545 grm. <sup>4</sup>
Amount required .. .. .		

<sup>1</sup> According to HARRIS (" *The Military Malaria Problem in Hong-Kong*", Journal R.A.M. Corps): "Malaria, to-day, is absent from the cities in the colony of Hong-Kong, but is still vital and dangerous in the country".

<sup>2</sup> Sulphate : 61 kg. 800 gr. ; hydrochloride : 4 kg. 260 grm.

<sup>3</sup> Including 94 per cent of sulphate and 6 per cent of hydrochloride.

<sup>4</sup> In 1930, 7.08 grm. were used for each case. At the rate of 20 grm., an amount of 227 kg. would have been required. (S.)

## INDIA.

POPULATION .. .. .	1929	348,000,000
CASES OF MALARIA (estimated) .. .. .		100,000,000 <sup>1</sup>
CASES TREATED (in the hospitals and dispensaries of the provinces indicated in Table B with a population of 246 million inhabitants) .. .. .	Average 1925-29 1929	8,678,664 10,096,894
(Including an average of 662,768 cases treated by the railway companies.)		



QUININE :

Imported by the State .. .. .		0
Distributed gratuitously :		
By the State .. .. .	Average	
	1921-30 <sup>2</sup>	6,979 kg. 778 gr.
By the railway companies .. ..		1,634 kg.
		<hr/>
		8,613 kg. 778 gr.
CINCHONA FEBRIFUGE distributed gra-		
tuitously :		
By the State .. .. .	Average	
	1921-30 <sup>2</sup>	3,763 kg. 189 gr.
By the railway companies .. ..	Average	
	1921-30 <sup>2</sup>	886 kg.
		<hr/>
		4,649 kg. 189 gr.
Quinine sold at reduced prices .. ..	Average	
	1921-30 <sup>2</sup>	3,026 kg. 290 gr.
Total amount of quinine and cinchona		
febrifuge distributed free of charge		
or at reduced prices .. .. .		16,289 kg. 257 gr.
Total consumption of quinine .. ..		— <sup>3</sup>
Amount required .. .. .		— <sup>4</sup>

LEGISLATION : The Government of India controls the production, sale and distribution of quinine and other cinchona alkaloids. It regulates the purchase of quinine from and sale to countries other than India.

CINCHONA CULTIVATION.<sup>5</sup>

<sup>1</sup> According to the *Statistical Abstract for British India* for 1925-26, the case mortality rate of cases treated in hospital was 0.18 to 0.22 per cent. The estimate of 100 million malaria cases is perhaps less than the actual figure. (S.) The case mortality among native soldiers who were sufficiently ill to be admitted to hospital was 0.42 per cent in the period 1903-07 ; it was 0.36 per cent among native prisoners and 0.16 per cent among European soldiers. (JAMES, "Malaria at Home and Abroad".)

The figure of 100 million malaria cases calculated by BENTLEY is reported on page 100 of the "Annual Report (1932) of the Public Health Commissioner with the Government of India" (Volume I).

*Malaria mortality* : Out of a population of 246,500,000 inhabitants, including Coorg and Ajmer, the average annual mortality from fever during the years 1925 to 1929 was 3,577,551. If it is considered that 25 per cent of these deaths are due to malaria, the number of deaths per annum from this cause is 894,387 for the provinces mentioned in Table B—i.e., the malaria mortality is 363 per 100,000 inhabitants.

If this figure of 894,387 deaths from malaria is correct, it is evident that the figure given for treated cases, which is hardly 10½ times higher, must be inferior to the actual malaria morbidity. (Moreover, according to the data for the Bengal Presidency, the United Provinces and the Bombay Presidency, malaria caused on an average 1,184,984 deaths in the period from 1925 to 1929.)

CHRISTOPHERS (*How to do a Malaria Survey*, page 99) reports that 30 to 50 per cent of the deaths attributed to fever must be due to malaria. In addition, JAMES (*Malaria at Home and Abroad*), probably according to Ross, attributes to India, as a whole, a malaria mortality of 500 per 100,000—i.e., 1,130,000 deaths annually.

<sup>2</sup> These figures include, for certain States, averages of 2, 3, 4, 5 and 6 years. (See Table B.)

<sup>3</sup> According to the sixty-ninth "Annual Report of the Cinchona Plantations and Factory in Bengal for 1930-31": "The total consumption of quinine in India is keeping remarkably steady at about 211,000 lb. per annum"—i.e., 95,709 kg.

<sup>4</sup> According to the "Annual Report of the Public Health Commissioner with the Government of India for 1922", the estimated requirements of quinine might amount to from 226,800 to 680,700 kg. (The latter figure corresponds to 6.8 grammes for each of the assumed 100 million malaria patients.) (S.)

On the other hand, if the method used in Italy were applied, the production of quinine would become a State industry and the price of this alkaloid could be considerably reduced, and, if each inhabitant were allowed an amount of quinine equal to the consumption per head in Italy (about 1 gramme), the quinine requirements would be 235,972 kg.

<sup>5</sup> The total bark production of Bengal, the Madras Presidency and Burma does not amount to one-tenth of the world production.

Table A.<sup>1</sup>

NUMBER OF MALARIA CASES TREATED IN HOSPITALS AND DISPENSARIES  
OF BRITISH INDIA FROM 1916 TO 1929.

Year	Indoor treatment (total cases)	Outdoor treatment (total cases)
1916.. .. .	985,040	5,519,106
1917.. .. .	950,822	6,176,809
1918.. .. .	1,054,240	5,525,000
1919.. .. .	1,120,901	6,030,605
1920.. .. .	1,103,642	6,691,336
1921.. .. .	1,080,776	7,204,859
1922.. .. .	1,038,014	6,875,829
1923.. .. .	1,033,449	7,114,543
1924.. .. .	1,037,376	7,698,856
1925.. .. .	1,014,175	7,704,700
1926.. .. .	964,556	7,707,608
1927.. .. .	939,063	7,394,833
1928.. .. .	914,889	7,615,289
1929.. .. .	1,002,416	9,347,882

These figures confirm, to a great extent, the average of 8,600,000 cases for the period 1925 to 1929 furnished by the Sanitary Administration. (S.)

<sup>1</sup> According to "Statistical Abstracts for British India for 1925-26" (page 410).

Table B.

AMOUNT OF QUININE AND CINCHONA FEBRIFUGE USED IN SOME PROVINCES  
AND STATES OF BRITISH INDIA.

Province	Population	Cases treated (average 1925-29)	Free distribution			Sold at reduced prices (quinine)
			Data for average of	Quinine	Cinchona febrifuge	
Delhi..	488,188	113,033	10 years	kg. gr. 80 607	kg. gr. 56 180	kg. gr. —
Bengal Presidency..	46,695,536	2,186,278	10 "	1,207 340	2,640 480	—
Punjab	20,685,024	1,478,980	10 "	1,496 915	74 041	325 01
Madras Presidency..	42,318,985	875,000	3 "	681 456	—	869 10
Assam ..	7,606,230	291,305	10 "	88 320	64 377	(Average 1921-22)
Bihar and Orissa ..	34,002,189	969,492	10 "	24 550	179 176	356 87
United Provinces ..	45,375,787	945,565	10 "	176 180	(Average for 5 years)	—
Central Provinces and Berar	13,912,760	331,660	10 "	365 645*	(Average for 4 years)	—
Bombay Presidency ..	19,348,219	896,915	6 "	1,231 933	173 400*	489 71
North-West Frontier Provinces	2,251,340	286,429	10 "	405 358	(Average for 6 years)	985 60
Burma ..	13,212,192	304,003	10 "	1,129 620	244 405	—
Coorg ..	163,838			(Average for 5 years)	104 905	—
Ajmer Mervara ..	495,271			(Average for 3 years)	109 545	—
				1928-30)	21 200	—
	246,555,459	8,678,660		6,979 778	3,705 152	3,026 29

\* The amount of quinine indicated for each year is 149 kg. 630 gr., to which is added 216 kg. 15 gr. without any reason being given. For cinchona febrifuge also, the statistics give 0 for each year, while a note gives the amount as 173 kg. 400 gr.

In addition, the following figures, taken from the report by the Principal Medical Officer of the Bikaner State Railways, may be quoted :

	Cases treated (average for five years)	Value of quinine imported (average for six years (rupees)
State of Bikaner ..	28,998	2,052

**Table C.**  
MALARIA TREATMENT AMONG EMPLOYEES OF THE BRITISH INDIA RAILWAYS.

Railway	Kilometres in malaria zones <sup>1</sup>	Number of employees <sup>2</sup>	Cases treated		Quinine kg. gr.	Other alkaloids or cinchona febrifuge kg. gr.	Number of years on which the averages are calculated
			Absolute figures	Percentage			
Great Indian Peninsular Rly.	292	115,431	111,143	167	112 146 5 s	35 432	4
Darjeeling Himalayan Rly. . .	125	1,800	3,000				4
Assam Rly. and Trading Co., Ltd. . . . .	—	8,000	19,789		78 418	1 800	4
Mysore . . . . .	—	1,265	2,631		2		5
Mysore (workshops) . . . . .	—	—	1,035		2 909		2
Tarikere . . . . .	—	—	1,804		2 907	363	5
Bikaner . . . . .	—	—	2,956		5 082		4
Bengal-Nagpur Rly. . . . .	740	73,206 (a)	95,631	123	202 304		5-8
North-Western Rly. . . . .	0 4	124,207	127,988 s	123	254 111 (b)	39 (c)	2
Assam Bengal Rly. . . . .	855	15,618	21,004	102	61 740	30 504	4
East Indian Rly. . . . .	154	147,548	98,100 (d)	65	274 116		4
Bombay Baroda and Central India Rly. . . . .	511.6	76,372	50,876	62	37 104 s	112 492 s	5
Burma . . . . .	693	28,124	14,546	56	68		4-5
Madras and Southern Maha- ratta Rly. . . . .	790	55,943	17,741 s	27	85 566	145 151	3
Bengal North-Western Rly. . .	508	27,725	7,687	23	6 609	14 717	5
Bengal Doors Rly. . . . .	112	1,691	7,439 s	485	20 729 s		4
Debrui-Sadiya Rly. . . . .	194	8,000	19,789	257	68 833		4
Eastern Bengal Rly. . . . .	1,769	56,000	15,101	20	145 152		1-3
H.E.H. the Nizam's Guar- anteed State Rly. . . . .	415	13,049	3,416		54	136	—
South Indian Rly. . . . .	254	36,294 (e)	3,189 (f)		8 165 (g)	17 337 (h)	5
Jodhpur Rly. . . . .	—	—	37,902		55 360	68 040	3
	7,412	794,809	662,768		1,538 251	600 756	
					95 901 s	285 287 s	
					1,634 152	886 043	

(a) Figures for 1930.  
(b) 309 in 1930.  
In this calculation, an isolated malarial railway station is counted as equal to 2 miles (3.218 km.) of railway line.  
The members of the employees' families are usually treated free of charge (Senior White). In order to calculate the number of the members of families, multiply the number of employees by 4, or 4.4.  
Members of families included.  
No part of the North-Western Railway runs through malarious areas, but serious outbreaks occur regularly every few years (Punjab, Sind and Baluchistan). An epidemic occurred in Sind in 1929.  
To these quantities must be added quinine or cinchona febrifuge tablets or ampoules of which the content has not been specified. If the tablets were of 5 grains and the ampoules of 0.5 gm., the following figures would be obtained:

B.B. and C.I.R. : Quinine tablets. . . . .	kg. gr.
Ampoules . . . . .	79 630
Quinine tablets. . . . .	3 311
D. H. R. . . . .	12 960
	95 901

Cinchona febrifuge . . . . . kg. gr.  
285 287

Not including the tablets distributed by the heads of the service, the amount of which is not known.  
Figures for the entire State, the population of which is 2,125,982.

(e) 39,452 in 1930.  
(f) 5,016 in 1930.  
(g) 19,065 in 1930.  
(h) 28,576 in 1930.



# DUTCH EAST INDIES.

POPULATION .. .. .	1929	60,000,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED .. .. .		— <sup>1</sup>
QUININE :		
Imported .. .. .		0
Distributed gratuitously .. .. .	1931	7,000 kg.
Sold at reduced prices .. .. .		—
Total quantity distributed by the State .. .. .	1931	7,700 kg. <sup>2</sup>
Amount required .. .. .		— <sup>3</sup>

## CINCHONA CULTIVATION.<sup>4</sup>

<sup>1</sup> It is impossible to give exact figures.

According to HOFFMAN, *op.cit.*, page 200, 12,066 cases of malaria were treated in the hospitals in 1924. There were 452 deaths.

<sup>2</sup> Hydrochloride, sulphate and bisulphate. A small part of the quinine produced in the Dutch East Indies is sufficient for the consumption of the territory.

<sup>3</sup> As the requirements of quinine are determined by the incidence of malaria, of which even a rough estimate cannot be made, it is impossible to fix the amount required. Up to the present, the quantities of quinine have been sufficient.

<sup>4</sup> The cinchona plantations of Java and Sumatra furnish more than nine-tenths of the total production of the world.

# INDO-CHINA.

POPULATION .. .. .	1929	20,495,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (in hospital) .. .. .	Average	
	1925-29	20,988 <sup>2</sup>
	1929	21,366
QUININE :		
Imported by the State <sup>3</sup> .. .. .	Average	
	1921-30	2,772 kg. 800 gr.
	1930	3,733 kg.
Imported by private persons (free	Average	
pharmacies) .. .. .	1921-30	1,806 kg.
	1930	2,800 kg.
Distributed gratuitously (including	Average	
military distribution, which is	1921-30	2,486 kg. 200 gr.
steadily increasing) .. .. .	1930	3,289 kg.

Sold at reduced prices .. .. .	Average	
	1921-30	269 kg. 100 gr.
	1930	762 kg.
Amount required .. .. .		7,000 kg. <sup>4</sup>

LEGISLATION : A number of circulars, decrees and ordinances, from 1891 to 1922, on the subject of distribution, the sale price of quinine, etc. ; a decree of December 4th, 1909, creating a State Quinine Service in Indo-China.

#### CINCHONA CULTIVATION.<sup>5</sup>

<sup>1</sup> From the point of view of malarial endemicity the population is divided up as follows :

		Spleen index varying between (per cent)
1. Very high endemicity .. .. .	3,370,000	20-70-100
2. High endemicity .. .. .	3,696,000	30-60
3. Medium endemicity .. .. .	6,871,000	
4. Low endemicity .. .. .	3,598,000	
5. Very low endemicity .. .. .	2,549,000	

(Even assuming the very modest estimate of a morbidity of 25 per cent for No. 1, 20 per cent for No. 2, 10 per cent for No. 3 and 2 per cent for Nos. 4 and 5, this would give a figure of 1,766,720 cases). (S.)

<sup>2</sup> 1,497 deaths—*i.e.*, a malaria case mortality of 7.13 per cent. (S.)

<sup>3</sup> Public Relief and Military Departments.

<sup>4</sup> This quantity would be sufficient for 350,000 cases. It should be noted that, even in 1930, the imports amounted to 6,533 kg. According to the calculation made in footnote 1 the amount required would be about 20 grm.  $\times$  1,766,720—*i.e.*, 35,344 kg. (S.)

According to the Inspector-General of Hygiene and Public Health, Indo-China alone could absorb 30,000 kg. of quinine per year. (S.)

<sup>5</sup> Recent experiments.

#### IRAQ.

POPULATION .. .. .	1929	3,300,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (varying greatly in number)	Average	
	1925-29	106,893 <sup>2</sup>
	1930	151,063
QUININE :		
Imported by the State .. .. .	Average	
	1925-30	769 kg. 760 gr.
	1930	198 kg. 223 gr.
Imported by private persons .. .. .	1930	392 kg.

Distributed gratuitously .. .. .	Average	
	1925-30	721 kg. 304 gr. <sup>3</sup>
	1930	708 kg. 438 gr.
Amount required .. .. .		1,360 kg. <sup>4</sup>

<sup>1</sup> The average number of cases of malaria seems to have been 16.8 per cent of the total morbidity for the period 1923-26. According to information furnished by the Public Health Administration of Iraq "one in every six persons examined by the Health Service in Iraq has malaria". In 1929 and 1930, about 5 per cent of the population was treated for malaria.

Malaria is particularly severe during the flood years of the Euphrates. (This was the case in 1923 and 1929.)

<sup>2</sup> This average has been calculated according to the tables of monthly malaria prevalence and the tables giving the cases treated by the Health Service.

1925 .. .. .	86,688	1928 .. .. .	87,476
1926 .. .. .	175,923	1929 .. .. .	158,902
1927 .. .. .	103,477	1930 .. .. .	151,063

The average quantity of quinine used for each treatment was 5.325 grm., and the consumption (six years' average) is 0.26 grm. per inhabitant.

<sup>3</sup> The distribution of quinine by the Government is always free of charge ; in areas where health services do not exist, the distribution is organised through administrative officials or sheiks. The quinine tablets are stamped "free".

<sup>4</sup> At the rate of 20 grm. per person, this quantity would be sufficient to treat 68,000 cases, or 2.06 per cent of the population. (S.) This figure is reported with the following note :

"Supposing satisfactory arrangements were completed for distribution of quinine, which would involve considerable expense, this quantity should be doubled in epidemic years. It may be safely estimated that three times the present distribution of quinine could be used if all sufferers could be reached. The cost of quinine is a factor, but the greater expense is associated with satisfactory arrangements for distribution."

In order to treat an average of 106,893 malaria patients at the rate of 20 grm. per head, 2,137 kg. 860 gr. of quinine would be necessary.

## ITALY.

POPULATION .. .. .	1929	41,506,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (hospitals, dispensaries, quinine distributors, etc.) .. .. .	Average	
	1926-30	213,632
	1930	203,580
QUININE :		
Imported by the State (sulphate and other salts) .. .. .	Average	
	1920-29	4,503 kg. 410 gr. <sup>2</sup>
Cinchona bark <sup>3</sup> .. .. .	Average	
	1922-29	77,300 kg.
	1928	101,900 kg.
	1929	102,300 kg.
Sold at reduced prices by the State (for free distribution) .. .. .	Average	
	1921-30	18,738 kg. 100 gr.
	1929-30	21,942 kg.
	1930-31	21,544 kg.

Distributed gratuitously by way of	Average	
subsidy .. .. .	1920-29	747 kg. 200 gr.
Sold at fixed prices .. .. .	Average	
	1921-30	7,511 kg. 900 gr.

26,250 kg.

Amount required : Average annual  
consumption .. .. . 28,000 kg.<sup>4</sup>

LEGISLATION : L. 23.XII.1900, No. 505 regarding Government quinine.

L. 2.XI.1901, No. 460.

L. 22.VI.1902, No. 224.

L. 19.III.1904, No. 209.

Executive regulations, 28.II.1907, No. 61.

R.D.L. 21.VII.1927, No. 1502.

### CINCHONA CULTIVATION.<sup>3</sup>

<sup>1</sup> In 1922, the malaria districts covered an area of 84,046 sq. km.

#### *Malaria Mortality.*

	Absolute figures	Rate per 100,000 inhabitants		Absolute figures	Rate per 100,000 inhabitants
1900 .. ..	15,865	49	1925 .. ..	3,588	9.0
1905 .. ..	7,845	23.6	1926 .. ..	2,683	6.7
1910 .. ..	3,621	10.5	1927 .. ..	2,562	6.3
1915 .. ..	3,835	10.5	1928 .. ..	2,825	7.01
1918 .. ..	11,477	32.4	1929 .. ..	2,705	6.52
1923 .. ..	3,307	8.8			

<sup>2</sup> Quinine imports are decreasing and bark imports are increasing.

<sup>3</sup> In recent years, most of the bark has come from the Italian plantation at Jibitoe, which was started in 1922 and has produced the following quantities :

	Dry bark	Sulphate	Average yield
1927.. .. .	13,972 kg.	679 kg.	4.98 per cent of the weight of the bark.
1928.. .. .	35,906 kg.	1,820 kg.	
1929.. .. .	85,682 kg.	4,164 kg.	

It is estimated that in 1936 the production will be about 860,000 kg. of bark, which is equal to 40,000 kg. of sulphate.

#### *Imports of Bark and Sulphate of Quinine, 1922 to 1929.*

	Bark kg.	Sulphate and other salts kg.
1920 .. .. .	—	7,755
1921 .. .. .	—	5,274
1922 .. .. .	67,300	6,813
1923 .. .. .	66,500	5,182
1924 .. .. .	96,200	7,420
1925 .. .. .	77,600	1,781
1926 .. .. .	47,500	1,657
1927 .. .. .	59,200	1,162
1928 .. .. .	101,900	4,638
1929 .. .. .	102,300	3,348
Total .. .. .	618,500	45,030
Average .. .. .	77,300	4,503

(In 1929-30, the "Azienda" was not obliged to purchase any quinine sulphate, sufficient stocks of salts and supplies of bark being available.)



\* The "Azienda's" annual average output of quinine preparations during the last ten years was 27,000 kg.

Exports : The report of the "Azienda del Chinino" for the year 1928-29 shows an export of 296 kg. of quinine (to foreign countries and colonies).

GOVERNMENT QUININE SOLD OR DISTRIBUTED FREE OF CHARGE IN THE  
KINGDOM AND THE UTILISATION OF THE FUND FORMED OUT  
OF THE PROFITS OF THE ADMINISTRATION FOR THE PURPOSE OF COMBATING  
THE CAUSES OF MALARIA.

Financial year	Sale				Free distribution (by way of subsidy)		Total	
	Ordinary price (sale to the public)		Preferential price (public administrations and public and private organisations entrusted with the free distribution)					
	Quantity kg.	Value lire	Quantity kg.	Value lire	Quantity kg.	Value lire	Quantity kg.	Value lire
1919-20 ..	8,056	2,672,944	15,946	4,672,189	665	182,315	24,667	7,529,448
1920-21 ..	6,706	3,162,465	22,552	9,836,013	974	422,142	30,232	13,420,620
1921-22 ..	8,132	4,370,939	18,940	9,956,448	737	359,401	27,809	14,686,788
1922-23 ..	7,758	4,152,332	16,016	8,191,857	791	411,822	24,565	12,756,011
1923-24 ..	7,216	4,275,427	10,326	5,903,529	723	380,348	18,265	10,559,304
1924-25 ..	8,344	5,516,000	19,106	12,276,585	617	398,921	28,067	18,191,506
1925-26 ..	8,107	5,351,321	21,165	14,111,163	960	616,861	30,232	20,079,345
1926-27 ..	7,255	4,788,634	17,980	11,811,532	946	620,308	26,181	17,210,474
1927-28 ..	6,858	4,259,934	17,529	10,466,968	552	331,272	24,939	15,058,174
1928-29 ..	7,916	4,615,378	18,759	10,834,683	407	225,500	27,082	15,675,561
1929-30 ..	6,574	—	—	—	—	—	—	—
1930-31 ..	6,958	—	—	—	—	—	—	—

JAMAICA.

POPULATION .. .. .	1929	994,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED (in hospitals) .. .. .	Average	
	1925-29	1,773
	1929	1,618
QUININE :		
Imported by the State .. .. .	Average	
	1926-30	249 kg. <sup>2</sup>
Distributed gratuitously .. .. .	Average	
	1926-30	86 kg. 909 gr.
Sold at reduced prices .. .. .	Average	
	1926-30	152 kg. 795 gr. <sup>3</sup>

Amount required . . . . .

272 kg. 160 gr.<sup>4</sup>

<sup>1</sup> Malaria is decreasing. It appears to be restricted to the plains, where rains and irrigation are abundant. There are eight endemic zones.  
Malaria mortality is steadily declining.

*Malaria Mortality, 1918 to 1927.*

	Absolute figures	Rate per 100,000 inhabitants		Absolute figures	Rate per 100,000 inhabitants
1918 .. ..	336	45.4	1924 .. ..	469	54.2
1919 .. ..	392	46	1925 .. ..	476	53.8
1920 .. ..	398	45.5	1926 .. ..	395	45.4
1921 .. ..	503	58.7	1927 .. ..	358	41.1
1922 .. ..	371	43	1928 .. ..	345	36.4
1923 .. ..	356	41.2	1929 .. ..	343	34.5

According to BOYD and ARIS (*Amer. Jl. of Trop. Med.*, 1929, Volume XIX, pages 331 to 405), the following cases were recorded in the hospitals outside Kingston :

	Deaths	Admissions for malaria
1920 .. .. .	49	2,803
1925 .. .. .	77	1,823
1926 .. .. .	40	1,746

The same writers recorded a spleen index in 1928 and 1929 of 5.87 per cent among 11,998 schoolchildren, and a parasite index of 8.91 per cent among 6,445 schoolchildren.

<sup>2</sup> In addition, 131 pints of *tinctura cinchonæ composita*.

<sup>3</sup> BOYD and ARIS give the following figures regarding the quinine distributed by the medical stores :

	lb.
1919 .. .. .	657.16
1920 .. .. .	392.23
1921 .. .. .	441.5
1922 .. .. .	365.8
1923 .. .. .	528.76
1924 .. .. .	423.52
1925 .. .. .	605.43
1926 .. .. .	511.85
Total .. .. .	3,926.25

Average per year : 490.8 lb. (or 223 kg.).

<sup>4</sup> At the rate of 20 grammes per head, this quantity would be sufficient to treat 13,600 malaria patients. Assuming that the malaria case mortality rate is 0.5 per cent, this would give  $350 \times 200 = 70,000$  cases of malaria per year, for which 1,400 kg. of quinine would be required. (S.)

**JAPAN.**

POPULATION .. .. .	1929	63,740,000 <sup>1</sup>
CASES OF MALARIA <sup>2</sup> (steadily decreasing) .. .. .	Average	
	1926-30	30,662
	1929	22,937
	1930	17,186
CASES TREATED (in hospitals and dispensaries) .. .. .	Average	
	1926-30	13,402
	1928 (maximum)	16,208
	1930	10,904

QUININE <sup>3</sup> :

Imported by the State ..		0
Imported by private persons	Doubtful information	
Total for the period ..	1921-28	23,616 kg.
Distributed gratuitously ..	Average	
	1926-30	137 kg. 827 gr. <sup>4</sup>
	1929	116 kg.
	1930	80 kg. <sup>5</sup>
Sold at reduced prices ..		0
Amount required .. ..		— <sup>6</sup>

<sup>1</sup> Malarial Provinces :

Population (1930 Census) :

1. Kyoto .. .. .	1,552,832
2. Shiga.. .. .	691,631
3. Aomori .. .. .	879,914
4. Niigata .. .. .	1,933,326
5. Fukui.. .. .	618,144
6. Gumma .. .. .	1,186,080
7. Tochigi .. .. .	1,141,737
8. Shizuoka .. .. .	1,797,805
9. Okinawa .. .. .	577,509

Total.. .. . 10,378,978

According to the *International Health Year-Book*, Volume V, the tropical form exists only in the Province of Okinawa, where the malaria mortality was 20.89 per 100,000 in 1926 and 31.17 in 1927.

Malaria mortality for the entire country : average 1925-1929 : 149 ; maximum in 1926 : 190 deaths ; minimum in 1929 : 97 deaths (about two-thirds of which occurred in the Province of Okinawa alone).

<sup>2</sup> According to the statistics of notifiable diseases (document E.I.14.1931), malaria is not compulsorily notifiable.

<sup>3</sup> Japan has three quinine factories. The imports of bark were 486,000 kg. per year (average 1926 to 1931) and the production of quinine (hydrochloride and sulphate) 30,158 kg. (1926 to 1930).

<sup>4</sup> According to information received by the Secretariat, the Government does not provide for the distribution of quinine except when the gravity of malarial endemicity calls for such action.

On an average, 25,000 persons take quinine as a preventive.

<sup>5</sup> For 10,904 cases treated and 22,264 persons taking quinine for prophylactic purposes ; this quantity therefore only represents 2.42 gm. per person. In most cases, both categories of consumers purchase the drug. (S.)

<sup>6</sup> At the rate of 20 gm. for an average of 30,662 cases, 612 kg. 240 gr. would be required. (S.)

KENYA.

POPULATION .. .. .	1929	3,003,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in Government hospitals	Average	
and dispensaries) .. .. .	1926-30	30,420 <sup>2</sup>
	1930	27,535

QUININE :

Imported by the State.. ..	1930	750 kg. <sup>3</sup>
Distributed gratuitously .. ..	1930	712 kg. 150 gr.
Sold at reduced prices .. ..	1930	127 kg. 335 gr.
Amount required .. ..		796 kg. <sup>4</sup>

LEGISLATION .. .. . — 5

<sup>1</sup> There is a high incidence of endemic malaria in Kenya and the risk for Europeans and immigrants is serious (S. P. JAMES, *Trop. Diseases Bull.*, Vol. 27, page 191). Cases of blackwater fever have been recorded (50 cases in 1930 out of 6,248 malaria in-patients).

<sup>2</sup> This figure does not include cases treated in dispensaries and by quinine distributors in the reserves and a number of other places.

<sup>3</sup> The different salts are specified ; they are mostly bisulphate and bihydrochloride.

<sup>4</sup> This amount is less than the 1930 consumption. At the rate of 20 grm. per patient, it would be sufficient for the treatment of 39,800 malaria patients. (S.)

<sup>5</sup> Quinine is sold at cost price in the post-offices.

**MADAGASCAR.**

POPULATION .. .. . 1929 3,800,000

CASES TREATED (hospitals and consultations) .. .. .	Average	
	1925-29	444,511
	1925 (maximum)	589,347
	1928 (minimum)	263,566
	1929	454,038

QUININE :

Imported by the State (steadily increasing) .. .. .	Average	
	1921-30	2,792 kg. 900 gr.
	1930	4,660 kg.

Imported by private persons	Average	
	1924-30	224 kg. 400 gr.

Distributed gratuitously ..	Average	
	1921-30	1,775 kg. 400 gr.
	1930	2,860 kg.

Sold at reduced prices .. ..	Average	
	1923-30	39 kg. 600 gr.
	1930	100 kg.



Amount required .. .. . 5,000 kg. <sup>1</sup>

CINCHONA CULTIVATION.<sup>2</sup>

<sup>1</sup> At the rate of 20 grm. per case, this quantity would obviously be insufficient. (S.)

<sup>2</sup> Experiments in cinchona growing have been made.

FEDERATED MALAY STATES.

POPULATION .. .. .	1929	1,562,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED :		
In Government and estate hospitals ..	Average	
	1927-30	75,814
	1930	62,391
In dispensaries and travelling dispensaries, etc. .. .. .		100,096
		<hr/> 162,487
QUININE :		
Imported into the country (Customs figures) (progressive increase) ..	Average	
	1928-30	2,156 kg. 400 gr.
	1930	2,450 kg.
Imported by the State (including the quantity purchased on the market) (progressive increase) .. .. .	Average	
	1921-30	1,117 kg. 134 gr. <sup>2</sup>
	1930	1,874 kg. 132 gr.
Distributed gratuitously : health departments and hospitals of the medical departments .. .. .	Average	
	1923-30	1,202 kg. 266 gr.
	1930	1,596 kg. 672 gr.
Sold at reduced prices .. .. .		—
Amount required .. .. .		2,721 kg. <sup>3</sup>
LEGISLATION .. .. .		— <sup>4</sup>

<sup>1</sup> According to the annual report for 1930 (page 4), malaria mortality is still very high :

	Deaths from "malaria and fevers of undefined origin"	Rate per 100,000
1927 .. .. .	20,736	1,320
1928 .. .. .	20,053	1,240
1929 .. .. .	19,968	1,010
1930 .. .. .	16,721	970

In the estates, the notification of malaria and causes of death is compulsory.

In the estates, 8.9 per cent of deaths from all causes are due to malaria (12.5 per cent if deaths due to fevers of undefined origin are included).

In the Government hospitals in 1930, the admissions for malaria (36,647) represented 56.9 per cent of all admissions for avoidable diseases (64,439) and 55.61 per cent of admissions for all causes. A percentage of 30.4 of deaths from avoidable diseases was due to malaria.

The case mortality rate in these hospitals was as follows in 1930 :

		Deaths	Case mortality
Admissions for acute malaria.. ..	32,145	1,713	5.33
Admissions for chronic malaria .. ..	4,504	202	4.48
	36,649		

The distribution of the three types of plasmodium was as follows :

Malignant tertian 62.5 per cent, benign tertian 29.4 per cent, quartan 3.3 per cent, mixed infection 4.8 per cent.

<sup>2</sup> Principally bihydrochloride, 576 kg., and hydrochloride (tablets), 442 kg.

The total also includes cinchona febrifuge : 98 kg. 900 gr. This product is less and less used in Government departments and private institutions.

In order to give an idea of the progressive increase in quinine imports and the quantities distributed free, we give the following official figures :

	lb.	oz.		lb.	oz.
1921 .. .. .	892	4	1926 .. .. .	1,544	6
1922 .. .. .	492	4	1927 .. .. .	1,715	4
1923 .. .. .	1,432	4	1928 .. .. .	3,835	0
1924 .. .. .	1,780	5	1929 .. .. .	4,504	4
1925 .. .. .	1,838	0	1930 .. .. .	4,063	0

<sup>3</sup> The standard treatment adopted in the Federated Malay States is as follows : 2 grammes per day for about 14 days in the estate hospitals and 2 grammes per day for 7 days in the Government hospitals.

<sup>4</sup> Since 1923, a Government enactment provides that " the health officer may at any time, if it appears to him necessary for the health of the labourers employed on an estate, by order in writing to the employer or resident manager, direct that quinine be regularly administered free of charge in such doses and at such times as shall be stated in the order, or to any class of persons employed on the estate ".

## UNFEDERATED MALAY STATES.

POPULATION .. .. . 1929 1,360,000

CASES OF MALARIA .. .. . —<sup>1</sup>

CASES TREATED (in hospitals, dispensaries,  
etc.) .. .. . Average 68,072  
1926-30

(except State of  
Kelantan, which  
only gives one  
year, 1930)

73,032<sup>2</sup>

### QUININE :

Imported by the State.. .. .	1930	645 kg. 926 gr. <sup>3</sup>
Bought on the market and distributed gratuitously .. .. .	1930	181 kg. 900 gr. <sup>4</sup>
Distributed gratuitously .. .. .	1930	311 kg. 623 gr. <sup>5</sup>
Sold at reduced prices .. .. .		0 <sup>6</sup>

Amount required . . . . .

677 kg. 820 gr.<sup>7</sup>

<sup>1</sup> In the State of Brunei, the death rate from malaria amounted to 227 per 100,000 inhabitants in 1929 and 327 in 1930.

<sup>2</sup> Population in 1921 :

Cases treated in the hospitals and dispensaries :

Johore .. .. .	282,234	42,097	} Figures given by each State
Kedah .. .. .	338,558	15,904	
Perlis .. .. .	40,087	2,166	
Kelantan .. .. .	309,300	5,329	
Trengganu .. .. .	153,765	6,416	
Brunei .. .. .	25,451	1,100	
	1,149,395	73,032	

(i.e., about 5 per cent of the total population of these States). (S.)

<sup>3</sup> Plus 34,700 tablets, the quinine content of which is not stated. Taking the content as 5 grains, the total would be 11 kg. 242 gr. of quinine.

The State of Trengganu does not import quinine.

<sup>4</sup> The information received is incomplete. The State of Brunei does not supply any data regarding quinine. The population of this State represents about 2 per cent of that of the Malay States not included in the Federation.

The States of Johore, Perlis and Brunei do not purchase quinine on the market for free distribution. No information is available for the State of Kelantan.

<sup>5</sup> Plus 4,700 tablets (5 grains ? = 1 kg. 522 gr.).

No information has been received from the States of Kelantan and Brunei.

<sup>6</sup> Except a very small quantity in the State of Brunei.

<sup>7</sup> I.e., 660 kg., plus 55,000 tablets (at the rate of 5 grains = 17 kg. 820 gr.).

This figure does not include the requirements of the State of Brunei. At the rate of 20 grammes per patient, and taking as an average 73,032 cases treated, 1,361 kg. 440 gr. would be required. (S.)

## MARTINIQUE.

POPULATION .. .. .	1929	230,000
CASES TREATED (in hospital) .. .. .	Average 1927-30	28
QUININE :		
Imported by the State .. .. .	Average 1921-30	2 kg. 400 gr.
Imported by private persons .. .. .	Average 1921-30	1 kg.
Distributed gratuitously .. .. .	Average 1921-30	2 kg. 300 gr.
Amount required .. .. .		4 kg.



# MAURITIUS.

POPULATION .. .. .	1929	406,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (in hospitals and dispensaries; steadily increasing) .. .. .	Average 1927-30 1930	35,656 59,601
QUININE :		
Imported into the country .. .. .	Average 1927-30	2,351 kg. <sup>2</sup>
Imported by the State .. .. .	Average 1921-30 1930	374 kg. 100 gr. 434 kg.
Purchased on the spot and distributed gratuitously .. .. .	Average 1926-30	6 kg. 600 gr.
Distributed gratuitously (total) .. .. .	Average 1921-30 1930	430 kg. 500 gr. 554 kg.
Sold at reduced prices .. .. .		0
Amount required .. .. .		431 kg. <sup>3</sup>

1 Year	Malaria Mortality		General Mortality (according to Ann. Rep. Med. & Health Dept., 1930) (per thousand)
	Absolute figures	Rate per 100,000 inhabitants	
1927.. .. .	2,095	523	25.1
1928.. .. .	2,424	600	28.2
1929.. .. .	2,310	570	30.63
1930.. .. .	3,460	853	35.4

In 1930, 3,460 deaths from malaria were recorded, or 65.47 per cent of all deaths due to infectious diseases ; the case mortality rate was about 6 per cent of 59,601 recorded cases.

<sup>2</sup> Including 40 per cent (954 kg.) of cinchona febrifuge and other cinchona products.

<sup>3</sup> Estimate based on the average of the last ten years ; if only the cases treated in 1930 are taken into account, at the rate of 20 grm. per case, 1,192 kg. would be required. (S.)

# MEXICO.

POPULATION .. .. .	1929	16,350,000
CASES OF MALARIA .. .. .		450,000 <sup>1</sup>
CASES TREATED (in hospitals, dispensaries, etc.)	1931	43,602



# QUININE :

Imported by the State .. .. .	0
Imported by private persons .. .. .	+
Purchased by the State on the local market and distributed .. .. .	1931 51 kg. <sup>2</sup>
Amount required .. .. .	500 kg. <sup>3</sup>

<sup>1</sup> Estimated figure. Malaria is subject to compulsory notification. It is endemic in the greater part of Mexico, especially along the coasts where economic conditions and the means of communication are less well developed. The anti-malaria campaign carried on by the Federal Government and some agricultural undertakings and oil companies seems to consist exclusively of anti-larval measures.

*Epidemics.*—A malaria epidemic broke out during the last few months of 1931 in certain States, especially in Vera Cruz.

## MALARIA MORTALITY IN THE REPUBLIC AND IN CERTAIN TOWNS.

Year	Entire country		Mexico	Vera Cruz	Tampico
	Deaths	Rate per 100,000	Rate per 100,000		
1921 .. .. .	—	—	—	395	909
1922 .. .. .	—	—	—	316	529
1923 .. .. .	—	—	—	255	386
1924 .. .. .	—	—	—	250	221
1925 .. .. .	—	—	—	246	154
1926 .. .. .	—	—	—	210	201
1927 .. .. .	—	—	—	198	279
1928 .. .. .	18,851	118	4.1	141	169
1929 .. .. .	16,859	104	5.2	63.4	181
1930 .. .. .	26,499	157	6.6	53	140
1931 .. .. .	—	—	5.1	—	—

<sup>2</sup> Plus the amount contained in 39,000 plasmoquin compound tablets and a certain unknown quantity.

<sup>3</sup> This is the minimum. At the rate of 20 gm. per case treated, 872 kg. would be required, and at the rate of 20 gm. for each of the 450,000 malaria patients, 9,000 kg. would be required. (S.)

## FRENCH MOROCCO.

POPULATION .. .. .	1929	5,000,000
CASES OF MALARIA .. .. .		— 1
CASES TREATED (steadily increasing) .. .. .	Average	
	1925-29	46,184
	1925 (minimum)	23,791
	1929 (maximum)	77,869

QUININE :

Imported by the State ..		—
Distributed gratuitously (to the health organisations and public health services ; substantial increase) .. .. .	Average 1923-30 1923 1929 (maximum) 1930	729 kg. 379 kg. 1,457 kg. 798 gr. 1,306 kg. 935 gr.
Sold at reduced prices (Government quinine) ..	Average 1923-30 1928 (maximum)	464 kg. 400 gr. 1,206 kg.
Sold at half the cost price (to colonists and employers).. .. .	Average 1927-30 1929 (maximum)	431 kg. 200 gr. 738 kg. 930 gr.
Consumption : total .. ..	Average 1923-30 1929 (maximum) 1930	1,429 kg. 800 gr. 3,527 kg. 748 gr. 2,418 kg. 911 gr.
Amount required .. ..		3,500 kg. <sup>2</sup>
		Subsequently : 5,000 kg.

<sup>1</sup> In 1928, after a lull of seven years, an epidemic broke out. It will be noted that, in 1929, after the epidemic, the cases treated were more numerous than ever before.

<sup>2</sup> At the rate of 20 grm. per case, this quantity would be sufficient to treat 175,000 malaria patients, or rather more than double the number of cases treated in 1929. The amount of 5,000 kg. is estimated for the time when the population will have become familiar with preventive quinine treatment.

MOZAMBIQUE.<sup>1</sup>

POPULATION .. .. .	1929	3,300,000 <sup>2</sup>
CASES OF MALARIA .. .. .		— <sup>3</sup>
CASES TREATED (in hospitals) .. .. .	Average 1926-30	935 <sup>4</sup>
QUININE :		
Imported by the State .. .. .	Average 1921-30 1929	228 kg. 640 gr. 539 kg. 23 gr.
Distributed gratuitously .. .. .	Average 1921-30	115 kg.

Sold at cost price .. .. .	Average 1921-30	104 kg.
Amount required .. .. .		1,000 kg. <sup>5</sup>

LEGISLATION : Quinine is exempt from Customs duties.

<sup>1</sup> These figures are taken from the reply by the Health Administration and from the volume *Estatísticas dos Serviços de Saúde, 1928 and 1929*, of the Colony of Mozambique.

<sup>2</sup> Including 28,000 whites.

<sup>3</sup> Average spleen index : 40 per cent. In the hospitals malaria was the cause of 3.89 per cent of all deaths in 1930.

<sup>4</sup> The cases of blackwater fever (on an average 90 cases are treated in hospitals each year) are not included in this figure.

It should be noted that, in 1928, out of 21,103 whites admitted to the hospitals, 23.75 per cent were treated for malaria while, out of 7,596 negroes, the percentage was 3.37 per cent. These percentages remained approximately the same in 1929. (S.)

<sup>5</sup> Including 700 kg. for free distribution.

## NETHERLANDS.

POPULATION .. .. .	1929	7,833,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED .. .. .	Average 1926-30	2,000
QUININE :		
Cinchona bark imported .. .. .	1929	8,500,000 kg. <sup>2</sup>
Distributed gratuitously .. .. .		0
Sold at reduced prices .. .. .	Average 1921-30 1930	190 kg. 400 gr. <sup>3</sup> 147 kg.
Total amount of quinine used .. .. .	Average 1921-30	2,811 kg. 600 gr. <sup>4</sup>
Amount required .. .. .		—

LEGISLATION.<sup>5</sup>

<sup>1</sup> Total of 2,000 cases recorded. Malaria is not compulsorily notifiable.

<sup>2</sup> Including 4,000,000 kg. re-exported. Quinine is not imported into the Netherlands.

<sup>3</sup> Sulphate.

<sup>4</sup> Evidently a great quantity must be exported. (S.)

<sup>5</sup> No legislation. The pharmacopœia, however, lays down standards to which products extracted from cinchona bark must conform.

# NEW HEBRIDES (Franco-British).

POPULATION . . . . . 1929 60,000

## A. Information supplied by the French Ministry of the Colonies.

CASES OF MALARIA : See B.

CASES TREATED (in the French hospital of Port Vila) . . . . .	Average 1926-30	675
	1928 (maximum)	897

## QUININE :

Imported by the State . . . . .	Average 1921-30	46 kg. 384 gr.
	1930	141 kg. 250 gr.
Distributed gratuitously by the State . . . . .	Average 1928-30	29 kg. 653 gr.
Sold through the Government . . . . .	Average 1928-30	44 kg. 35 gr.

Amount required annually . . . . .

1

## B. Information supplied by the British Authorities.

CASES OF MALARIA : About 100 per cent of the population.

In 1930, 21.5 per cent of admissions to the hospital was due to malaria.

Quinine is used by hospitals (French national hospitals, mission hospitals), by planters, traders, etc. The French and mission hospitals sell the quinine at almost cost price.

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<sup>1</sup> At the rate of 20 grm. per person, the amount of quinine required for 60,000 malaria patients would be 1,200 kg. per year. (S.)

# NIGERIA (including British Cameroons).

POPULATION . . . . . 1929 19,586,000

CASES OF MALARIA . . . . . — 1

CASES TREATED (Europeans and natives by Government medical officers) . . . . .	Average 1925-29	21,041 <sup>2</sup>
	1929	24,860



QUININE :

Imported by the State .. .. .	1929-30	700 kg. 500 gr. <sup>3</sup>
Imported by private persons .. ..		4
Distributed gratuitously .. .. .	Average	
	1926-29	368 kg. <sup>5</sup>
	1929	475 kg. 826 gr.
Amount required .. .. .		1,269 kg. <sup>6</sup>

CINCHONA CULTIVATION.<sup>7</sup>

<sup>1</sup> According to the enquiry by BARBER and OLLINGER (*Ann. Trop. Med. and Paras.*, December 31st, 1931, Vol. 25, Nos. 3 and 4), on 6,838 individuals (children and adults), parasites were found in 61.4 per cent. At Lagos, the rate varied from 28.5 to 94.1 per cent. In that city, the malaria mortality rate was as follows per 100,000 inhabitants : 1926, 106 ; 1927, 106 ; 1928, 59 ; 1929, 82 ; 1930, 66.

<sup>2</sup> Not including cases treated in native dispensaries, missions and by private practitioners. According to the *Annual Medical and Sanitary Reports*, 1928 and 1929, malaria represented 25.63 per cent of all cases of infectious diseases treated in the Government institutions in 1928, and 20.7 per cent in 1929.

<sup>3</sup> This figure, which is less than the average import owing to a pre-existent stock, does not include quinine imported by the native administrations for use in dispensaries built and equipped by them. There were about 160 of these dispensaries functioning in 1931.

<sup>4</sup> The quantity of quinine imported by medical missions or by chemists and druggists for local sale is not known.

<sup>5</sup> The amount of quinine distributed gratuitously is only known for the northern provinces and the town of Lagos (western provinces).

<sup>6</sup> This amount will probably increase with the system of native administration dispensaries recently instituted. If, according to the enquiry by BARBER and OLLINGER relating to many individuals in the least-infected age, about 60 per cent of the inhabitants are infected, and if this proportion is applied to the population of the southern provinces, which was estimated in 1929 at 8,750,000 persons, the number of malarious individuals for these areas alone would be 5,250,000, for whose treatment 105,000 kg. of quinine would be required. (S.)

<sup>7</sup> Experimental cinchona plantations in the Cameroons province (see document C.H./Malaria/177).

NYASALAND.

POPULATION .. .. .	1929	1,360,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in State hospitals and dispensaries) .. .. .	Average	
	1926-30	5,501 <sup>2</sup>
	1930	8,386

QUININE :

Imported by the State .. .. .	Average	
	1924-30	202 kg. 440 gr. <sup>3</sup>
	1930	365 kg. 663 gr.
Imported by private persons and missions .. .. .		+ <sup>4</sup>

Distributed gratuitously .. .. .	Average	
	1924-30	90 kg. 218 gr. <sup>5</sup>
	1930	113 kg. 889 gr.
Sold at reduced prices <sup>6</sup> .. .. .	Average	
	1924-30	101 kg. 940 gr.
	1930	137 kg. 700 gr.
Amount required .. .. .		About 202 kg. 440 gr. <sup>7</sup>

<sup>1</sup> According to SHELLEY, H. M. (*Trans. R. S. Trop. Med. and Hygiene*, Vol. 25, page 129, 1931), malaria is very prevalent in the colony : *Pl. falc.* 84 per cent ; *Pl. vivax.* 14 per cent ; *Pl. malar.* 2 per cent.

<sup>2</sup> The number of cases treated in mission hospitals and dispensaries is not known, but may be estimated at one-third of the number of cases treated in Government hospitals. There are 12 hospitals and 90 dispensaries in the country. The number of cases not treated among the native population is not known, but must be high.

Malaria mortality : In 1930, only 7 deaths due to malaria were recorded out of 8,386 cases treated in the hospitals. The case mortality is always very low.

<sup>3</sup> More than 75 per cent being bihydrochloride.

<sup>4</sup> Most of the quinine is imported by the Government.

<sup>5</sup> Natives receive quinine free of charge at the Government hospitals and dispensaries. A free issue is made to all Government officials and their families.

<sup>6</sup> Quinine is sold at all the post offices (about thirty-four in number) at cost price.

<sup>7</sup> This quantity will probably increase as more and more natives learn the value of quinine, but the high cost of this alkaloid will probably prevent the Government from procuring a sufficient quantity.

## FRENCH ESTABLISHMENTS IN OCEANIA.

POPULATION .. .. .	1929	36,000
CASES OF MALARIA .. .. .		—
CASES TREATED (in hospital) .. .. .		0
QUININE :		
Imported by the State .. .. .	Average <sup>1</sup>	
	1921-30	4 kg. 800 gr.
Imported by private persons .. .. .	Average	
	1921-30	2 kg. 300 gr.
Distributed gratuitously .. .. .	Average	
	1921-30	3 kg. 450 gr.
Sold at reduced prices .. .. .	Average	
	1921-30	250 gr.
Amount required .. .. .		7 kg.

<sup>1</sup> Only 42 kg. were imported in 1921 and 6 kg. in 1930.

### PALESTINE.

POPULATION .. .. .	1929	930,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in dispensaries) ..	Average	
	1926-30	9,424
	1926 (minimum)	7,956
	1931 (maximum)	11,503
QUININE :		
Imported by the State .. ..	Average	
	1926-30	188 kg. 600 gr. <sup>2</sup>
	1930	329 kg.
Imported by private persons ..	Average	400 kg.
Distributed gratuitously .. ..	Average	
	1926-30	159 kg. 400 gr.
	1930	166 kg.
Sold at reduced prices .. ..		0
Amount required .. .. .		600 kg.

### LEGISLATION.<sup>3</sup>

<sup>1</sup> The percentages of malaria cases among patients treated in dispensaries are as follows : 1926, 2.09 ; 1927, 2.29 ; 1928, 1.75 ; 1929, 2.82 ; 1930, 2.82.

<sup>2</sup> Practically all being quinine sulphate.

<sup>3</sup> Quinine is free from Customs duties.

### PANAMA.<sup>1</sup>

POPULATION .. .. .	1929	500,000
CASES OF MALARIA .. .. .		95,000-100,000 <sup>2</sup>
CASES TREATED .. .. .		—
QUININE :		
Distributed by the hospitals and dispensaries and by the Gor- gas Institute and the Health Department for their anti- malaria campaign .. .. .	Average per year	306 kg. 500 gr.
Amount required .. .. .		— <sup>3</sup>

<sup>1</sup> Data supplied by Dr. E. ICAZA, head of the laboratory of the St. Thomas's Hospital.

<sup>2</sup> These figures are obtained by calculating that 25 to 30 per cent of the population in the plains along the coast and 12 to 15 per cent of the population living at higher altitudes suffer from malaria each year.

After a year in which quinine was distributed in five villages situated on the banks of rivers, the Gorgas Memorial Institute has recorded the following parasite rates : Children 25.6 per cent, adults 16.2 per cent.

According to the annual report (1930) of the Medical Department of the United Fruit Company (page 42), the investigations made by KOMP in the Almirante Division, where the campaign against anopheles and the treatment of malaria patients are well organised, have shown an infection rate of 20.8 to 32.2 per cent among the population of all ages. More recently—i.e., on March 31st, 1932—Dr. CONNOR stated that the infection rate was 18 per cent.

In the districts where the anti-malaria campaign is not organised, this rate may easily reach 40 to 60 per cent.

According to the biennial report of the Health Department of the Republic of Panama (1931, pages 36 to 41), the examination of 328 children in various districts showed a spleen index of 46 per cent and a parasite index of 13.1 per cent. This examination took place in December 1929 at the beginning of the anti-malaria campaign organised by the Health Department.

<sup>3</sup> At the rate of 20 grm. per case, 1,900 to 2,000 kg. of quinine would be required. (S.)

## PERSIA.

POPULATION . . . . .	1929	9,000,000
CASES OF MALARIA . . . . .		— <sup>1</sup>
CASES TREATED . . . . .		— <sup>2</sup>
QUININE :		
Imported by the State.. . . .	Average 1928-30	140 kg. 700 gr.
Distributed gratuitously . . . . .	1930	357 kg.
Amount required . . . . .		— <sup>3</sup>

<sup>1</sup> Malaria exists in certain provinces, especially in Guilan and Mazanderan, on the shores of the Caspian Sea, where 50 per cent of the population are affected. In other districts (Shahirar), this proportion reaches 60 per cent.

According to GILMOUR, 1925, malaria is responsible for 19 to 40 per cent of all cases of disease during the year. At Teheran, 20 per cent of the patients attending the dispensaries are suffering from malaria. In the villages examined, the lowest rate was 85 per cent.

<sup>2</sup> The cases of malaria treated by doctors in the provinces are not recorded.

<sup>3</sup> Without knowing the number of patients, it is impossible to estimate the amount of quinine required. If it is estimated that 10 per cent of the population needs treatment, 18,000 kg. of quinine would be required per year. (S.)

## PERU.

POPULATION.. . . .	1929	6,350,000
CASES OF MALARIA . . . . .		— <sup>1</sup>
CASES TREATED . . . . .		—



QUININE :

Imported by the State .. .. .	Average	
	1928-31	2,855 kg.
	1931	2,283 kg.
Amount required .. .. .		— <sup>2</sup>

LEGISLATION : Law No. 2364. Quinine intended for malaria prophylaxis is exempt from Customs duty.

<sup>1</sup> The Government has appointed a Commission of Enquiry on Malaria, which is at present drawing up a plan of campaign (summer of 1932). Malaria constitutes a serious problem for Peru.

<sup>2</sup> In the absence of other data, this quantity may be estimated on the basis of the Government's imports—i.e., 2,855 kg. (S.)

PHILIPPINE ISLANDS.

POPULATION .. .. .	1929	12,175,000
CASES OF MALARIA .. .. .	Average	
	1926-30	65,296 <sup>1</sup>
	1930	64,251
CASES TREATED (in the hospitals of the Philippine Health Service only) .. .. .	Average	
	1926-30	3,242 <sup>2</sup>
	1930	4,089
QUININE :		
Imported by the State and private persons <sup>3</sup> .. .. .	Average	
	1921-30	1,769 kg.
	1930	2,341 kg.
Distributed gratuitously .. .. .	Average	
	1929-30	111 kg. 542 gr.
Sold at reduced prices .. .. .	Average	
	1929-30	8 kg. 261 gr.
Amount required .. .. .		513 kg. 609 gr. <sup>4</sup>

CINCHONA CULTIVATION. <sup>5</sup>

<sup>1</sup> Malaria is not a compulsorily notifiable disease.

This average includes cases discovered by the field personnel of the service (physicians, nurses, sanitary inspectors) in their routine inspections, cases treated in hospitals and dispensaries and those found by quinine distributors.

Considerable allowance should be made in respect of the figures of malaria cases found by the field personnel, as they were based on impression diagnosis. In 1931, 10,105 blood films from suspected malaria cases from different provinces were examined in the laboratories of the Division of Malaria Control of the Philippine Health Service; 3,578 of these, or 35.4 per cent, showed the presence of malaria parasites (2,108 benign tertian, 1,345 malignant tertian, 93 mixed infection and 32 quartan).

*Malaria mortality* (rate per 100,000 inhabitants) : 1926, 210.67 ; 1927, 166.33 ; 1928, 133.78 ; 1929, 127.02 ; 1930, 123.52.

The number of cases given must be much less than those actually existing. Indeed, in 1930, out of 64,251 cases recorded, 15,145 deaths were registered. This case mortality rate is so high that it could only be justified if all the cases were pernicious fevers, for which the case mortality rate is 26.6 per cent according to DEADERICK'S statistics. (S.)

<sup>2</sup> Progressively increasing ; the number of hospitals is also increasing.

Cases treated in dispensaries and by quinine distributors are not included, as the figures available are not sufficiently reliable.

<sup>3</sup> Data furnished by the Bureau of Customs. The amounts imported by the State or by private individuals are not separately recorded (quinine and cinchona alkaloids).

<sup>4</sup> This figure represents the average quantities imported by the Government rather than the amount required. (At the rate of 20 grm. per malaria patient, the amount of quinine required for the treatment of 65,296 cases would be 1,305 kg.) (S.)

<sup>5</sup> Successful attempts to develop cinchona plantations have been made since 1927 in the province of Bukidnon, where conditions appear to be favourable. The Philippine Islands hope in time to produce sufficient quinine for their own use. At present they are still dependent on the Dutch East Indies (see document C.H./Malaria/177).

## REUNION ISLANDS.

POPULATION .. .. .	1929	190,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (in the colonial hospital at Saint-Denis) .. .. .	Average 1924-30	161
QUININE :		
Imported .. .. .	Yearly average	500 kg. (approx.)
Distributed gratuitously (steadily increasing) .. .. .	Average 1924-30 1930	37 kg. 40 gr. 64 kg. 80 gr.
Amount required .. .. .		— <sup>2</sup>
CINCHONA CULTIVATION. <sup>3</sup>		

<sup>1</sup> *Malaria mortality* : very high.

Year	Absolute figures	Malaria mortality rate per 100,000 inhabitants	Percentage of all deaths
1924 .. .. .	776	—	16.44
1927 .. .. .	924	—	18.93
1929 .. .. .	1,431	753	26.84
1930 .. .. .	1,487	782	27.28

In 1924, the spleen index calculated on 7,840 schoolchildren was 0.43 per cent in the *Hauts* communes, 8.94 per cent in the *Sous le Vent* communes, and 21.62 per cent in the *Du vent* communes.

<sup>2</sup> Assuming that 10 per cent of the population needs treatment, 380 kg. of quinine would be required.

<sup>3</sup> At an altitude of 900 metres, there is a cinchona plantation with 20,000 trees, of which 2,000 can be exploited. Yield in 1930 : 2,500 kg. of bark with a content of 2.5-3 per cent.

### NORTHERN RHODESIA.

POPULATION .. .. .	1929	1,299,000 <sup>1</sup>
CASES TREATED (in hospitals, dispensaries, etc.) .. .. .	Average 1927-29	Europeans : 551 Natives : 1,960
		Total : 2,511
	1929	„ 3,026
QUININE :		
Imported by the State ..	Average 1928-30 1930	695 kg. 700 gr. <sup>2</sup> 897 kg.
Distributed gratuitously ..	Average 1928-30 1930	279 kg. 560 gr. 344 kg. 962 gr.
Sold at reduced prices ..	Average 1928-30 1930	498 kg. 900 gr. 558 kg. 835 gr.
Amount required .. .. .		769 kg. <sup>3</sup>

<sup>1</sup> Including 9,981 Europeans in 1929.

In 1929, there were 5 cases of blackwater fever out of 330 malaria patients treated in hospital ; in 1925 to 1929, the proportion was 5.5 per cent.

<sup>2</sup> Quinine, and 6 kg. 400 gr. quinine ethyl carbonate.

Owing to the existence of a previous stock, the quantity distributed exceeds the quantity imported.

<sup>3</sup> The reduction in the quantity required for the year 1931-32 is due to the fact that, from July 1st, the Rhodesian Railways will provide their own drug supplies.

The increase in the amount given will depend on the growth of the European population and on the medical facilities which the Government will be able to provide for the natives. Both depend to some extent on the success of the mining venture.

### SOUTHERN RHODESIA.

POPULATION .. .. .	1929	1,069,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED (in hospitals) .. .. .	Average 1927-31 1931	1,063 1,048

QUININE :

Imported by the State .. .. .	1930	324 kg.
	1931	324 kg.
Distributed annually by the Health Ministry .. .. .	1930	369 kg. 133 gr.
	1931	372 kg. 829 gr.
Distributed gratuitously .. .. .		— <sup>2</sup>
Distributed at reduced prices .. .. .		— <sup>3</sup>
Amount required .. .. .		372 kg. 600 gr. <sup>4</sup>

<sup>1</sup> Malaria is a serious disease both among Europeans and the native population. (Malaria and blackwater fever rank fourth in the list of diseases fatal to Europeans and cause 7.97 per cent of all deaths.)

Deaths caused by malaria and blackwater fever among Europeans (about 50,000) : 1927, 30 ; 1928, 38 ; 1929, 42 ; 1930, 28 ; 1931, 36 (24 of which were due to malaria and 12 to blackwater fever.)

<sup>2</sup> Insufficient data. A small quantity.

<sup>3</sup> Insufficient data. Mostly imported by the Government.

<sup>4</sup> It is thought that the quantity would be much greater if quinine were less expensive.

ST. KITTS—NEVIS (Leeward Islands).

POPULATION .. .. .	1929	31,000
CASES TREATED <sup>1</sup> (in hospital) .. .. .	1927	186
	1928	1,213
	1929	838
	1930	159

QUININE :

Imported by the State .. .. .	Average 1927-30	4 kg. 337 gr.
Bought on the market .. .. .	Average 1927-30	1 kg. 700 gr.
Distributed gratuitously .. .. .		0
Sold at reduced prices .. .. .		0
Amount consumed .. .. .	Average 1926-30	3 kg. 800 gr.
Amount required .. .. .		5 kg. 670 gr.

<sup>1</sup> The years 1928 and 1929 were very rainy, while 1930 was very dry.



### ST. LUCIA (Windward Islands).

POPULATION .. .. . 1929 57,000

CASES TREATED.. .. . Average <sup>1</sup>  
1926-30 2,038  
1930 1,324

#### QUININE :

Imported by the State .. ..	18 kg. 144 gr. per year.
Distributed gratuitously .. ..	13 kg. 500 gr. per year.
Sold at reduced prices .. ..	5 kg. per year (approx.).
Amount required .. .. .	18 kg. 144 gr. <sup>2</sup>

#### LEGISLATION. <sup>3</sup>

<sup>1</sup> The average has been calculated on the data of 1926, 1928, 1929 and 1930. No information is available for 1927.

<sup>2</sup> At the rate of 20 grammes per person, this quantity would be sufficient for 907 cases. For an average of 2,038 cases, 40 kg. 760 gr. would be required. (S.)

<sup>3</sup> Quinine is exempt from Customs duty.

### ST. VINCENT.

POPULATION .. .. . 1929 51,995

CASES OF MALARIA <sup>1</sup> .. .. . Average  
1926-30 694  
1930 458

CASES TREATED : Probably the same number.

#### QUININE :

Imported by the State .. .. .	Average	
	1925-30	8 kg. 650 gr.
	1930	2 kg. 320 gr.
Distributed gratuitously .. .. .	Average	
	1925-30	8 kg. 380 gr.
	1930	6 kg. 832 gr.
Amount required .. .. .		11 kg. 340 gr. <sup>2</sup>

<sup>1</sup> Malaria mortality (rate per 100,000 inhabitants) : 1925, 10 ; 1926, 22 ; 1927, 13 ; 1928, 29 ; 1929, 21 ; 1930, 23.

<sup>2</sup> At the rate of 20 grm. per person, this quantity would be sufficient for 558 malaria patients. (S.)

### SARAWAK.

POPULATION .. .. .	1929	600,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in hospitals and dispensaries) .. .. .	Average 1926-30	501
QUININE :		
Imported by the State.. ..	Average 1926-30	39 kg. 281 gr.
	1930	53 kg. 978 gr.
Distributed gratuitously ..		4 kg. 500 gr. (approx.).
Sold at reduced prices .. ..		+
Amount required .. .. .		54 kg. 432 gr.

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<sup>1</sup> Malaria is endemic in this State ; it is particularly severe in certain areas. The Medical and Health Administrations make special provision for the care of the inhabitants of these areas. Malaria is often brought in by immigrants from China and Johore.

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### SIAM.

POPULATION .. .. .	1929	11,506,000
CASES OF MALARIA .. .. .		1
CASES TREATED .. .. .	Average 1926-27—1930-31	5,311
	1930-31	7,904
QUININE :		
Imported by the State.. ..	1930	1,422 kg.
	Average 1928-29—1930-31	2,055 kg. 666 gr.
Distributed gratuitously ..	1930	25 kg.
Sold at reduced prices .. ..		502 kg.
Amount required .. .. .		60,000 kg.

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<sup>1</sup> In 1930-31, there were 40,265 deaths from malaria. In 1929, the malaria mortality rate was 359 per 100,000 inhabitants.

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# SIERRA LEONE.

POPULATION .. .. .	1929	1,600,000
CASES OF MALARIA .. ..		1
CASES TREATED (in hospitals and dispensaries ; steadily increasing) .. .. .	Average 1926-30 1926 (minimum) 1930 (maximum)	5,132 3,749 6,095
QUININE :		
Imported by the State..		136 kg. per year. <sup>2</sup>
Distributed gratuitously		31 kg. 750 gr. per year.
Sold at reduced prices ..		0
Amount required .. ..		534 kg. 320 gr. <sup>3</sup>

<sup>1</sup> The examination of 2,671 children showed that, in 1930, the spleen index was 46 per cent at Freetown and 79 per cent in the rural schools. The parasite index was 45 per cent (57 per cent among adults in the northern provinces in 1927 to 1929).

<sup>2</sup> Quinine bihydrochloride.

<sup>3</sup> This amount depends on the purchase price, and, in particular, on the cost of distribution, which prevents the extension of quinine therapy. If the price of quinine were reduced, however, the consumption would reach the amount indicated.

In view of the high endemicity, as shown by the figures quoted, and assuming that at least 10 per cent of the population ought to be treated, the amount of quinine required, at the rate of 20 grm. per case, would be 3,200 kg. (S.)

# SOLOMON ISLANDS.

POPULATION .. .. .	1929	151,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in the Tulagi Government Hospital) .. .. .	Average 1926-30	150
QUININE :		
Imported by the State.. .. .	1930	98 kg. 427 gr. <sup>2</sup>
Distributed gratuitously .. .. .	1930	89 kg. 529 gr. <sup>2</sup>
Sold at reduced prices .. .. .		130 gr.
Amount required .. .. .		102 kg. 303 gr.

<sup>1</sup> Malaria is widely prevalent throughout the Protectorate. Among natives under 12 years the spleen rate is 80 per cent, and, over 12 years, 40 per cent ; 80 per cent of the children are carriers of malaria parasites. Cases of blackwater fever have been more frequent since 1915. The malaria percentage of all admissions to Tulagi Hospital is 22.7 per cent (1926 to 1930).

<sup>2</sup> Tablets, ampoules, sulphate, bihydrochloride.

### FRENCH SOMALI COAST.

POPULATION .. .. .	1929	90,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (in the hospital at Jibuti) ..	Average	
	1926-30	19
	1930	30
QUININE :		
Imported by the State.. .. .		15 to 20 kg. per year
Amount required .. .. .		— <sup>2</sup>

<sup>1</sup> There is no malaria in the town of Jibuti. The patients all come from outside.

<sup>2</sup> 17 kg. 500 gr. represents the average amount of quinine imported by the State; it is probably also used for prophylactic treatment by Europeans. (S.)

### BRITISH SOMALILAND.

POPULATION .. .. .	1929	345,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED (in hospitals and by the	Average	
“patrols”) .. .. .	1926, 29, 30	1,568
	1930	1,760
QUININE :		
Distributed gratuitously .. .. .	Average	
	1925-30	23 kg. 246 gr. <sup>2</sup>
	1930	48 kg. 500 gr.
Amount required .. .. .		<sup>3</sup>

<sup>1</sup> Clear epidemic aspect. Malignant tertian is the most prevalent. Benign tertian is always rare and sometimes quite absent, as, for instance, in 1927. In certain years and certain regions—for instance, in 1926—quartan is more prevalent than benign tertian.

<sup>2</sup> A sufficient quantity of quinine is left at the coffee shop, which is the local meeting-place.

<sup>3</sup> Although there is no information, it may be assumed that the necessary amount would be equal to that distributed free of charge in 1930. (S.)

### ITALIAN SOMALILAND.

POPULATION .. .. .	1929	1,030,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED .. .. .	1930	30,000



QUININE :

Distributed gratuitously .. .. .	+ <sup>2</sup>
Amount required .. .. .	— <sup>3</sup>

<sup>1</sup> The malaria zones, in which the 30,000 cases mentioned occurred, are situated along the two great rivers, the Webi Shebeli and the Juba.

<sup>2</sup> No information regarding the amount of quinine used.

<sup>3</sup> At the rate of 20 grm., and on the basis of the 30,000 cases treated in 1930, 600 kg. of quinine would be required. (S.)

SPAIN.

POPULATION .. .. . 1929 22,761,000

CASES OF MALARIA .. .. . — <sup>1</sup>

CASES TREATED (in anti-malaria dispensaries) <sup>2</sup> ..	Average	
	1929-31	38,971 <sup>3</sup>
	1931	38,651

QUININE :

Imported into the country ("Comercio de Importacion", partida 941) <sup>4</sup> .. .. .	Average	
	1925-29	4,129 kg.
	1929	5,828 kg.

Purchased by the Central Anti-Malaria Commission .. .. .	Average	
	1929-31	1,568 kg.
	1931	1,684 kg.

Distributed gratuitously .. .. .	Average	
	1929-31	1,568 kg. <sup>5</sup>
	1931	1,684 kg.

Sold at reduced prices : the distribution will begin in 1932.

Amount required (according to PITTALUGA) ..	9,000 kg. <sup>6</sup>
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LEGISLATION : Since 1932, distribution of "Government quinine", the municipalities paying the Central Anti-Malaria Commission for the quinine distributed by the dispensaries situated in their area. The chemists in the malaria zones are compelled to sell Government quinine at a price fixed by the said Commission.

<sup>1</sup> According to PITTALUGA (document C.H./Malaria/58) 300,000 in 1925. According to the same author (document C.H./Malaria/26) 250,000 cases in 1924. (Estimate based on a malaria case mortality of 0.8 per cent.)

Mortality from malaria (*International Health Year-Book*) :

	Absolute figures	Rate per 100,000 inhabitants
1927 .. .. .	832	3.73
1928 .. .. .	736	3.28
1929 .. .. .	567	2.51

<sup>2</sup> The treatment of malaria cases in hospitals is much less usual in Spain than in other countries. (S.) The figures from 1925 to 1931 show a progressive increase, which is probably due to the increase in the number of dispensaries.

<sup>3</sup> The figures for previous years have not been used, as the Anti-Malaria Service was not sufficiently developed.

<sup>4</sup> As there is no Government monopoly, the chemists can purchase quinine freely abroad. The sale to the public is free outside the zones declared to be infected with malaria.

<sup>5</sup> This quantity corresponds to 43 grm. per case treated in 1931 and 36.9 grm. in 1929. (S.) (1931 : 1,684 grm., and 38,651 cases treated.)

<sup>6</sup> According to PITTALUGA (document C.H./Malaria/58), the quantity of quinine imported annually—about 6,000 kg.—is not sufficient for the 300,000 cases of malaria per year, and, at the rate of 30 grm. per case, the figure would have to be 9,000 kg. (Imports: 1916, 5,234 kg.; 1917, 7,317; 1918, 3,859; 1919, 7,979; 1920, 7,634; 1921, 3,774; 1922, 6,330; 1923, 6,300.)

### STRAITS SETTLEMENTS.

POPULATION .. .. .	1929	1,132,000
CASES OF MALARIA .. .. .		1
CASES TREATED (in hospitals, dispensaries and travelling dispensaries of Singapore, Penang and Malacca) .. .. .	Average 1927-31 1931	21,946 15,868
QUININE OR SECONDARY ALKALOIDS :		
Imported by the Government (in Sin- gapore, Penang and Malacca) ..	Average 1927-31 1931	367 kg. 720 gr. 329 kg. 624 gr.
Bought on the market .. .. .	Average 1927-31 1931	20 kg. 23 gr. 3 kg. 455 gr.
Distributed gratuitously (by the hos- pitals and dispensaries).. .. .	1931	113 kg. 694 gr.
Sold at reduced prices .. .. .		0
Amount required .. .. .		342 kg. 411 gr. <sup>2</sup>

<sup>1</sup> The spleen index, which was not very high in 1921, as shown by the reports, decreased in 1929, the highest being 2.3 per cent in the areas under control and 18.6 per cent in the *kampongs*, where no control measures have been instituted. According to the annual report (1930) of the Medical Department of the Straits Settlements, the admissions for malaria in the Government hospitals in 1930 represented 40.9 per cent of admissions for all infectious or avoidable diseases. In 1930, 5,023 deaths from malaria were recorded—i.e., 29.9 per cent of the deaths due to avoidable diseases. The deaths due to “non-specified fevers” represent 12.2 per cent of the deaths from avoidable diseases. In the Government hospitals, 24.5 per cent of the deaths from avoidable diseases are due to malaria. This percentage is equivalent to that of the deaths due to tuberculosis.

Malaria case-mortality rate in 1930 in Government hospitals was 7.53 per cent.

Malaria mortality in the country in 1930 : 5,023 deaths for 1,168,806 inhabitants—i.e., a rate of 429 per 100,000. During the years 1921-1925, the case mortality rate according to HOFFMAN (*op. cit.*, page 183) was 433 per 100,000.

<sup>2</sup> At a rate of 20 grammes of quinine for each malaria patient treated from 1927 to 1931, the annual requirement would be 438 kg. 920 gr. of quinine.

## SUDAN.

POPULATION .. .. .	1929	6,469,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED (in hospitals and dis- pensaries) .. .. .	Average 1928-31	107,194
QUININE :		
Imported by the State .. ..		About 907 kg. 200 gr. per year.
Imported by private persons ..		<sup>2</sup>
Distributed gratuitously .. ..		About 453 kg. 500 gr.
Amount required .. .. .		About 1,134 kg. <sup>3</sup>

<sup>1</sup> The malaria incidence varies greatly according to the rainfall.

<sup>2</sup> The annual import of quinine (other than that brought in by the Government) is very small, since the sale of such privately imported stocks is confined to the few towns in which private pharmacies exist.

<sup>3</sup> Varies with the incidence. This figure is likely to show a steady rise following the progress of medical work generally and the consequent increase among the more primitive people of an appreciation of the value of quinine in the treatment of malaria. At the rate of 20 grm. per patient, the amount required would be 2,143 kg. 880 gr. (S.)

## SURINAM.

POPULATION .. .. .	1929	151,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED .. .. .	Average 1928, 30, 31 1931	13,845 <sup>2</sup> 16,816
QUININE :		
Imported by the State .. .. .	Average 1929-31 1931	140 kg. 75 kg.
Bought on the market and distributed gratuitously .. .. .	Average 1929-31	86 kg. 666 gr.
Distributed either gratuitously or at reduced prices .. .. .	Average 1928-31 1931	94 kg. 98 kg.
Amount required .. .. .		90 to 100 kg. <sup>3</sup>

LEGISLATION.<sup>4</sup>



<sup>1</sup> It is impossible to fix this figure, as the disease is especially prevalent among the negroes and the Indians in the inaccessible interior of the country.

In the cultivated districts, the spleen index varies from 0 to 20 per cent (40 per cent in 1911). In the interior, which is inhabited by negroes and Indians, it is 50 to 75 per cent.

<sup>2</sup> Not including cases treated by private physicians. No information for 1929.

<sup>3</sup> At the rate of 20 grm. per patient, 13,845 cases would require 276 kg. 900 grm. (S.)

<sup>4</sup> Quinine is distributed free of charge to the plantation workers, to needy persons, negroes and Indians. Against payment of a small amount (10 cents for 3 days' treatment) it is also issued to the remainder of the population in the cultivated districts.

Ethyl carbonate, hydrochloride, bihydrochloride, sulphate, bisulphate, carbonate, salicylate and tannate of quinine, together with compound plasmoquinine, are exempt from Customs duty.

## SWAZILAND.

POPULATION .. .. .	1929	130,000
CASES OF MALARIA .. .. .		1
CASES TREATED .. .. .		—
QUININE :		
Imported by the State.. .. .	Average	
	1925-30	26 kg. 716 gr. <sup>2</sup>
	1930	40 kg. 313 gr.
Distributed gratuitously .. .. .		— <sup>2</sup>
Sold at cost price : A very small quantity.		
Amount required .. .. .		56 kg. 700 gr. <sup>3</sup>

<sup>1</sup> The incidence of malaria in Swaziland varies greatly from year to year. Over the western half of the country, it is practically unknown, as most of this region is above an altitude of 3,500 feet (1,000 metres). The disease occurs every autumn (March and April) in the low veld in the eastern half of the country ; but the population here, both white and native, is small.

The variation in the incidence occurs in the middle veld at an altitude of 1,000 to 3,000 feet (300 to 900 metres). In some years, malaria attacks a large proportion of the population in this part, while, in other years, it is almost absent. In 1931 and 1930, for instance, it might almost be said that there was no malaria in this area, while, in 1929, it was very prevalent and, in 1928 and 1927, it was moderately severe. Although no exact figures can be given, it is estimated that, in good years, there are fewer than 1,000 cases of malaria and, in bad years, from 7,000 to 12,000 cases.

<sup>2</sup> Almost all the quinine imported.

<sup>3</sup> In good years, the amount of quinine imported is more than sufficient but, in years when malaria is prevalent, it is not nearly sufficient for the adequate treatment of all cases. An annual amount of about 2,000 oz. (56 kg. 700 gr.) would be required ; the surplus from the mild years could be used in the bad years.

At present, quinine is distributed free of charge at the headquarters of all districts and at all police posts, mission stations and trading posts in the malarial areas, but the natives do not take full advantage of these facilities and, if adequate distribution is to be effected, it would have to be done by kraal-to-kraal visits during outbreaks of malaria.



## SYRIA AND LEBANON.

POPULATION..	1929	2,750,000
CASES OF MALARIA ..		— <sup>1</sup>
CASES TREATED ..		—
QUININE :		
Imported into the country ..	Average 1930-31 1931	5,878 kg. 4,183 kg.
Distributed gratuitously ..		1,800 kg. <sup>2</sup>
Amount required ..		5,878 kg.

LEGISLATION : Since 1925 imports of quinine have been free from duty.

<sup>1</sup> Malaria ranks before most other diseases as regards both general morbidity and mortality; it is, however, steadily decreasing, thanks to preventive and curative quinine treatment and sanitation measures.

Three areas, the Sanjak of Alexandretta, the Gharb or the Oronte Valley and the country round Damascus are particularly infected.

As regards the area and town of Alexandretta, we have received the following information :

Spleen index (percentage)				Hospital treatment for malaria in proportion to all admissions (percentage)			
1920 ..	90	1920 ..	48				
1925 ..	40	1926 ..	32				
1931 ..	20	1931 ..	16				

In the army of occupation, 2,793 cases, confirmed by microscopic examination, were recorded in 1920, 1,527 in 1922 and 739 in 1930. The number of primary infections was : 1,214 in 1920, 437 in 1922 and 86 in 1929.

<sup>2</sup> Of this quantity, 1,000 kg. was intended for the army and 800 kg. was distributed by the State health services, in addition to 25,000 ampoules which, reckoned at 0.25 grm. each, would amount to 6 kg. 250 gr. of quinine.

## TANGANYIKA TERRITORY.

POPULATION..	1929	4,825,000
CASES OF MALARIA ..		1
CASES TREATED (in hospitals, dispensaries, etc.) ..	Average 1925-29	30,128
	1925 (minimum)	27,277
	1928 (maximum)	33,731

QUININE :

Imported by the State . . . .	Average	
	1928-30	607 kg. 748 gr. <sup>2</sup>
	1930	688 kg. 719 gr.
Imported by private persons . .	Average	
	1926-31	242 kg. 640 gr. <sup>3</sup>
Distributed gratuitously (steadily increasing) . . . . .	Average	
	1921-30	477 kg. 775 gr.
	1930	904 kg. 982 gr.
Sold at reduced prices (steadily increasing) . . . . .	Average	
	1926-30	79 kg. 520 gr.
	1930	206 kg. 763 gr.
Amount required :		
(a) By the State.. . . .		874 kg. 804 gr.
(b) By commercial firms . .		163 kg. 732 gr.
Total . . . . .		1,038 kg. 536 gr. <sup>3</sup>

	Malaria mortality (as a percentage of the total mortality)	Malaria morbidity (as a percentage of all cases of infectious diseases)
1925 .. . . .	21.46	26.40
1926 .. . . .	13.75	21.40
1927 .. . . .	15.63	18.65
1928 .. . . .	18.56	22.40
1929 .. . . .	8.78	21.43

<sup>2</sup> Including secondary alkaloids of cinchona and an average quantity of 36 kg. 150 gr. of alkaloid mixtures.

<sup>3</sup> To these figures must be added a considerable quantity of quinine, which is imported for sale to the public by other firms than pharmacies and for which there are no statistics. The native authorities also import a certain quantity for distribution to the inhabitants. It is estimated that this quantity will increase as and when new tribal nursing formations are created.

**FRENCH TOGOLAND (Mandated Territory).**

POPULATION . . . . .	1928	188,000
CASES OF MALARIA . . . . .		— <sup>1</sup>
CASES TREATED (in hospital; greatly increasing) . . . . .	Average	
	1926-30	27,188
	1930	39,641

QUININE :

Imported by the State .. .. .	Average	
	1922-30	92 kg.
	1930	167 kg.
Imported by private persons .. ..	Average	
	1922-30	42 kg. 900 gr.
	1930	50 kg.
Distributed gratuitously .. .. .	Average	
	1922-30	92 kg. 500 gr.
	1928	180 kg.
	1929	148 kg.
	1930	167 kg.
Amount required .. .. .		250 kg. <sup>2</sup>

<sup>1</sup> Nearly 22 per cent of the inhabitants of Togo were treated in hospital in 1930 for malaria, each patient receiving 4 to 6 grm. of quinine.

<sup>2</sup> At the rate of 20 grm. per treatment and on the basis of the number of cases treated in 1930, 792 kg. 820 gr. of quinine would be required. (S.)

TRANS-JORDAN.

POPULATION .. .. .	1929	300,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED.. .. .	Average	
	1926-30	3,133
	1930	1,476
QUININE :		
Imported by the State .. .. .	Average	
	1926-30	17 kg. 800 gr.
Imported by private persons .. ..	Average	
	1926-30	24 kg.
Purchased on the spot and distributed gratuitously .. .. .	Average	
	1926-30	10 kg.
Distributed gratuitously.. .. .	Average	
	1926-30	18 kg. 800 gr.
	1930	14 kg.
Sold at reduced prices .. .. .		0
Amount required .. .. .		200 kg. <sup>2</sup>

LEGISLATION.<sup>3</sup>

<sup>1</sup> The highest malaria rate is found in the Jordan Valley and among the population engaged in temporary work in that area. The examination of the whole population in order to establish the spleen rate has shown a remarkable decrease in the number of cases ; as the annual report for 1930 shows, this decrease is confirmed by a marked decline in the spleen index among the children of the towns inspected :

SPLEEN INDEX (percentage)				
1926	1927	1928	1929	1930 (out of 6,191 children)
25.3	19.5	14.9	9.5	6.6

<sup>2</sup> On account of present financial stringency only 20 kg. can be used.  
<sup>3</sup> All cases notified to Government clinics can be treated free of charge with quinine.

### TRINIDAD (including Tobago).

POPULATION .. .. .	1929	403,000
CASES OF MALARIA .. .. .		<sup>1</sup>
CASES TREATED <sup>2</sup> (in hospitals only) .. .. .	Average 1926-30	808
QUININE :		
Imported by the State .. .. .	1930	171 kg. 260 gr.
Imported by private persons .. .. .	1930	222 kg. 270 gr.
Distributed gratuitously .. .. .	1930	11 kg. 200 gr. <sup>3</sup>
Sold at reduced prices .. .. .	1930	5 kg. 811 gr.
Amount required .. .. .		141 kg. 750 gr. <sup>4</sup>

LEGISLATION : Any person in possession of an authorisation may sell quinine in a post office, police station or forestry station, provided it is not within two miles of a licensed chemist.

#### <sup>1</sup> Malaria mortality :

Year	Rate per 100,000 inhabitants	Year	Rate per 100,000 inhabitants
1921 .. .. .	244	1926 .. .. .	209
1922 .. .. .	225	1927 .. .. .	169
1923 .. .. .	201	1928 .. .. .	218
1924 .. .. .	199	1929 .. .. .	161
1925 .. .. .	206	1930 .. .. .	158

<sup>2</sup> The number of cases treated outside the hospitals is not known.

<sup>3</sup> This quinine was distributed in the schools. The amount issued to the Government services is not stated.

<sup>4</sup> For the Government departments and gratuitous distribution.

### TUNIS.

POPULATION .. .. .	1929	2,200,000
CASES TREATED .. .. .	1930	18,374 <sup>1</sup>



QUININE :

Imported by the State.. .. .	1930	462 kg. <sup>2</sup>
Distributed gratuitously .. .. .	Average 1929-30	289 kg. 487 gr.
	1930	296 kg. 475 gr.
At fixed prices <sup>3</sup> (sold or at any rate deposited with shopkeepers) .. ..	1930	110 kg.
Amount required .. .. .		1,660 kg. <sup>4</sup>

LEGISLATION : A Decree of June 15th, 1909, regulates the sale of monopoly quinine to the public. The tablets are marked "H.T. ".

<sup>1</sup> This figure falls short of the actual figure, as a number of physicians have not noted all cases of malaria treated by them, while the cases treated in the hospitals are not counted.

<sup>2</sup> Hydrochloride, 412 kg. ; tannate, 480 kg. ; formiate, 5 kg.

<sup>3</sup> The Director of Indirect Taxation supplies the tobacco retailers in all places with boxes containing 10 pills of quinine hydrochloride. These boxes are resold at cost price plus the cost of distribution. In 1930 : 55,000 boxes of 10 pills = 110 kg. of quinine.

<sup>4</sup> More extensive quinine treatment is contemplated, to be applied, not only to the patients, but also to afebrile gamete-carriers. Attempts will be made to continue this treatment until it is established by several blood-tests that parasites have entirely disappeared from the blood.

TURKEY.

POPULATION .. .. .	1929	14,200,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (steadily increasing) ..	Average 1928-31	285,856 <sup>2</sup>
	1931	504,901
QUININE <sup>3</sup> :		
Imported into the country .. ..	Average 1928-31	20,692 kg. 500 gr.
Imported by the State.. .. .		6,660 kg. 500 gr.
Imported by private persons ..	Average 1928-31	14,030 kg.
Distributed gratuitously by the Ministry of Public Health ..	Average 1928-31	3,428 kg. 750 gr.
Bought by the Red Cross .. ..	Average 1928-31	1,747 kg. 250 gr.
		<hr/>
	Total ..	5,176 kg.

Sold at cost price by the Ministry of

Public Health (Government  
quinine) .. .. .

Average

1928-31

1,484 kg. 500 gr.

Amount required .. .. .

20,000 to 25,000 kg.<sup>4</sup>

# LEGISLATION.<sup>5</sup>

<sup>1</sup> In the areas stated to be "anti-malaria campaign zones", malaria and all its clinical forms were made notifiable by Article 97 of the Public Health Law of May 6th, 1930. Under the regulations regarding infectious diseases which were in force before the promulgation of this law, the Ministry of Public Health and Social Welfare was entitled to make any disease notifiable if it spread to an alarming extent. Thus, in the anti-malaria campaign zones, malaria was added to the list of notifiable diseases in 1925.

Malaria is not notifiable in the areas which are not organised as anti-malaria campaign zones.

According to the report by Dr. HUSAMETTIN Bey at the Algiers Congress (March 1930), the population of the anti-malaria zones represented about 20.8 per cent of the total population.

*Malaria mortality* : According to the *International Health Year-Book*, Vol. 5, there were 2,093 deaths from malaria in 1927 and 1,834 in 1928—i.e., about 12.9 per 100,000 inhabitants.

<sup>2</sup> 1928, 125,666 ; 1929, 207,252 ; 1930, 305,607.

These figures only refer to the anti-malaria zones, but many cases of malaria are treated outside these zones.

<sup>3</sup> Mostly basic hydrochloride. The Ministry also purchases euquinine, but in smaller quantities.

<sup>4</sup> This quantity would be sufficient for 1,000,000 to 1,125,000 malaria patients. In order to treat the 504,901 cases which occurred in 1931, 10,098 kg. would have been sufficient (S.)

<sup>5</sup> Turkish legislation on malaria (Law of April 4th, 1917) seems to be based on the Italian legislation ; it provides for the purchase of quinine by the State. There is a factory at Constantinople preparing tablets from quinine purchased in Europe.

According to regulations drawn up in conformity with the provisions of Law No. 796, all departments, even outside the anti-malaria campaign zones, must include the necessary funds in their budget for the purchase of quinine for free distribution.

## UGANDA.

POPULATION .. .. . 1929 3,411,000

CASES OF MALARIA .. .. . <sup>1</sup>

CASES TREATED (the number of Average

patients treated in and out of 1926-30 35,740 <sup>2</sup>

hospitals is steadily growing).. 1930 46,604

### QUININE :

Imported by the State.. .. Average

1921-30

368 kg. 700 gr.

1921

156 kg. 500 gr.

1930

595 kg.

Distributed gratuitously .. Average

1921-30

368 kg. 700 gr. (approx.).

1930

595 kg. (approx.).

Sold at cost price .. .. .	0 <sup>3</sup>
Amount required .. .. .	— 4

<sup>1</sup> Malaria mortality :

	Deaths (among the patients treated)
1920 .. .. .	26
1921 .. .. .	25
1922 .. .. .	31
1923 .. .. .	37
1924 .. .. .	25
1925 .. .. .	48
1926 .. .. .	91
1927 .. .. .	55
1928 .. .. .	61
1929 .. .. .	30
1930 .. .. .	80

The average for the period 1926 to 1930 is 67.4 deaths among 2,644 malaria patients treated in hospital—i.e., a case mortality rate of 2.54 per cent. (S.)

<sup>2</sup> This increase does not indicate an increase in malaria ; it is due to the fact that, with the development of the medical services, more cases are treated than formerly.

<sup>3</sup> Since August 1st, 1931, steps have been taken to sell quinine to the public at almost cost price in the Government hospitals and dispensaries.

<sup>4</sup> It is impossible to state the amount required, as it increases every year with the development of the medical services. At the rate of 20 grm. per case, 46,604 malaria patients would require 932 kg. (S.)

## UNION OF SOUTH AFRICA.

POPULATION .. .. . 1929 7,895,000

CASES OF MALARIA .. .. . 1

CASES TREATED.. .. . —

### QUININE :

Imported by the State	Average 1926-30	614 kg. 385 gr.
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Distributed gratuitously .. .. .	From October 1st, 1929, to February 28th, 1931	1,035 kg. 466 gr.
	During 12 months	730 kg. 900 gr.

Sold at reduced prices <sup>2</sup>

Amount required .. 635 kg. 40 gr. (approx.).

<sup>1</sup> Malaria is only notifiable in certain parts of the Union. The disease is only prevalent in the Provinces of Transvaal, Natal and Zululand. According to the report by SWELLENGREBEL (see annual report for 1931 by the Department of Public Health of the Union of South Africa), among a group of persons examined in a district in the Transvaal, where quinine is not used for prophylactic purposes, a spleen index of 77 per cent was observed (among 39 children). In another group of inhabitants who did not use mechanical protection, this index reached 88 per cent (among 26 children).

<sup>2</sup> In some cases, quinine is sold at reduced prices to colonists in outlying districts.

## UNION OF SOVIET SOCIALIST REPUBLICS.

POPULATION .. .. .	1929	157,500,000
CASES OF MALARIA .. .. .	Average	
	1925-29	3,924,456 <sup>1</sup>
	1929	2,993,072
CASES TREATED.. .. .		—
QUININE :		
Imported by the State .. .. .	1929	58,000 kg.
Amount required .. .. .		— <sup>2</sup>
CINCHONA CULTIVATION. <sup>3</sup>		

<sup>1</sup> Malaria is notifiable.

Year	Cases of malaria	Rate per 10,000 inhabitants
1925 .. .. .	5,124,719	311.7
1926 .. .. .	4,523,696	253.8
1927 .. .. .	3,684,041	227.2
1928 .. .. .	3,296,752	183
1929 .. .. .	2,993,072	—

<sup>2</sup> According to RUBAKIN, the Five Year Plan provides for 55,000 kg. of quinine for the Russian Socialist Federal Soviet Republic ; as the population of this area corresponds to about four-fifths of the population of the malarial areas of the Union of Soviet Socialist Republics, the total amount required would be 68,000 kg.

This quantity represents slightly less than 20 grm. per malaria patient (average 1925 to 1929). (S.)

<sup>3</sup> Experiments in cinchona-growing are being made in Turkestan and in the Caucasus.

## UNITED STATES OF AMERICA.

POPULATION .. .. .	1929	120,957,000 <sup>1</sup>
CASES OF MALARIA .. .. .		— <sup>2</sup>
CASES TREATED.. .. .		—
QUININE :		
Imported into the country .. ..	Average	107,970 kg. 600 gr. <sup>3</sup>
	1929-30	+ 55,268 kg. <sup>4</sup>
The total imports may therefore be estimated at		163,238 kg. 600 gr. <sup>5</sup>
Distributed gratuitously .. ..		— <sup>6</sup>
Sold at reduced prices .. .. .		— <sup>6</sup>
Amount required .. .. .		— <sup>7</sup>



<sup>1</sup> In 1929, the population of the malaria districts was 40,600,000.

<sup>2</sup> In 1916, VON EZDORF, taking as a basis the cases notified, estimated the morbidity rate at 4 per cent for eight States (Alabama, Arkansas, Florida, Kentucky, Louisiana, North Carolina, South Carolina, Tennessee) with a total of 15,000,000 inhabitants. In 1929, when the notification of malaria had become compulsory in thirty-five States, the same author, taking the morbidity rate of 4 per cent as a basis, estimated the number of malaria patients at 1,000,000 in twelve States with a population of 25,000,000 inhabitants. K. T. MAXCY, taking as a basis a case mortality rate of 0.5 per cent, also gives the figure of about 1,000,000 malaria patients for these same States (*Public Health Report*, May 25th, 1923).

*Malaria Mortality :*

	Estimated population	Deaths
1925 .. .. .	38,123,268	3,255
1926 .. .. .	39,742,978	3,128
1927 .. .. .	39,362,693	3,341
1928 .. .. .	39,982,405	5,824
1929 .. .. .	40,602,117	5,092

i.e., a mortality rate of 12.5 per 100,000 inhabitants for the malaria districts and 4.2 for the total population. (S.)

Blackwater fever does not exist in the United States.

<sup>3</sup> About half is in the form of sulphate and the remainder in the form of other quinine salts and derived alkaloids (52,801 and 55,169 kg. respectively).

<sup>4</sup> This quantity corresponds to 884,293 kg. 200 gr. of imported cinchona bark, most of which is used for making tonics against colds.

<sup>5</sup> According to the report of the Department of Commerce, the following amounts of quinine and other quinine salts were re-exported :

	kg.	grm.		kg.	grm.
1923 .. .. .	1,077	500	1927 .. .. .	847	806
1924 .. .. .	1,288	700	1928 .. .. .	736	816
1925 .. .. .	3,572	500	1929 .. .. .	695	285
1926 .. .. .	3,436	985	1930 .. .. .	647	457

Every year, an amount of 2,721 kg. 600 gr. of quinine bisulphate is used for denaturing alcohol.

<sup>6</sup> In the United States, quinine is generally not distributed by the Health Administration or sold by the State at reduced prices.

<sup>7</sup> At the rate of 20 grm. per patient, the quantity of quinine required for 1,000,000 patients would be 20,000 kg. (S.)

## VENEZUELA.

POPULATION .. .. .	1929	3,157,000
CASES OF MALARIA .. .. .		145,222 <sup>1</sup>
CASES TREATED .. .. .		—
QUININE :		
Imported by the State .. .. .	Average	
	1924-31	249 kg. 563 gr.
Imported by private persons .. .. .	Average	
	1922-29	9,647 kg. 400 gr.
Distributed gratuitously .. .. .		249 kg. 563 gr.
Amount required (for the State and for free distribution) .. .. .		240 kg. <sup>2</sup>

LEGISLATION : There are no Customs duties on imports of quinine.

<sup>1</sup> According to the conclusions of the National Health Conference held at Caracas on December 19th, 1931, the malaria infection rate is 4.6 per cent for the entire population and 2.85 per cent for children from 5 to 14 years.

According to RIVIERO SALDIVIA (communication to the Algiers Congress of 1931, Vol. 1, page 289), malaria caused 8,000 deaths out of a total of 56,000 in 1929; this represents a rate of 253.4 per 100,000 inhabitants. During the period 1908 to 1912, according to HOFFMAN, *op. cit.*, malaria mortality amounted to 305.6 per 100,000.

<sup>2</sup> This figure represents only the amount intended by the Government for free distribution. At the rate of 20 grm. per patient, 2,904 kg. would be required for 145,222 patients. (S.)

### VIRGIN ISLANDS (British).

POPULATION .. .. .	1929	5,000
CASES TREATED (in hospitals and dispensaries) ..	Yearly average	50
QUININE :		
Imported by the State .. .. .	Per year	255 grm.
Distributed gratuitously .. .. .		0
At reduced prices .. .. .		0
Amount required .. .. .		255 grm.

### YUGOSLAVIA.

POPULATION .. .. .	1929	13,700,000
CASES OF MALARIA .. .. .	Yearly average	500,000 to 600,000 <sup>1</sup>
CASES TREATED (in hospitals, dispensaries, the insurance companies, army, etc.) .. ..	Average 1926-30	300,000 to 350,000
QUININE :		
Imported by the State .. .. .	Average 1926-30	2,500 to 3,000 kg.
	1930	2,800 kg.
Imported by private persons .. .. .	Yearly average	1,000 to 1,500 kg.
Distributed gratuitously .. .. .	Average 1926-30	2,500 to 3,000 kg.
Sold at reduced prices .. .. .		0 <sup>2</sup>
Amount required .. .. .		3,500 to 4,000 kg. <sup>3</sup>

LEGISLATION : Law of April 29th, 1931, regarding the anti-malaria campaign.

<sup>1</sup> Malaria is not notifiable.

<sup>2</sup> The Government does not sell quinine. All the quinine imported by the Government is distributed free of charge.

<sup>3</sup> The amount required for the army is not included ; at the rate of 20 grm. per case, 11,000 kg. of quinine would be required. (S.)

### ZANZIBAR.

POPULATION .. .. .	1929	220,000
CASES OF MALARIA .. .. .		— <sup>1</sup>
CASES TREATED (steadily increasing) .. ..	Average 1926-30	7,342
	1930	8,993
QUININE :		
Imported by the State .. .. .	Average 1926-30	77 kg. 400 gr.
Distributed gratuitously .. .. .	Average 1926-30	75 kg.
Amount required .. .. .		75 kg. <sup>2</sup>

<sup>1</sup> In 1930, malaria represented 6.53 per cent of all cases treated.

<sup>2</sup> At the rate of 20 grm. per case, the amount required would be 174 kg. 600 gr. (S.)

# SYNOPTIC TABLE OF THE DATA REGARDING THE ENQUIRY INTO

(As this table is bi-lingual, the continental system has been adopted — the English

PAYS	Population (en milliers)  (in 1,000's)  1929	Cas traités Cases treated		Quinine importée par le gouvernement Quinine imported by the Government		Quinine distribuée gratuitement <sup>1</sup> Quinine distributed free <sup>1</sup>
		Moyenne <sup>1</sup> Average <sup>1</sup>	Dernière année <sup>2</sup> Last year <sup>2</sup>	Moyenne <sup>3</sup> Average <sup>3</sup>	Dernière année <sup>2</sup> Last year <sup>2</sup>	Moyenne <sup>3</sup> Average <sup>3</sup>
1	2	3	4	5	6	7
Afrique-Equatoriale française . . .	8.130	1.051	910	212,000	795,000	52,400
Afrique-Occidentale française . . .	14.267	19.228	27.174	1.089,700	1.665,000	805,400
Algérie . . . . .	6.500	—	—	—	2.700,000	—
Antigua . . . . .	30	721	302	10,886	10,886	11,340
Argentine . . . . .	11.193	143.553	113.136	—	3,518	—
Australie . . . . .	6.414	—	—	—	—	—
Bahama . . . . .	61	7	3	—	—	—
Barbade . . . . .	170	—	—	—	—	—
Betchouanaland . . . . .	160	2.561	1.433	11,080	24,950	—
Bolivie . . . . .	3,000	—	—	2.053,800	938,000	2.053,800
Bornéo britannique septentrional .	294	6.431	8.625	52,000	52,000	176,250
Bulgarie . . . . .	5.825	—	—	3.750,000	3.750,000	875,000
Cameroun français . . . . .	1.930	1.077	9.898	240,000	240,000	240,000
Ceylan . . . . .	5.479	1.398.841	1.759.111	6.120,000	9.690,710	6.198,000
Chine . . . . .	458.700	—	—	—	8.508,234	—
Chypre . . . . .	349	8.624	10.080	280,527	460,284	280,527
Colombie . . . . .	8.000	—	—	—	—	—
Congo belge . . . . .	10.000	9.034	9.470	—	2.500,000	—
Costa-Rica . . . . .	504	—	5.500	100,000	100,000	100,000
Côte de l'Or . . . . .	2.984	14.965	25.593	556,562	611,000	556,567
Côte des Somalis . . . . .	90	19	30	17,500	17,500	—
Dominique . . . . .	42	2.400	2.400	10,000	10,000	15,000
Egypte . . . . .	14.493	1.770	1.770	—	—	551,500
Erythrée . . . . .	510	—	14.340	—	—	—
Espagne . . . . .	22.761	38.971	38.651	1.568,000	1.684,000	1.568,000
Etablissements du Détroit . . . . .	1.132	21.946	15.868	387,743	333,079	—
Etablissements français d'Océanie .	36	—	—	4,800	6,000	3,450
Etats malais fédérés . . . . .	1.562	75.814	162.487	1.117,533	1.874,132	1.202,266
Etats malais non fédérés . . . . .	1.360	68.072	73.032	—	657,168	—
Etats-Unis d'Amérique . . . . .	120.957	—	—	—	—	—
Fernando-Po . . . . .	23	—	—	—	90,000	—
Gambie . . . . .	210	1.830	1.752	44,868	66,000	44,868
Grèce . . . . .	6.315	19.706	20.488	12.416,000	17.000,000	4.275,300
Grenade . . . . .	76	8.975	7.617	56,200	58,960	45,210
Guadeloupe . . . . .	250	834	265	—	—	2,200
Guyane britannique . . . . .	310	22.163	24.330	409,000	396,000	30,200
Guyane française . . . . .	50	1.700	1.599	77,500	73,000	77,100
Haiti . . . . .	2.500	44.434	52.351	388,800	388,800	388,200
Honduras britannique . . . . .	51	445	547	12,814	15,860	—
Hong-Kong . . . . .	1.144	9.204	11.348	66,225	60,952	—
Inde . . . . .	348.000	8.678.664	10.096.894	—	—	13.262,967
Indes néerlandaises . . . . .	60.000	—	—	—	—	—
Indochine . . . . .	20.495	20.988	21.366	2.772,800	3.733,000	2.486,200
Irak . . . . .	3.300	106.893	151.063	769,760	198,223	721,304
Italie . . . . .	41.506	213.632	203.580	4.503,410	3.348,300	18.738,100
Jamaïque . . . . .	994	1.773	1.618	249,000	271,660	86,909
Japon . . . . .	63.740	13.402	10.904	—	—	137,827
Kénia . . . . .	3.003	30.420	27.535	—	750,000	—
Madagascar . . . . .	3.800	444.511	454.038	2.792,900	4.660,000	1.775,400
Maroc français . . . . .	5.000	46.184	77.869	—	—	729,000
Martinique . . . . .	230	28	34	2,400	3,000	2,300
Maurice . . . . .	406	85.656	59.601	374,100	434,000	430,500

<sup>1</sup> Calculated as a rule on the five-year period ending, according to the countries concerned, in 1929, 1930 or 1931.

<sup>2</sup> When the figures for the last year were not available, the figures for the average of the period under consideration have been repeated in italics.

<sup>3</sup> Calculated as a rule on the ten-year period ending, according to the countries, in 1929, 1930 and 1931.



# THE QUININE REQUIREMENTS OF MALARIAL COUNTRIES

decimal point being replaced by a comma, and the comma by a point.)

Quinine distribuée gratuitement <sup>a</sup> Quinine distributed free <sup>a</sup>	Quinine distribuée à prix réduit Quinine distributed at reduced price		Quantité nécessaire Amount necessary		COUNTRIES
Dernière année <sup>a</sup> Last year <sup>a</sup>	Moyenne <sup>a</sup> Average <sup>a</sup>	Dernière année <sup>a</sup> Last year <sup>a</sup>	Evaluation des administrations sanitaires Estimate of the Health Administrations	Evaluation du Secrétariat <sup>a</sup> Estimate of the Secretariat <sup>a</sup>	
Kg.	Kg.	Kg.	Kg.	Kg.	
8	9	10	11	12	13
198,000	—	—	350,000	350,000	French Equatorial Africa.
1.164,000	3,301	24,236	3,000,000	3,000,000	French West Africa.
1.599,000	—	—	25,000,000	25,000,000	Algeria.
6,480	—	—	11,946	11,946	Antigua.
1.515,685	—	—	5,000,000	5,000,000	Argentine.
—	—	—	—	—	Australia.
—	—	—	1,417	1,417	Bahama.
0,972	—	—	—	—	Barbados.
18,144	—	2,268	24,950	51,220	Bechuanaland.
2,053,800	—	—	—	2,053,800	Bolivia.
176,250	—	—	196,800	196,800	British North Borneo.
1,000,000	2,875,000	2,875,000	6,500,000	7,000,000	Bulgaria.
240,000	—	—	—	215,400	French Cameroons.
7,424,524	—	—	11,340,000	11,340,000	Ceylon.
—	—	—	—	—	China.
460,284	—	—	580,291	580,291	Cyprus.
118,330	—	—	70,000,000	70,000,000	Colombia.
3,750,000	—	—	102,500,000	102,500,000	Belgian Congo.
100,000	—	—	100,000	100,000	Costa Rica.
611,000	—	—	907,200	907,200	Gold Coast.
—	—	—	—	17,500	Somali Coast.
15,000	—	—	70,000	70,000	Dominica.
721,000	—	—	2,000,000	2,000,000	Egypt.
2,450,000	—	—	—	2,450,000	Eritrea.
1,684,000	—	—	—	9,000,000	Spain.
113,694	—	—	342,411	438,920	Straits Settlements.
5,789	0,250	0,261	7,000	7,000	French Settlements in Oceania.
1,596,672	—	—	2,721,000	2,721,000	Federated Malay States.
495,045	—	—	677,820	1,361,440	Unfederated Malay States.
—	—	—	—	20,000,000	United States of America.
—	—	—	—	90,000	Fernando Poo.
66,000	—	—	66,000	66,000	Gambia.
10,342,000	8,108,000	6,568,000	40,000,000	40,000,000	Greece.
44,226	11,200	11,113	56,700	56,700	Grenada.
4,000	—	—	12,000	12,000	Guadeloupe.
25,000	379,000	371,000	—	2,720,000	British Guiana.
65,000	—	6,000	90,000	90,000	French Guiana.
388,200	5,200	5,200	388,200	388,200	Haiti.
—	—	—	—	408,000	British Honduras.
—	35,132	34,388	76,545	227,000	Hong-Kong.
9,765,173	3,026,290	1,974,000	680,700,000	680,700,000	India.
7,000,000	—	—	—	7,000,000	Dutch East Indies.
3,289,000	269,100	762,000	7,000,000	30,000,000	Indo-China.
708,438	—	—	1,360,000	2,137,860	Irak.
21,544,000	7,511,900	6,958,000	28,000,000	28,000,000	Italy.
93,895	152,795	140,616	272,160	1,400,000	Jamaica.
80,000	—	—	—	612,240	Japan.
712,150	—	127,335	796,000	796,000	Kenya.
2,860,000	39,600	100,000	5,000,000	5,000,000	Madagascar.
1,306,935	895,600	1,111,976	5,000,000	5,000,000	French Morocco.
4,000	—	—	4,000	4,000	Martinique.
554,000	—	—	431,000	1,192,000	Mauritius.

<sup>a</sup> This item includes the amounts distributed gratuitously either by the States or by local organisations, such as communes, Red Cross Societies, estates, etc.

<sup>a</sup> Based on a dose of 20 gm. per case and per year.

# SYNOPTIC TABLE OF THE DATA REGARDING THE ENQUIRY INTO

(As this table is bi-lingual, the continental system has been adopted — the English

PAYS	Population (en milliers) (in 1,000's) 1929	Cas traités Cases treated		Quinine importée par le Gouvernement Quinine imported by the Government		Quinine distribuée gratuitement <sup>1</sup> Quinine distributed free <sup>1</sup>
		Moyenne <sup>1</sup> Average <sup>1</sup>	Dernière année <sup>2</sup> Last year <sup>2</sup>	Moyenne <sup>3</sup> Average <sup>3</sup>	Dernière année <sup>2</sup> Last year <sup>2</sup>	Moyenne <sup>3</sup> Average <sup>3</sup>
				Kg.	Kg.	Kg.
1	2	3	4	5	6	7
Mexique . . . . .	16.350	—	43.602	—	—	—
Mozambique . . . . .	3.300	935	873	228,640	539,023	115,000
Nigéria . . . . .	19.586	21.041	24.860	—	700,500	368,000
Nouvelles-Hébrides . . . . .	60	675	412	46,384	141,250	29,653
Nyassaland . . . . .	1.360	5.501	8.386	202,400	365,663	90,218
Ouganda . . . . .	3.411	35.740	46.604	368,700	595,000	368,700
Palestine . . . . .	930	9.424	11.503	188,600	329,000	159,400
Panama . . . . .	500	—	—	—	—	306,500
Pays-Bas . . . . .	7.833	2.000	2.000	—	—	—
Pérou . . . . .	6.350	—	—	2.855,000	3.283,000	—
Perse . . . . .	9.000	—	—	140,700	140,700	—
Philippines . . . . .	12.175	3.242	4.089	—	—	111,542
Réunion . . . . .	190	161	119	500,000	500,000	37,040
Rhodésie du Nord . . . . .	1.299	2.511	3.026	695,700	897,000	279,560
Rhodésie du Sud . . . . .	1.069	1.063	1.048	—	324,000	—
Iles Salomon . . . . .	151	150	131	—	98,427	—
Saint-Christophe . . . . .	31	599	159	6,037	6,037	—
Sainte-Lucie . . . . .	57	2.038	1.324	18,144	18,144	13,500
Saint-Vincent . . . . .	52	694	458	8,650	2,320	8,380
Sarawak . . . . .	600	501	512	39,281	53,978	4,500
Siam . . . . .	11.506	5.311	7.904	—	1.422,000	—
Sierra-Leone . . . . .	1.600	5.132	6.095	—	136,000	—
Somalie britannique . . . . .	345	1.568	1.760	—	—	23,246
Somalie italienne . . . . .	1.030	—	30.000	—	—	—
Soudan . . . . .	6.469	107.194	112.041	907,200	907,200	453,500
Surinam . . . . .	151	13.845	16.816	140,000	75,000	94,000
Swaziland . . . . .	130	—	—	26,716	40,313	26,716
Syrie et Liban . . . . .	2.750	—	—	5.878,000	4.183,000	1.800,000
Tanganyika . . . . .	4.825	30.128	30.104	607,748	688,719	477,775
Tchécoslovaquie . . . . .	14.657	596	441	—	—	1,000
Togo . . . . .	188	27.188	39.461	92,000	167,000	92,500
Transjordanie . . . . .	300	3.133	1.476	17,800	17,800	18,800
Trinité . . . . .	403	808	817	—	171,260	—
Tunisie . . . . .	2.200	—	18.374	—	462,000	289,487
Turquie . . . . .	14.200	285.856	504.901	6.660,500	6.660,500	5.176,000
Union de l'Afrique du Sud . . . . .	7.895	—	—	614,385	614,385	—
U.R.S.S. . . . .	157.500	3.924.456	2.993.072	—	58.000,000	—
Venezuela . . . . .	3.157	—	—	249,563	249,563	249,563
Iles Vierges . . . . .	5	50	50	0,255	0,255	—
Yugoslavie . . . . .	13.700	325.000	325.000	2.750,000	2.750,000	2.750,000
Zanzibar . . . . .	220	7.342	8.730	77,400	48,150	75,000
Totaux . . . . .	1.590.871	16.349.609	17.750.760	65.837,711	156.280,885	71.342,665
Totaux corrigés <sup>3</sup> . . . . .	—	16.018.389	17.307.724	49.403,941	59.809,526	57.306,310

<sup>1</sup> Calculated as a rule on the five-year period ending, according to the countries concerned, in 1929, 1930 or 1931.

<sup>2</sup> When the figures for the last year were not available, the figures for the average of the period under consideration have been repeated in italics.

<sup>3</sup> Calculated as a rule on the ten-year period ending, according to the countries, in 1929, 1930 and 1931.

# THE QUININE REQUIREMENTS OF MALARIAL COUNTRIES (continued)

decimal point being replaced by a comma, and the comma by a point.)

Quinine distribuée gratuitement <sup>4</sup> Quinine distributed free <sup>4</sup>	Quinine distribuée à prix réduit Quinine distributed at reduced price		Quantité nécessaire Amount necessary		COUNTRIES
Dernière année <sup>2</sup> Last year <sup>2</sup>	Moyenne <sup>3</sup> Average <sup>3</sup>	Dernière année <sup>4</sup> Last year <sup>4</sup>	Evaluation des Administrations sanitaires Estimate of the Health Administrations	Evaluation du Secrétariat <sup>5</sup> Estimate of the Secretariat <sup>5</sup>	
Kg.	Kg.	Kg.	Kg.	Kg.	
8	9	10	11	12	
51,000	—	—	500,000	9,000,000	Mexico.
115,000	104,000	104,000	1,000,000	1,000,000	Mozambique.
475,826	—	—	1,269,000	105,000,000	Nigeria.
29,605	44,033	39,635	—	1,200,000	New Hebrides.
113,889	101,940	131,700	202,440	202,440	Nyasaland.
595,000	—	—	—	932,000	Uganda.
166,000	—	—	600,000	600,000	Palestine.
306,500	—	—	—	1,950,000	Panama.
—	190,400	147,000	—	—	Netherlands.
—	—	—	—	2,855,000	Peru.
357,000	—	—	—	18,000,000	Persia.
111,542	8,000	8,000	513,609	1,305,000	Philippine Islands.
64,080	—	—	—	380,000	Reunion.
344,962	498,900	558,835	769,000	769,000	Northern Rhodesia.
—	—	—	372,600	372,600	Southern Rhodesia.
89,529	—	0,130	102,303	102,303	Solomon Islands.
—	—	—	—	—	St. Kitts.
13,500	5,000	5,000	18,144	40,760	St. Lucia.
6,832	—	—	11,340	11,340	St. Vincent.
4,500	—	—	54,432	54,432	Sarawak.
25,000	—	502,000	60,000,000	60,000,000	Siam.
31,750	—	—	534,320	3,200,000	Sierra Leone.
48,500	—	—	—	48,500	British Somaliland.
—	—	—	—	600,000	Italian Somaliland.
453,500	—	—	1,134,000	2,143,880	Sudan.
98,000	—	—	95,000	276,900	Surinam.
40,313	—	—	56,700	56,700	Swaziland.
1,800,000	—	—	5,878,000	5,878,000	Syria and Lebanon.
904,982	79,520	206,763	1,038,536	1,038,536	Tanganyika.
1,000	—	—	—	11,920	Czechoslovakia.
167,000	—	—	250,000	792,820	Togo.
14,000	—	—	200,000	200,000	Transjordan.
11,200	—	5,811	141,750	141,750	Trinidad.
296,475	—	110,000	1,660,000	1,660,000	Tunis.
5,176,000	1,484,500	1,484,500	22,500,000	22,500,000	Turkey.
730,000	—	—	635,000	635,000	Union of South Africa.
—	—	—	68,000,000	68,000,000	U.S.S.R.
249,563	—	—	240,000	2,904,000	Venezuela.
—	—	—	0,255	0,255	Virgin Islands.
2,750,000	—	—	3,750,000	1,100,000	Yugoslavia.
75,000	—	—	75,000	174,600	Zanzibar.
102,086,734	25,828,663	24,374,767	1,172,184,869	1,387,411,670	Totals.
68,988,880	21,346,963	19,139,523	—	—	Corrected totals <sup>6</sup> .

<sup>4</sup> This item includes the amounts distributed gratuitously either by the States or by local organisations, such as communes, Red Cross Societies, estates, etc.

<sup>5</sup> Based on a dose of 20 grm. per case and per year.

<sup>6</sup> The "Corrected total" is the sum of the figures for countries which have supplied data as regards both the last year and a certain number of the preceding years. The corrected totals of columns 3 and 4, 5 and 6, 7 and 10 are therefore comparable.



ANNEX.

LIST OF HEALTH DEPARTMENTS WHICH HAD REPLIED TO  
THE QUESTIONNAIRE OF THE HEALTH SECTION ON  
OCTOBER 12TH, 1932.

(The italics refer to countries where malaria, according to the statement of their own health authorities, does not constitute a problem.)

- |                                   |  |
|-----------------------------------|--|
| 1. French Equatorial Africa.      | 33. Gold Coast.  |
| 2. French West Africa.            | 34. Greece.  |
| 3. Algeria.                       | 35. Grenada.   |
| 4. Antigua.                       | 36. Guadeloupe.  |
| 5. Argentine.                     | 37. British Guiana.  |
| 6. Australia.                     | 38. French Guiana.   |
| 7. Bahamas Is.                    | 39. Haiti.   |
| 8. Barbados Is.                   | 40. British Honduras.  |
| 9. Bechuanaland.                  | 41. Hong-Kong.   |
| 10. <i>Bermuda.</i>               | 42. India.   |
| 11. Bolivia.                      | 43. Dutch East Indies.   |
| 12. British North Borneo.         | 44. French Indo-China.   |
| 13. Bulgaria.                     | 45. Iraq.  |
| 14. French Cameroon.              | 46. Italy.   |
| 15. Ceylon.                       | 47. Jamaica.   |
| 16. China.                        | 48. Japan.   |
| 17. Cyprus.                       | 49. Kenya.   |
| 18. <i>Cyrenaica.</i>             | 50. Madagascar.  |
| 19. Colombia.                     | 51. Federated Malay States.  |
| 20. Belgian Congo.                | 52. Unfederated Malay States.  |
| 21. Costa Rica.                   | 53. <i>Malta.</i>  |
| 22. <i>Curaçao.</i>               | 54. Martinique.  |
| 23. Czechoslovakia.               | 55. Mauritius.   |
| 24. Dominica.                     | 56. Mexico.  |
| 25. Egypt.                        | 57. <i>Montserrat.</i>   |
| 26. Eritrea.                      | 58. French Morocco.  |
| 27. <i>Falkland Is.</i>           | 59. Mozambique.  |
| 28. Fernando Po.                  | 60. Netherlands.   |
| 29. <i>Fiji.</i>                  | 61. New Hebrides.  |
| 30. Gambia.                       | 62. <i>New Zealand (including Cook<br/>Islands and Western Samoa).</i> |
| 31. <i>Gibraltar.</i>             | 63. Nigeria.   |
| 32. <i>Gilbert and Ellice Is.</i> |  |



- |  |   |
|--|---|
| 64. Nyasaland.   | 87. Italian Somaliland.                   |
| 65. French Establishments in Oceania.  | 88. Spain.                                |
| 66. Palestine.   | 89. Straits Settlements.                  |
| 67. Panama.  | 90. Sudan.                                |
| 68. Persia.  | 91. Surinam.                              |
| 69. Peru.  | 92. Swaziland.                            |
| 70. Philippine Is.   | 93. <i>Switzerland</i> .                  |
| 71. <i>Poland</i> .  | 94. Syria and Lebanon.                    |
| 72. Reunion.   | 95. Tanganyika.                           |
| 73. Northern Rhodesia.   | 96. French Togoland.                      |
| 74. Southern Rhodesia.   | 97. <i>Tonga</i> .                        |
| 75. <i>St. Helena</i> .  | 98. Trans-Jordan.                         |
| 76. St. Kitts.   | 99. Trinidad.                             |
| 77. St. Lucia.   | 100. <i>Tripolitania</i> .                |
| 78. <i>St. Pierre and Miquelon</i> .   | 101. Tunis.                               |
| 79. St. Vincent.   | 102. Turkey.                              |
| 80. Sarawak.   | 103. Uganda.                              |
| 81. <i>Seychelles</i> . (No malaria, with the exception of an epidemic in the Aldabra Island in 1930.) | 104. Union of South Africa.               |
| 82. Siam.  | 105. Union of Socialist Soviet Republics. |
| 83. Sierra Leone.  | 106. United States of America.            |
| 84. Solomon Is.  | 107. <i>Uruguay</i> .                     |
| 85. French Somali Coast.   | 108. Venezuela.                           |
| 86. British Somaliland.  | 109. Virgin Is.                           |
|  | 110. Yugoslavia.                          |
|  | 111. Zanzibar.                            |
-









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