

## **Report of the Director of Medical and Sanitary Services / [Ceylon].**

### **Contributors**

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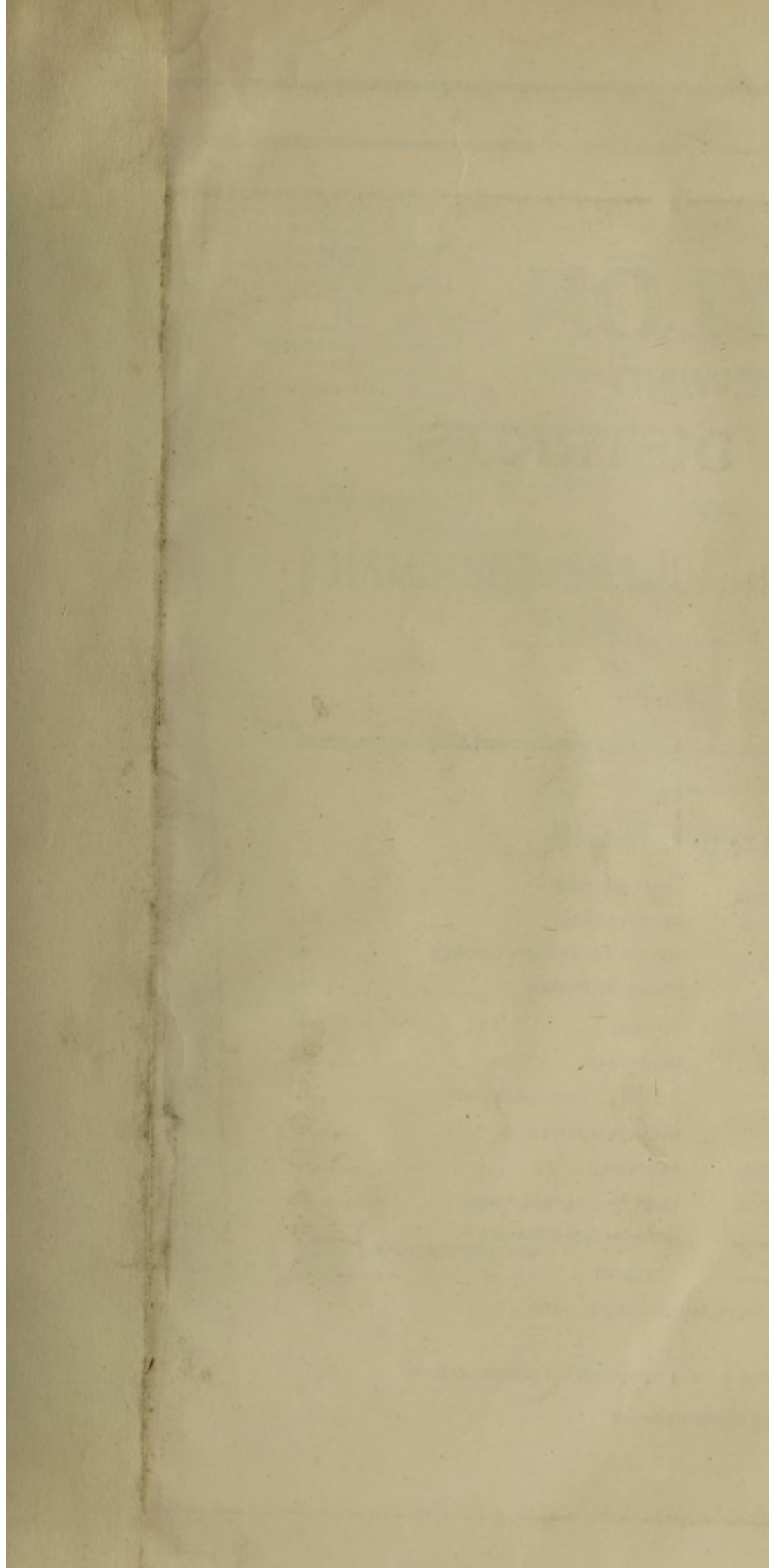
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# CEYLON

## SHEWING

### HEALTH DISTRICTS

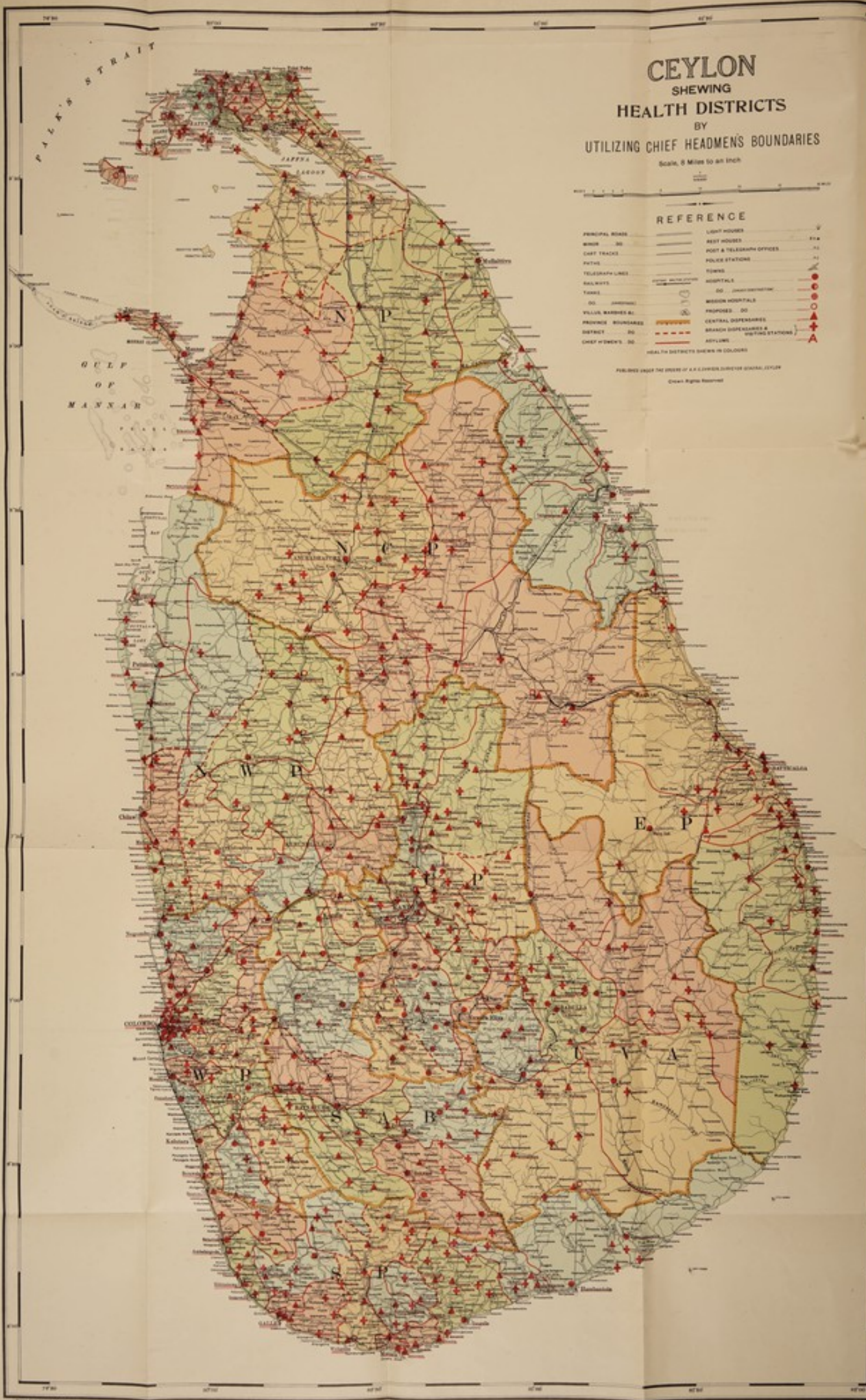
BY  
UTILIZING CHIEF HEADMEN'S BOUNDARIES

Scale, 5 Miles to an Inch

#### REFERENCE

PRINCIPAL ROADS	DO	LIGHT HOUSES	DO
MINOR " "	DO	REST HOUSES	DO
RAIL TRACKS	DO	POST & TELEGRAPH OFFICES	DO
PATHS	DO	POLICE STATIONS	DO
TELEGRAPH LINES	DO	POWERS	DO
RAILWAYS	DO	HOSPITALS	DO
TANKS	DO	DO	DO
DO	DO	MISSION HOSPITALS	DO
VILLAGE BARRIERS	DO	PROPHETS	DO
PROVINCE BOUNDARIES	DO	CENTRAL DISPENSARIES	DO
DISTRICT " "	DO	BRANCH DISPENSARIES & VISITING STATIONS	DO
CHIEF HEADMEN'S " "	DO	ADDITIONAL	DO

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# DEPARTMENT OF MEDICAL AND SANITARY SERVICES.

## REPORT OF THE DIRECTOR OF MEDICAL AND SANITARY SERVICES FOR THE YEAR 1927.

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## I.—ADMINISTRATION.

(a) (1) Staff on December 31, 1927.

- 1 Director of Medical and Sanitary Services.
- 1 Deputy Director of Medical and Sanitary Services.
- 1 Assistant Director of Medical Services.
- 1 Assistant Director of Sanitary Services.
- 1 Office Assistant.
- 1 Accountant.
- 1 Assistant Accountant.

*Medical Side.*

- 1 Medical Superintendent, General Hospital, Colombo.
- 1 Medical Superintendent, Lunatic Asylum, Angoda.
- 1 Medical Superintendent, Leper Asylum, Hendala.
- 1 Medical Superintendent, Civil Hospital, Kandy.
- 9 Provincial Surgeons.
- 1 Medical Officer in Charge, Anti-Tuberculosis Institute, Colombo.
- 1 Medical Officer in Charge, Lady Havelock and Lady Ridgeway Hospitals, Colombo.
- 1 Radiologist, General Hospital, Colombo.
- 1 Pathologist, General Hospital, Colombo.
- 1 Medical Officer in Charge, Dental Institute, Colombo.
- 65 Medical Officers in Grade I.
- 225 Medical Officers in Grade II.

*Sanitary Side.*

- 3 Inspecting Medical Officers of Estates.
- 2 Senior Medical Officers of Health.
- 6 Medical Officers of Health, Grade I.
- 16 Medical Officers of Health, Grade II.
- 2 Sanitary Engineers.\*
- 3 Assistant Inspecting Medical Officers of Estates in Grade II. (Medical Officers).
- 1 Sanitary Superintendent.
- 31 Sanitary Inspectors, Class I.
- 202 Sanitary Inspectors, Class II.
- 2 Draughtsmen (Sanitary Engineering Division).

*Research.*

- 1 Director of Bacteriological and Pasteur Institute.
- 1 Assistant Bacteriologist.
- 26 Laboratory Assistants.
- 1 Medical Entomologist.
- 1 Superintendent, Anti-Malaria Campaign.
- 4 Medical Officers.
- 8 Entomological Assistants.
- 9 Laboratory Attendants.

*Nursing Staff.**European—*

- 8 Matrons, 5 in Class I. and 3 in Class II.
- 1 Assistant Matron.
- 33 Sisters.

*Religious (European)—*

- 7 Mothers.
- 117 Sisters.

*Ceylonese—*

- 90 Matrons.
- 202 Nurses.
- 86 Pupil Nurses.
- 51 Hospital Midwives.
- 24 Pupil Midwives.

*Clerical Staff.**General Branch, Head Office—*

- 1 Chief Clerk.
- 1 Clerk, Class I.
- 32 Clerks in Classes II. and III.
- 1 Stenographer.
- 1 Telephone Clerk.

*Financial Branch, Head Office—*

- 3 Clerks, Class I.
- 39 Clerks in Classes II. and III.

*Branch Offices—*

- 9 Clerks of the Provincial Surgeons.
- 13 Clerks of the Medical Officers of Health.
- 2 Clerks, General Hospital, Colombo.
- 16 Clerks, Medical Stores.
- 3 Clerks, Lunatic Asylum, Angoda.
- 3 Clerks of the Inspecting Medical Officers of Estates.
- 1 Clerk, Office of the Medical Entomologist.
- 1 Clerk, Health Unit Office, Kalutara.
- 1 Clerk, Dental Institute.
- 2 Clerks, Bacteriological Institute.
- 2 Clerks, Sanitary Engineer's Office.

*Apothecaries.*

- 16 Apothecaries in Special Class.
- 92 Apothecaries in Class I.
- 251 Apothecaries in Class II.
- 8 Acting Officers.

*Vaccination.*

- 9 Inspectors of Vaccination.
- 33 Male Vaccinators, Class I.
- 108 Male Vaccinators, Class II.
- 16 Female Vaccinators.
- 1 Officer in Charge, Vaccine Station.
- 7 Depot Assistants and Cleaners.

*Medical Stores.*

- 1 Superintendent and Chief Storekeeper.
- 1 Assistant Superintendent.
- 1 Temporary Additional Storekeeper.
- 4 Overseers.

*Opium Branch.*

- 1 Opium Storekeeper.
- 12 Opium Clerks.
- 24 Opium Sellers.

*Miscellaneous.*

- 3 Hospital Stewards in Special Class.
- 6 Hospital Stewards in Class I.
- 34 Hospital Stewards in Class II.
- 1 Hospital Assistant, Prison Hospital, Colombo.

*Minor Employees.*

- |                        |                |
|------------------------|----------------|
| Binders                | } about 2,800. |
| Laboratory Cleaners    |                |
| Packers                |                |
| Peons                  |                |
| Overseers              |                |
| Dispensary Orderlies   |                |
| Caretakers             |                |
| Male Attendants        |                |
| Female Attendants      |                |
| Disinfecting Orderlies |                |
| Tappal Coolies         |                |
| Itinerating Coolies    |                |
| Latrine Coolies        |                |
| Garden Coolies         |                |
| Burial Coolies         |                |
| Nurses Ayahs           |                |
| Barbers, Dhobies, &c.  |                |

\* Mr. B. R. Dyer, one of the Sanitary Engineers, has been lent to this Government by the International Health Board of the Rockefeller Foundation for a term of two years.



(2) *Promotions, Appointments, &c.*

Dr. V. van Langenberg was appointed Deputy Director of Medical and Sanitary Services on November 4, 1927, *vice* Dr. G. Thornton, retired. Dr. R. G. Jayatileke was appointed Assistant Director of Medical Services on November 4, 1927, *vice* Dr. J. C. Cooke, retired. Drs. H. U. Leembruggen and S. Subramaniam were promoted to the Grade of Provincial Surgeon, with effect from October 15, 1926, and April 26, 1927, respectively. Drs. A. B. Jayasuriya, V. Gabriel, S. de Vas, K. Poothathamby, E. W. Arndt, and E. J. Christoffels were promoted from Grade II. to Grade I. of Medical Officers. Mr. W. H. D. E. Pereira was appointed Accountant on October 10, 1927, *vice* Mr. W. C. H. Tripp, retired on pension, and Mr. E. T. Abeynaike was appointed Chief Clerk, *vice* Mr. J. A. Dharmakirti, retired on pension. Drs. B. C. Das Gupta and D. S. M. E. Perera were promoted from Grade II. to Grade I. of Medical Officers of Health. Drs. W. G. Wickremasinghe, J. D. V. Wijeratne, V. Nadarajah, S. C. Thurairajah, H. A. Dirckze, C. L. S. Ferdinands, and M. W. M. de Silva were appointed Medical Officers of Health, Grade II.

Dr. G. Thornton, the Deputy Director of Medical and Sanitary Services, and Dr. J. C. Cooke, the Assistant Director of Medical Services; Dr. F. Foenander, Provincial Surgeon; Drs. (Miss) Alice de Boer and C. E. van Rooyen, Medical Officers, Grade I.; and Mr. W. C. H. Tripp, the Accountant, retired from the service on pension. Dr. W. H. Fernando, Medical Officer, and Dr. M. A. Brito Muttunayagam, Medical Officer of Health, resigned from the service. Dr. H. P. Joseph, Surgeon-in-Charge, Victoria Memorial Eye Hospital, died.

Four European Nursing Sisters and 4 European Religious Sisters resigned from the service, and 10 European Nursing Sisters and 11 European Religious Sisters arrived in the Island and assumed duties during the year.

(3) *Officers on Leave.*

Dr. S. T. Gunasekera, the Assistant Director of Sanitary Services, was on leave in England and in the United States of America from April 12, 1927, to October 24, 1927.

Twenty-eight Medical Officers were on leave in Europe at the beginning of the year, 20 proceeded to Europe, and 24 returned to the Island during the year.

One European Nursing Sister and 1 European Religious Nursing Sister were on leave in Europe at the beginning of the year, 6 European Nursing Sisters and 5 European Religious Sisters proceeded on leave to Europe during the year, and 4 European Nursing Sisters returned to the Island.

(b) *List of Ordinances affecting Public Health enacted during the Year.*

Ordinance No. 26 of 1927, an Ordinance to amend and consolidate the Law relating to the Department of Medical and Sanitary Services, the Ceylon Medical College, the Ceylon Medical Council, Medical Practitioners, Dentists, Midwives, and Pharmacists was passed. Under this Ordinance it will be incumbent on the Medical College to prepare a scheme for the training and registration of Pharmacists.

The Dangerous Drugs Ordinance passed its first reading and was submitted to a Select Committee of the Legislative Council.

(c) *Financial.*

Revenue and expenditure in 1926-1927 financial year (*i.e.*, October 1, 1926, to September 30, 1927):—

EXPENDITURE.		Rs.	c.	REVENUE.		Rs.	c.
1.	Personal emoluments	..	4,719,127 21	1.	Hospital and dispensary receipts	..	347,340 17
2.	Diets	..	1,766,224 49	2.	Sale of drugs and medical requisites	..	5,953 90
3.	Equipment and contingencies	..	524,755 38	3.	Sale of drugs under the Medical Wants Ordinance	..	25,630 25
4.	Special equipment	..	64,538 43	4.	Medical aid dues, maintenance, and visits	..	172,804 96
5.	Medicines and instruments	..	894,184 15	5.	Sale of opium	..	418,276 14
6.	Travelling	..	499,046 38	6.	Medical aid dues, export duties	..	1,329,168 96
7.	Transport of stores, &c.	..	34,073 22				
8.	Rents	..	69,765 39				
9.	Grants	..	37,789 25				
10.	Epidemics	..	53,154 21				
11.	Rebates payable under the Medical Wants Ordinance	..	176,140 0				
12.	Purchase of opium, &c.	..	114,582 0				
13.	Compensation to local bodies for loss in opium revenue	..	83,902 12				
14.	Incidental expenses	..	14,601 56				
15.	Public health scholarships	..	52,422 98				
16.	Investigation of snake and other possible reptile poisons	..	68 51				
17.	Theft of cash from the Bacteriological Institute	..	80 5				
Total		..	9,104,455 33	Total		..	2,299,174 38

The following table shows the expenditure for each of the past six years:—

	Rs.	c.		Rs.	c.
1921-1922	..	5,633,096 46*	1924-1925	..	7,798,824 24
1922-1923	..	5,524,453 70	1925-1926	..	8,598,923 3
1923-1924	..	7,250,657 20	1926-1927	..	9,104,455 33

\* Including arrears of salary under the new Salaries Scheme.



## II.—PUBLIC HEALTH.

### A.—GENERAL REMARKS.

During the year the health of the Island was satisfactory on the whole.

In the Western Province there was a widespread outbreak of influenza and dengue during the latter part of the year; the monsoon rains in May and October resulted in an increase in malaria, pulmonary affections, and bowel complaints, but otherwise the health of the Province was good.

In the Province of Sabaragamuwa there were no cases of plague, cholera, or smallpox, but there was an increase in the number of cases of chickenpox and measles, and a rise in the number of cases of dysentery treated in hospitals. There were no outbreaks of malarial fever in the Ratnapura District, but in the Kegalla District malaria was very prevalent towards the end of the year.

In the Eastern Province the health of the people was satisfactory on the whole. There was an outbreak of enteric fever, however, which resulted in 7 deaths, and as usual malaria, anchylostomiasis, and parangi were prevalent.

The health of the people in the Northern Province is reported as satisfactory during the year. There were 4 cases of cholera, as compared with 50 last year. Malaria was the most prevalent disease, and there was an increase in the number of cases of influenza.

In the Province of Uva malaria was prevalent throughout the year, and there were mild outbreaks in the last four months of the year. During the months of February, March, and April there were sporadic epidemics of a mild type of chickenpox and measles at certain places, and in July and August an epidemic of dysentery broke out which resulted in 3 deaths.

The general health of the Southern Province was fairly satisfactory. There were no cases of plague or cholera. Chickenpox and measles prevailed occasionally in different places. Malaria was prevalent throughout the year, but not in epidemic form.

Malaria, anchylostomiasis, and parangi were prevalent in the North-Central Province throughout the year, especially after the rains. During the dry weather the health of the Province was comparatively good.

In the Central Province there was a severe epidemic of malarial fever in the Galagedara and Paldeniya districts in December. There was an outbreak of smallpox in Kotagaloluwa which resulted in 3 deaths, and a serious outbreak of plague in Kandy town.

The whole of the North-Western Province is malarial, and a very severe epidemic broke out in November which lasted for several months.

*Prevalence of Sickness in the different Seasons of the Year.*—Generally speaking the health of the people is better in the dry months than in the wet months during which the south-west and north-east monsoons prevail. The south-west monsoon rains last from the end of May till the end of July, and the north-east rains come in November, December, and January. One of the chief diseases in Ceylon is malaria fever, and all Provinces report that this disease becomes more prevalent soon after the rains begin, especially the north-east rains. The months of November, December, and January are usually characterized by severe outbreaks of the disease in epidemic form, and in the year under review epidemics occurred in the North-Western Province and in the Central Province in November and December, and it was necessary to send additional medical aid to the fever-stricken areas, so severe were the outbreaks.

During the months of October, November, and December pneumonia is more prevalent than at other times, and is more often than not a sequela of influenza, which also prevails at that time of the year.

*Relative Mortality of the different Seasons.*—As stated in the last paragraph, the wet months are less healthy than the dry months, and the monthly mortality figures for the past three years show that fewer deaths occur in each of the comparatively dry months of April, May, and September than in each of the other months. The figures given in this section under Vital Statistics are interesting in this connection.

*Itinerating Medical Officers.*—It may not be out of place to mention the work of the Itinerating Medical Officers. The first Itinerating Medical Officer was appointed in 1920 to the North-Central Province, because the need for such an officer to treat the villagers in that parangi-stricken Province was realized. It was also realized that treatment had to be brought to the homes of the villagers, as they themselves in many cases would make no effort to rid themselves of the disease by going to the nearest dispensary or hospital, partly because they were so enfeebled by disease and starvation that many of them were unable to walk that distance, and partly because attendance there meant the loss of a day's work on field or chena.

The result of that first appointment was so successful that the system was gradually extended, until in the year 1927 ten Itinerating Medical Officers were employed for the treatment of parangi in different Provinces. In June, 1927, the scope of the work of these Medical Officers was extended and they were given orders to equip themselves with all the necessary drugs and treat all diseases that came under their purview. This change in plan was made because, on the one hand, the number of parangi cases requiring treatment was diminishing, and because, on the other hand, it was realized that numerous cases of malaria and anchylostomiasis would remain untreated unless medical aid was brought to the villager's very door. This system has been successful, and it is along these lines that development should take place in future. Ceylon at present is comparatively well provided with hospitals and dispensaries, and, for some years at least, to increase the number of Itinerating Medical Officers will be more beneficial to the sick and poverty-stricken villager than the multiplication of hospitals.



## 1.—General Diseases.

The most prevalent general diseases are rheumatism, ulcers, intestinal disorders (gastro-enteritis, enteritis, and diarrhoea), bronchitis, and pneumonia. Malignant growths prevail to some extent.

The following table shows the most noteworthy contrasts in the case of the general diseases treated during the years 1923, 1924, 1925, 1926, and 1927, the figures being for the whole Island (in-patients at hospitals):—

	1923.	1924.	1925.	1926.	1927.
Rheumatism—					
Cases ..	3,754	4,377	4,535	4,398	4,365
Deaths ..	55	34	39	20	20
Ulcers—					
Cases ..	9,341	9,233	10,778	17,925	13,260
Deaths ..	127	76	59	114	56
Intestinal Disorders—					
Cases ..	4,283	4,716	4,919	4,991	4,764
Deaths ..	995	1,137	1,186	1,149	1,015
Bronchitis—					
Cases ..	4,982	5,168	5,645	6,206	7,139
Deaths ..	811	564	699	871	891
Malignant Growths—					
Cases ..	503	442	400	407	478
Deaths ..	59	57	63	106	89
Pneumonia—					
Cases ..	5,390	5,344	5,357	5,650	6,168
Deaths ..	2,097	1,902	1,887	2,011	1,900

As regards malignant growths, the total number of deaths from "cancer or malignant diseases" reported by the Registrar-General was 540, as against 509 registered in 1926, 406 in 1925, 473 in 1924, and 433 in 1923.

Nearly all operable cases of cancer in women resort to either the General Hospital or the Lady Havelock Hospital for treatment.

Twenty-six cases of cancer were admitted to the Lady Havelock Hospital for Women, Colombo, during the year under review. Of these, the sites were uterus 21, breast 1, bowel 2, and ovary 2. The average age of these patients was 39 years.

An analysis of the admissions for cancer to the General Hospital, Colombo, in 1927 is given on page 9.

## 2.—Communicable Diseases.

## (a) Mosquito or Insect-borne.

(1) *Malaria*.—There were 25,146 cases of malaria and malarial cachexia admitted into hospitals during the year 1927, and 865,594 cases treated at dispensaries and out-patient departments of hospitals.

Malaria is the most prevalent disease in the Island, and all Provinces suffer to a greater or smaller extent. The North-Western Province is perhaps the most malarious Province, and statistics show a larger mortality from malaria in that Province during the past five years than in any other Province.

There were two particularly bad epidemics of malarial fever during the year, both in the last two months of the year—one in the North-Western Province and one in the Central Province in the Paldeniya and Galagedara districts. Additional medical aid was sent, especially to the affected areas in the North-Western Province, and quinine was distributed through headmen and Itinerating Medical Officers.

The following table shows a comparison of 1927 figures with the figures of 1923, 1924, 1925, and 1926:—

	1923.	1924.	1925.	1926.	1927.
Number of cases treated at dispensaries ..	1,193,225	925,476	785,903	1,061,457	865,594
Cases admitted to hospitals ..	34,522	26,865	22,600	29,334	25,146
Total number of deaths in hospitals ..	568	504	392	632	488
Total number of deaths registered for the Island ..	2,118	1,388	1,063	1,331	1,331

It may be stated that many deaths due to malaria are registered under pyrexia of unknown origin.

The following table shows the hospital admissions on account of malaria in the different Provinces for the last three years:—

	1925.		1926.		1927.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
General Hospital, Colombo ..	2,041	27	2,324	37	2,501	35
Western Province ..	2,429	38	3,492	60	2,121	34
Central Province ..	2,215	38	3,759	64	2,954	78
Northern Province ..	2,630	33	2,554	55	2,721	35
Eastern Province ..	1,480	30	1,219	33	1,000	29
Southern Province ..	1,793	24	2,110	55	1,693	35
North-Western Province ..	2,396	85	4,053	130	3,189	92
North-Central Province ..	2,215	45	2,361	88	1,916	40
Province of Uva ..	2,132	25	3,125	46	3,047	52
Province of Sabaragamuwa ..	2,424	35	3,985	58	3,871	58
Railway Extensions ..	845	12	204	5	—	—
Lunatic Asylum ..	—	—	148	1	73	—
	22,600	392	29,334	632	25,146	488



*Cancer Returns, General Hospital, for 1927.*  
SINHALESE.

Age.	Sex.	Cheek.		Tongue.		Penis.		Breast.		Uterus.		Palate, Jaw, and Mouth.		Skin and Extremities.		Stomach.		Caecum.		Rectum.		Liver.		Intestines.		Ovary.		Oesophagus.		Lymph. Glands.		Other Sites.		Sites not specified on Notes.		Total.		
		C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.	C.	D.			
20-30	Male	3	—	2	—	4	—	2	1	6	1	—	—	1	—	1	1	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	4	—	17	1	
	Female	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	3		
31-40	Male	11	1	5	—	12	—	8	2	13	1	1	1	1	—	1	1	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	3	2	43	2	
	Female	4	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	1		
41-50	Male	26	2	6	—	13	1	4	3	18	4	5	2	—	—	3	2	—	—	—	1	—	2	2	3	1	—	—	—	—	—	—	—	—	5	6	38	5
	Female	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	8		
51-60	Male	11	—	9	1	13	1	1	—	15	—	5	—	2	—	3	1	1	1	—	2	—	—	—	—	—	—	—	—	—	—	—	—	11	1	38	8	
	Female	4	—	3	—	5	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	3	59	5	
61 and upwards	Male	13	—	2	—	—	—	—	—	—	—	4	1	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	8	2	32	3	
	Female	4	2	—	—	—	—	1	—	5	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	2	36	2
Total		77	5	30	2	47	2	16	6	57	6	23	1	4	—	11	4	3	—	6	1	9	5	4	—	4	1	3	—	2	1	5	—	56	5	357	39	

## TAMILS.

20-30	Male	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
-------	------	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

## OTHER RACES.

	20-30		3	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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C = cases.

D = deaths.

\* Thyroid.

† Vagina.

† Prostate.



It may be mentioned that a good number of cases of malaria in remote villages were treated by Itinerating Medical Officers appointed primarily for the treatment of parangi (yaws).

8,478 lb. and 1,602,824 tablets of quinine costing Rs. 183,535 were issued free for preventive and curative purposes during the year.

The reports of the Superintendent, Anti-Malaria Campaign, Dr. K. J. Rustomjee, and the Medical Entomologist, Mr. H. F. Carter, for 1927, appear in the Appendix to this Report.

(2) *Dengue Fever*.—There was a virulent epidemic of dengue in the Western Province, the other Provinces being practically immune.

(b) *Infectious Diseases.*

(1) *Enteric*.—The following table shows the number of cases of deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	921 ..	1,600 ..	1,520 ..	1,352 ..	1,488
Hospital deaths ..	270 ..	408 ..	392 ..	361 ..	304
Total number of deaths registered for the Island	597 ..	816 ..	721 ..	544 ..	510

As stated in the previous reports, the number of hospital admissions does not indicate the actual prevalence of the disease, as some deaths from enteric are undoubtedly included amongst those reported as due to "pyrexia."

The Registrar-General's returns show that 510 deaths from enteric fever and 13,502 from pyrexia of unknown origin were registered during the year, and doubtless some of the latter should have been included under the former head. The corresponding figures for the previous year were 544 and 17,798 respectively.

The diagnosis was in each case of enteric fever confirmed by Widal's test.

In many cases admission to hospital is sought only in the late stages of the disease, and the mortality of such cases is therefore high.

(2) *Smallpox*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	240 ..	45 ..	28 ..	65 ..	27
Hospital deaths ..	35 ..	9 ..	3 ..	4 ..	5

Of the cases reported during the year, 7 cases were landed in Colombo and 1 case in Galle from steamers; 2 cases occurred in Colombo town, 16 in the Central Province, and 1 case in the North-Western Province.

The steps taken by this Department to deal with the cases of smallpox reported to it are given in Section III. of this Report.

(3) *Diphtheria*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	15 ..	19 ..	18 ..	20 ..	36
Hospital deaths ..	6 ..	7 ..	6 ..	6 ..	9
Total number of deaths for the Island	20 ..	17 ..	8 ..	13 ..	11

(4) *Influenza*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Number of cases treated at dispensaries ..	23,372 ..	30,719 ..	38,519 ..	44,179 ..	55,589
Hospital cases ..	4,443 ..	3,888 ..	5,711 ..	5,345 ..	6,147
Hospital deaths ..	162 ..	115 ..	91 ..	96 ..	112
Total number of deaths for the Island	2,358 ..	1,726 ..	1,532 ..	1,590 ..	1,756

There has been a steady decrease in the number of deaths from influenza in the Island from 1920 to 1925 and thereafter a slight increase. The Central, Western, North-Western, and Sabaragamuwa Provinces contributed the largest number of cases in the year under review.

(5) *Cholera*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	— ..	17 ..	305 ..	56 ..	11
Hospital deaths ..	— ..	14 ..	186 ..	47 ..	6*
Total number of deaths registered for the Island	— ..	20 ..	189 ..	54 ..	3*

\* Some of the hospital deaths may have been registered under acute diarrhoea before the diagnosis of the disease was made bacteriologically.

Of the 11 cases, 8 occurred in the Province of Uva and the other 3 in the Northern Province. There were two outbreaks in two separate centres in the Province of Uva. The steps taken to deal with these outbreaks are given in Section III. of this Report. In every case the diagnosis of Asiatic cholera was confirmed by bacteriological tests.

(6) *Dysentery*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	5,884 ..	6,165 ..	5,478 ..	5,004 ..	5,202
Hospital deaths ..	993 ..	1,217 ..	1,079 ..	862 ..	792
Total number of deaths registered for the Island	3,326 ..	4,080 ..	3,723 ..	3,514 ..	3,144



Of the in-patients (hospital cases) treated during the year, 987 cases and 213 deaths were reported from the Central Province, 886 cases and 113 deaths from the Western Province, 781 cases and 152 deaths from the Province of Sabaragamuwa, and 546 cases and 31 deaths from the Northern Province. 25,256 out-patients were treated for this disease during the year, as against 26,210 the previous year, the above-named Provinces contributing the largest number of them. The continued prevalence of, and the mortality from, this disease emphasize the necessity for improved water supplies in many districts and towns. Of the 3,144 deaths registered for the Island during the year under review, 1926, i.e., 61.25 per cent. of them were among the Indian immigrant population on estates. It is satisfactory to record that a number of estate proprietors are beginning to realize more thoroughly the value of a protected and good water supply, and it will be interesting to observe the effect that their efforts in this direction will have on the incidence of this disease among estate labourers in future years.

(7) *Leprosy*.—During the year 1,047 cases with 57 deaths, as against 997 cases with 88 deaths the previous year, were treated at the Government hospitals, including the two Asylums which are maintained in the Island for the segregation of lepers under the Leper Ordinance, No. 4 of 1901, one at Hendala in the Western Province and the other on the Island of Mantivu in the Eastern Province. A report on these two Leper Asylums is given in Section VII., Prisons and Asylums, and details are given there of the effect of E.C.C.O. treatment on the leper patients.

It may be mentioned that on account of the overcrowding at the Hendala Leper Asylum a Committee was appointed in January, 1927, by His Excellency the Governor to consider the establishment of a Leper Settlement in the Colony, and to draw up for the consideration of Government a detailed scheme with estimates.

The Committee held several meetings. They visited the Leper Asylums at Hendala and Mantivu and also several suggested sites. A site west of Mundel lake in the North-Western Province was considered very suitable, and the question of water supply there is being investigated by the Public Works Department.

(8) *Parangi (Yaws)*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Hospital cases ..	9,748 ..	6,149 ..	4,897 ..	4,386 ..	3,482
Hospital deaths ..	32 ..	18 ..	19 ..	14 ..	11
Number of cases treated at dispensaries ..	56,459 ..	50,236 ..	42,320 ..	39,782 ..	36,131
Total number of deaths for the Island ..	49 ..	27 ..	15 ..	12 ..	12

The decrease in the number of admissions to hospitals and of dispensary cases is due to the intensive campaigns carried out by ten Itinerating Medical Officers in the Central, Southern, Uva, Sabaragamuwa, Eastern, North-Western, and North-Central Provinces (two Itinerating Medical Officers in each of the last three named). During the year a new campaign was started in the Eastern Province.

The distribution of the disease judged from hospital returns of cases treated is shown in the following table:—

	1924.	1925.	1926.	1927.
General Hospital, Colombo ..	445 ..	312 ..	305 ..	222
Lunatic Asylum, Angoda ..	— ..	1 ..	— ..	1
Western Province ..	485 ..	486 ..	456 ..	352
Central Province ..	911 ..	646 ..	525 ..	499
Northern Province ..	367 ..	281 ..	213 ..	195
Eastern Province ..	404 ..	446 ..	228 ..	199
Southern Province ..	1,123 ..	591 ..	633 ..	514
North-Central Province ..	584 ..	483 ..	556 ..	257
North-Western Province ..	400 ..	367 ..	414 ..	299
Province of Uva ..	370 ..	433 ..	395 ..	431
Province of Sabaragamuwa ..	1,058 ..	851 ..	661 ..	503
Railway Extensions ..	2 ..	— ..	— ..	—
	<u>6,149</u>	<u>4,897</u>	<u>4,386</u>	<u>3,482</u>

The dispensary cases as regards Provinces were as follows:—

	1926.	1927.		1926.	1927.
Western ..	1,994 ..	2,631 ..	North-Western ..	11,688 ..	10,007
Central ..	2,106 ..	1,820 ..	North-Central ..	12,994 ..	11,755
Northern ..	698 ..	421 ..	Uva ..	1,243 ..	1,008
Eastern ..	2,881 ..	2,465 ..	Sabaragamuwa ..	1,811 ..	1,517
Southern ..	4,367 ..	4,507 ..			

The ten Itinerating Medical Officers treated a total number of 18,101 cases (a large number of these patients attended a second and a third time), and 30,276 intravenous injections of neo-salvarsan were given by them during the year 1927, as against 15,440 cases and 30,666 injections in 1926.

The treatment of villagers for parangi by means of Itinerating Medical Officers has met with great success. Comment must be made on the assistance rendered by the Government Agents and their Assistants, and on the enthusiasm and interest displayed by the headmen of the villages. That the treatment has been appreciated by the villagers is shown by the readiness with which they seek treatment for themselves and their children from the Itinerating Medical Officers. The speedy results of the treatment are a sufficient advertisement for it and greatly impress the villagers. There is no doubt that this treatment has resulted in a diminution in the number of parangi cases in the Provinces. The Itinerating Medical Officers report that they do not now come across the old type of case with ugly ulcerations or typical secondaries. Moreover,



the attitude of the villager towards the disease appears to be changing. It is no longer looked upon as inevitable, a disease that must come to a person sooner or later. In some districts the villagers have begun to think it a disgrace to have parangi.

(9) *Plague*.—The following table shows the number of cases and deaths in the past five years:—

	1923.	1924.	1925.	1926.	1927.
Cases ..	232 ..	153 ..	68 ..	16 ..	117
Deaths ..	211 ..	145 ..	63 ..	15 ..	106

Of the 117 cases reported for the year under review, 83 cases were from Colombo town, 4 from the Western Province, 1 from the North-Western Province, 25 from Kandy town, and 4 from the Central Province. Of the 83 cases from Colombo town, 33 bubonic cases and 1 septicaemic case were admitted to the Infectious Diseases Hospital, Angoda. Of these, 29 cases (including the septicaemic case) died and 5 cases recovered and were discharged; the recovery percentage being 17.6, as against 14.2 the previous year. Of the 33 bubonic cases, 23 had groin, 6 axillary, and 4 cervical buboes. Of the 5 cases who recovered, 2 had groin, 2 axillary, and 1 cervical buboes.

There was an epidemic of plague in Kandy town during the latter part of the year. The Kandy Municipality took the necessary measures to deal with it.

(10) *Tubercular Diseases of the Lungs*.—The following table shows a comparison between 1927 figures and the figures for the last five years:—

	1922.	1923.	1924.	1925.	1926.	1927.
Cases treated in hospitals	3,308 ..	4,099 ..	3,656 ..	4,155 ..	4,363 ..	4,247
Total number of deaths in hospitals	865 ..	990 ..	860 ..	1,000 ..	1,074 ..	1,027
Total number of deaths registered for the Island	3,108 ..	3,332 ..	3,235 ..	3,241 ..	3,309 ..	3,353

Three special institutions—the Anti-Tuberculosis Institute, Colombo, and the Kandana Sanatorium, Western Province, for early cases, and the Ragama Tuberculosis Hospital, Western Province, for advanced and chronic cases—are maintained to deal with this disease. A large number of cases are also treated in the Tuberculosis Wards of the General Hospital, Colombo.

The Anti-Tuberculosis Institute, Colombo, and the Kandana Sanatorium were built from money provided by the King Edward VII. (Memorial) Anti-Tuberculosis Fund. The report of the Secretary of that fund is given in Section X. (Miscellaneous).

#### (c) *Helminthic Diseases.*

*Anchylostomiasis*.—The following table shows a comparison of 1927 figures with the figures of the last five years:—

	1922.	1923.	1924.	1925.	1926.	1927.
Number of cases treated at dispensaries	— ..	114,157 ..	153,488 ..	147,528 ..	152,195 ..	170,818
Cases admitted to hospitals	9,818 ..	11,344 ..	11,720 ..	12,618 ..	13,040 ..	12,600
Total number of deaths in hospitals	982 ..	1,030 ..	865 ..	923 ..	897 ..	789
Total number of deaths registered for the Island	1,869 ..	1,857 ..	1,853 ..	2,119 ..	2,121 ..	1,943

A reference to the report of Dr. W. P. Jacobs, Director of the Anchylostomiasis Campaign, given in the Appendix to this Report will show that during 1927 the campaign officers covered the greater part of the Island as far as treatment on estates and in schools was concerned. As regards the villagers, the above table shows that a very large number of them received treatment at hospitals and dispensaries. In some districts treatment was carried to the villagers' own doors in remote and inaccessible villages by the Itinerating Medical Officers appointed primarily for the treatment of parangi. It is too early yet to see in the statistical returns the result of this Island-wide campaign against anchylostomiasis, but there is little doubt that results will be seen there in the future, especially after the proper use of latrines has become more widespread.

### B.—VITAL STATISTICS.

	1925.	1926.	1927.
I.—Ceylonese Population (i.e., the total population of the Island, less the European population and the Indian immigrant population on estates)—			
Estimated population on December 31	4,409,566 ..	4,475,311 ..	4,585,490
Total births	169,699 ..	179,180 ..	181,223
*Birth rate per thousand	38.48 ..	40.04 ..	39.52
Total deaths	97,812 ..	105,632 ..	93,454
*Death rate per thousand	22.18 ..	23.60 ..	20.38
Infant mortality (rate per thousand births registered)	167 ..	169 ..	142
II.—European Population (including officials)—			
Estimated population on December 31	10,212 ..	10,834 ..	11,447
Total births	131 ..	193 ..	168
*Birth rate per thousand	12.0 ..	16.9 ..	13.99
Total deaths	88 ..	85 ..	75
*Death rate per thousand	8.0 ..	7.4 ..	6.25
Infant mortality (rate per thousand births registered)	15 ..	26 ..	24
III.—Indian Immigration Population on Estates—			
Estimated population on December 31	589,724 ..	638,847 ..	691,855
*Total births	23,431 ..	27,515 ..	24,079
Birth rate per thousand	38.20 ..	43.1 ..	34.8
*Total deaths	19,643 ..	19,168 ..	19,478
Death rate per thousand	32.03 ..	30.0 ..	28.2
Infant mortality (rate per thousand births registered)	216 ..	209 ..	228

\* Calculated on the population of July 1.



The registration of births and deaths is compulsory throughout the Island, but the registration of the causes of deaths cannot be totally relied on as the majority of the registering officers are non-medical men. The Registrar-General supplies figures concerning the vital statistics of the 33 principal towns in Ceylon, and these figures may be considered more reliable as regards the causes of death, as the larger proportion of them are certified to by Registered Medical Practitioners.

From the above figures it will be noted that the death rate in 1927, as compared with 1926, has decreased among the Ceylonese population, among the European population, and also among the Indian immigrant population on estates, and that the death rate among Indian immigrant labourers is considerably higher than that among the Ceylonese population. On the other hand the birth rate among the Indian immigrant labourers is slightly lower than the rate among the Ceylonese population, 34.8 as compared with 39.5. The infantile mortality rate in 1927 was much less among the Ceylonese population than it was in 1926, 142 as against 169, but the infantile mortality rate has increased among the Indian immigrant population, the figures being 228 in 1927, as compared with 209 in 1926. The low infantile mortality rate, viz., 24, among the European population is satisfactory.

*Causation of Deaths.*—The following table shows the number of deaths registered amongst all classes (Ceylonese, European, and Indian-immigrant populations) during the years 1925, 1926, and 1927 under the several classes of disease:—

	1925.	1926.	1927.
I.—General diseases—			
(a) Epidemic diseases ..	7,793	7,599	7,036
(b) Septic diseases ..	127	140	147
(c) Tuberculous diseases ..	3,525	3,583	3,595
(d) Venereal diseases ..	202	193	195
(e) Cancer or malignant diseases ..	406	509	540
(f) Other general diseases ..	8,621	8,842	9,194
II.—Diseases of the nervous system and organs of special sense ..	15,312	17,392	16,203
III.—Diseases of the circulatory system ..	1,027	1,080	1,131
IV.—Diseases of the respiratory system ..	11,653	12,300	11,947
V.—Diseases of the digestive system ..	17,107	18,057	14,607
VI.—Non-venereal diseases of the genito-urinary system and annexa ..	1,594	1,686	1,535
VII.—The puerperal state ..	3,576	3,951	3,595
VIII.—Diseases of the skin and cellular tissues ..	10,352	10,409	9,179
IX.—Diseases of bones and organs of locomotion ..	19	23	22
X.—Malformations ..	17	15	26
XI.—Diseases of early infancy ..	8,448	9,420	9,579
XII.—Old age ..	4,789	4,877	5,154
XIII.—Affections produced by external causes ..	2,562	2,577	2,529
XIV.—Ill-defined diseases (including pyrexia) ..	20,415	22,236	16,793

The more notable causes of deaths amongst all classes (Ceylonese, Europeans, and Indian immigrant populations) were the following diseases:—

	1925.	1926.	1927.
(1) Dysentery ..	3,723	3,514	3,144
(2) Pulmonary tuberculosis ..	3,241	3,309	3,353
(3) Infantile convulsions ..	13,015	14,996	13,686
(4) Diarrhoea ..	8,140	8,595	8,308
(5) Pneumonia ..	7,371	7,627	8,004
(6) Anchylostomiasis ..	2,119	2,121	1,943
(7) Dropsy ..	1,986	1,879	1,580
(8) Anaemia ..	2,492	2,317	2,349
(9) Intestinal parasites ..	3,328	3,541	3,070
(10) Puerperal septicaemia ..	1,372	1,533	1,331
(11) Malaria ..	1,063	1,331	1,331
(12) Enteric fever ..	721	544	510
(13) Rickets ..	4,061	4,192	3,736
(14) Tetanus ..	292	305	293
(15) Rabies ..	31	58	67
(16) Cholera ..	189	54	3
(17) Influenza ..	1,532	1,590	1,756
(18) Leprosy ..	79	96	58
(19) Plague ..	64	16	100
(20) Scarlet fever ..	—	—	1
(21) Anthrax ..	—	—	1
(22) Pyrexia ..	15,707	17,798	13,502

The above figures show that infantile convulsions and pyrexia are the two principal causes of death, with diarrhoea and pneumonia following closely after them.

The following table shows the principal causes of deaths amongst Indian immigrant population on estates:—

	1925.	1926.	1927.
(1) Dysentery ..	2,470	2,132	1,926
(2) Debility ..	3,517	4,108	2,845*
(3) Diarrhoea ..	1,442	1,440	1,703
(4) Pneumonia ..	2,454	2,310	2,732
(5) Anchylostomiasis ..	1,501	1,474	1,269
(6) Infantile convulsions ..	1,386	1,749	1,503
(7) Dropsy ..	137	137	129
(8) Pulmonary tuberculosis ..	320	388	398
(9) Anaemia ..	—	45	41
(10) Other diseases ..	6,390	6,961	6,931

\* Deaths under one year.

From the above table it can be seen that debility amongst infants under one year, pneumonia, dysentery, diarrhoea, and infantile convulsions are the chief causes of death amongst Indian immigrant labourers.



*Monthly Mortality Figures.*—The following table shows the number of deaths registered in the Island in each of the years 1925, 1926, and 1927 according to months:—

Month.	Number of Deaths.		
	1925.	1926.	1927.
January	12,162	14,290	10,542
February	11,184	12,778	9,312
March	10,406	11,004	8,711
April	8,627	9,273	7,579
May	8,795	9,383	8,518
June	9,413	9,852	8,885
July	10,267	10,461	9,311
August	9,565	11,074	9,879
September	8,007	9,074	8,774
October	9,236	9,036	9,578
November	9,097	9,635	10,282
December	10,784	9,024	11,632
Total	117,543	124,884	113,003

Most deaths occur in or just after the wet months; January, February, July, and December especially showing high figures.

### III.—HYGIENE AND SANITATION.

#### A.—GENERAL REVIEW OF WORK DONE AND PROGRESS MADE.

The work of the Public Health Branch is increasing in volume and importance yearly and during the year under review considerable progress has to be recorded.

The six candidates who were awarded Public Health Fellowships by Government returned to Ceylon in October, 1927, after having secured Public Health qualifications and were attached to outstation Medical Officers of Health for practical training in local health work. Three of them were appointed to revenue districts according to the policy of the Department that each important district should have its own health officer.

A health unit was established in Kurunegala and a sanitary survey of the area started.

Preliminary steps have been taken to start anti-malarial campaigns in the towns of Kurunegala and Chilaw and it is hoped to have the work in full swing next year.

The services of Medical Officers of Health are being utilized to an increasing extent by local bodies, and it is gratifying to note that their expert advice is generally followed and their recommendations carried out.

On July 30, 1927, Mr. B. R. Dyer, Sanitary Engineer, whose services have been lent to the Ceylon Government for two years by the International Health Division of the Rockefeller Foundation for the purpose of organizing a sanitary engineering division, arrived in the Island and began work.

#### 1.—Preventive Measures.

##### (a) Mosquito and Insect-borne Diseases.

*Malaria.*—(a) A full account of the work done by the anti-malaria division is given in the report of the Superintendent, Anti-Malaria Campaign, in the Appendix to this Report.

(b) An account of the anti-malaria work done by the Medical Entomologist is given in his report in the Appendix.

(c) The Sanitary Engineer's report in the Appendix gives an account of the anti-malaria engineering carried out by his division.

(d) The following is an account of the work done by the Sanitary Branch of this Department:—

(1) *Tenmaratchi (Northern Province).*—At a meeting of the Anti-Malaria Advisory Board held on December 13, 1926, the question of anti-malaria measures at Tenmaratchi, a very malarious district in the Northern Province, was discussed, and it was decided that the matter should be referred to the Departmental Committee for their consideration and that meanwhile the Medical Officer of Health, Northern Province, should commence a campaign to get the people of the district to take quinine.

The Medical Officer of Health was instructed accordingly, and reported in due course that progress was slow as the people were prejudiced against taking quinine, despite a series of lectures on malaria delivered by him in the more important villages of Tenmaratchi. It was realized by the Departmental Committee that the only satisfactory method of getting quinine administered was by Sanitary Inspectors, Apothecaries, or similar officers, but there were no such officers available except the Sanitary Inspector stationed at Chavakachcheri. The most fever infected district was Kodaikamam and the neighbouring villages, and it was impossible to transfer the Chavakachcheri Sanitary Inspector to Kodaikamam. The Departmental Committee recommended that three Apothecaries should be appointed to distribute quinine in the Kodaikamam neighbourhood from January, 1928, but, as no Apothecaries were available, three pupil vaccinators were appointed to do the work under the Medical Officer of Health, Northern Province, from January, 1928. Good progress in quinine distribution is therefore to be expected in 1928 in that area. A considerable amount of quinine was distributed in 1927 at Chavakachcheri by the Sanitary Inspector stationed there.



(2) *Railway Anti-Malaria Work*.—Minor anti-mosquito work is carried out around railway premises in malarious stations by a gang of coolies supervised by a Sanitary Inspector. The following is a list of work done:—

Area of premises cleared .. ..	3,042,020 square feet
Pits dug to bury receptacles capable of holding water .. ..	53 of a cubic capacity of 3,712
Number of earth drains weeded, cleared, and graded .. ..	47
Length of above in feet .. ..	7,599
Cubic feet of earthwork removed in clearing and grading the above .. ..	34,843½
Number of new drains opened out to drain hollows, &c. .. ..	23
Length of above in feet .. ..	1,806
Cubic feet of earth removed from above .. ..	3,210½
Number of old drains closed (not required) .. ..	2
Length of above in feet .. ..	96
Cubic feet of earth used to fill above .. ..	432
Number of pits closed .. ..	111
Cubic feet capacity of pits closed .. ..	109,157½
Number of water stagnating pits cleaned and oiled .. ..	104
Square feet area of above .. ..	121,705
Amount of kerosine used in gallons .. ..	15
Amount of liquid fuel used in gallons .. ..	30
Number of trees pruned of overhanging branches, &c. .. ..	144
Number of trees completely removed .. ..	132
Number of live fences pruned .. ..	3
Length of above in feet .. ..	132

(b) *Epidemic Diseases.*

The incidence of most of these diseases has already been dealt with under Section II., Public Health. The following information deals with the activities of the Sanitary Branch of this Department in connection with the cases and outbreaks of disease reported to it.

*Enteric Fever*.—No epidemics were reported during the year. The disease occurs endemically in Colombo and Kalutara Districts, and sporadically throughout the Island.

As in preceding years, Colombo and Kalutara Districts contributed the majority of cases. The contributory factors for the spread of the disease, as heretofore, were: the ignorance and the indifference of the inmates of the houses, who, in the outlying villages primarily, take treatment from vedaralas, during which period the cases are not correctly diagnosed; the non-observance of the most elementary precautions regarding the proper disposal of infective discharges; the prevalent custom of visiting the sick and partaking of food and drink in such places without the necessary safeguards; the presence of undetected carriers in the community; inefficient disposal of refuse which leads to fly-breeding; and the misuse, in spite of advice given, of dry-earth latrines, which gives the opportunity to flies to spread disease germs; inefficient isolation of the patient; and the contamination of unprotected wells which are in the majority.

The prompt adoption of the usual preventive measures, including anti-typhoid inoculation on the outbreak of isolated cases, prevented the occurrence of epidemics.

*Smallpox*.—Kotagaloluwa (Central Province). An epidemic occurred in February. There were 12 cases with 3 deaths. The source of infection was India. The usual precautionary measures were adopted.

Kelegala (Nuwara Eliya District). Two cases occurred in May. Both patients recovered. None of the 24 contacts developed the disease. The source of infection was India.

Bandarapola (Matale District). A case occurred in a Tamil labourer in the Muwandeniya division of Bandarapola group of estates in July. The patient was a recent arrival from India. There were 49 contacts and none of these developed the disease. The patient recovered. The source of infection was traced to India. All necessary precautionary measures were adopted.

Yarrow Estate (Pussellawa). This case occurred in an Indian labourer on July 2 who had returned from India one month prior to her getting fever; the number of contacts was 139, and no fresh cases occurred among them. The source of infection was traced to India. The patient recovered. The usual precautionary measures were taken.

*Vaccination*.—The total number of primary vaccinations performed during the year under review was 147,444; of these, 136,540 were successful and 1,225 were failures. In 9,679 cases the results were not determined. The percentage of successful primary vaccinations was 93.81 per cent. in 1925, 96.18 in 1926, and 99.11 in 1927.

Vaccination is carried on throughout the year by trained male and female vaccinators. The former vaccinate in the towns, villages, and estates periodically according to annual programmes; the latter work in the towns and villages and vaccinate Muslim women and children.

A Vaccine Establishment for the preparation of calf lymph is maintained by Government (*vide* the report of the Officer in charge, Vaccine Establishment, in Section X. of this Report).

*Cholera*.—At Saravanai (Karaitivu, Northern Province) 2 cases occurred in March and both proved fatal. The source of infection was India.

At Achchuvely (Northern Province) 1 case occurred and it proved fatal. The source of infection was India.

Province of Uva. Two outbreaks occurred: one in July at Dyraba estate, Welimada, about the time of St. Anne's festival, and the other, in August, at Koslande estate in Koslande, during the time of the Kataragama Festival. There were 8 cases in all with 2 deaths. The source of infection was South India.

The prompt action taken enabled the outbreaks to be brought to an end within a short time.

*Plague*.—This disease occurred in three Provinces within the year, viz., Western, Central, and North-Western.

Western Province. There were 4 cases with 4 deaths, excluding those that occurred in the city of Colombo.



**Avissawella.** Two cases occurred in the bazaar area of Avissawella in February. Both proved fatal. The source of infection was grain from Colombo.

All necessary measures, including a rat campaign, were carried out. No further cases occurred.

**Attigala (Hanwella).** One case was reported from here. The patient fell ill in Colombo in September, returned to his village for a couple of days, and then went back to Colombo, where he died. The contacts, who were the family members, were kept under surveillance at their residence and no further cases occurred.

**Buthgomuwa.** One case occurred on December 30, 1926. The necessary action was taken in the following month when the case was reported. The case ultimately proved fatal. The source of infection was not traceable. There were 5 contacts, and they did not contract the disease.

**Central Province.** Four cases occurred with 4 deaths, exclusive of those that occurred in Kandy town. (The outbreak of plague in Kandy town was dealt with by Kandy Municipality.)

These 4 cases occurred at Bopitiya in Deltota, Mulhalkele, Uduwella estate in Uduwella, and Kotabogoda in Kadugannawa. All were traced to Kandy town.

**North-Western Province.** One case, which proved fatal, occurred within the Local Board limits of Kurunegala. There had been no plague in Kurunegala for years. Of the 780 rats that were trapped not one was found to be infected. The deceased was said never to have been out of Kurunegala, and yet on bacteriological examination, after death, the case was found to be positive. The source of infection was not traceable.

**Dysentery.**—This disease occurs chiefly in sporadic form, but when in epidemic form it occurs usually after the rains from the pollution of the unprotected surface wells. Outbreaks occurred at Medagama, Ellampitiya, and Malpotta in Uva, in 6 villages of Gandilahapattuwa, at Katugaha in Egoda pattuwa, and at Dodawatta, all in Kegalla District, and at Mahagama near Chilaw.

The cases reported were chiefly from rural areas. The sporadic cases were generally started by carriers, who give rise to other cases. The chief causes were: (1) the difficulty of isolating patients on account of lack of accommodation; (2) the ignorance and apathy of the people; (3) the failure on the part of some of the vedaralas either to diagnose the disease correctly or to report the cases promptly; (4) the poverty and the ignorance of the village folk which interfere with their resorting to more efficient methods of treatment; (5) the dry weather which comes in the wake of the rains with the attendant evils—dust and flies; and (6) the pernicious habits of partaking of food and drink in the patient's house without the necessary precautions.

**Chickenpox.**—Of the notifiable diseases, this disease, as in previous years, contributed the largest number of cases. However, the number of fatalities was negligible, and death, whenever it occurred, was due to debility or old age. The mild nature of the disease, the delay in reporting, the promiscuous intermingling between patients, those convalescing, and the healthy contacts in their homes, and later, the bathing of those convalescing at bathing places with others who had not previously been exposed to infection contribute largely to the easy spread of the disease.

**Measles.**—Schools were responsible in the majority of instances for the spread of this disease. In every case prompt measures were adopted and the schools closed for such periods as were considered necessary. The impracticability of isolating the patients in the pre-eruptive stage, when the disease is most infective, and the inadequate arrangements for isolation of patients are responsible for the spread.

#### (c) Helminthic Diseases.

**Anchylostomiasis.**—A full account of the preventive measures adopted to control this disease is detailed in the report of the Director, Anchylostomiasis Campaign, Ceylon (*vide* Appendix).

The following is a brief summary of the work carried out in 1927:—

#### Treatments.

		First Treatments.	Total Treatments.
By campaign units ..	..	299,761	299,761
By Government hospitals and dispensaries ..	..	832,019	1,039,003
By Mandapam Camp ..	..	141,720	141,720
By estate staff ..	..	70,245	89,113
Central Office ..	..	1,098	1,099
Kalutara Badde Health Unit ..	..	3,259	3,259
		<u>1,348,102</u>	<u>1,573,955</u>

#### Lectures.

Number given ..	..	1,500
Estimated attendance ..	..	244,765

#### Laboratory.

	Before Treatment.	After Treatment.
Number of examinations made ..	24,816	10,655



## 2.—General Measures of Sanitation.

*Conservancy:* (1) Public Latrines.—During the financial year 1926-27 45 public latrines were built by the Sanitary Boards and Village Committees throughout the Island as tabulated below:—

Province.	Number of Latrines.	Province.	Number of Latrines.
Western ..	5	Sabaragamuwa ..	2
Central ..	8	North-Western ..	8
Southern ..	14	Uva ..	1
Northern ..	2		
North-Central ..	4		45
Eastern ..	1		

Government allowed a grant of Rs. 50,000 to the Government Agents towards the cost of the above for the financial year 1926-27, out of which a sum of Rs. 26,242.57 was spent during the year.

(2) Private Latrines.—The following is a statement of the work done in this connection throughout the Island:—

(a) Number of notices served during the year ..	26,643
(i.) To construct latrines ..	21,434
(ii.) To repair latrines ..	5,037
(iii.) To convert pit latrines into dry earth latrines ..	172
(b) Number of latrines—	
(i.) Completed ..	Pit Latrines. 14,675
(ii.) Repaired ..	3,348
(iii.) Pit latrines converted into dry earth latrines ..	105
(c) Number of persons who failed to comply with the requirements of the notices ..	8,952
(d) Number of prosecutions entered ..	3,571
(e) Number of convictions obtained ..	2,485

The figures tabulated below show the distribution of latrines in the various Provinces:—

Province.	During 1927.		Latrines repaired.		Pit Latrines converted into Dry Earth Latrines.
	Pits.	Dry Earth.	Pits.	Dry Earth.	
Western ..	6,520	466	2,741	318	79
Southern ..	2,790	102	275	4	4
Central ..	2,177	119	308	18	18
Northern ..	22	50	—	—	2
North-Western ..	786	208	3	2	—
Uva ..	230	15	2	1	—
Sabaragamuwa ..	2,150	35	19	—	2
	14,675	995	3,348	343	105

The gradual education of the villagers in health matters has progressed. It is gratifying to note that not only have more latrines been repaired or completed, but also that the villagers are getting into the habit of using them, thereby minimizing the amount of soil pollution in rural areas.

*Disposal of Night-soil.*—The dry earth system of conservancy is the chief system employed in nearly all the Board towns. Latrines are conserved by coolies under the supervision of Inspectors. Day conservancy of latrines is being preferred to night conservancy, since it can be more effectively supervised, and no nuisance is caused with the exercise of ordinary care.

The night soil is disposed of by trenching. The trenching grounds are regularly supervised and maintained in good order.

Efforts have been made, throughout the year, to improve on the unsatisfactory methods of conservancy that were in vogue in various places. Some successes have been reported. Two such instances are mentioned below.

A voluntary system of conservancy had been in practice for some time in Alutgamaweediya, a village just outside the Sanitary Board town of Alutgama and populated entirely by Muslims. About 30 or 35 substantially built houses belonging to the richer folk of the place are provided with dry earth latrines, and it had been the practice for them to employ private coolies to bury the night soil in their own gardens. Early in the year the Medical Officer of Health addressed a meeting of the leading residents of the place on the dangers of indiscriminate burial of night soil. They were persuaded to organize and help themselves. From subscriptions collected a conservancy handcart was bought, and steps are being taken to secure from one of themselves a suitable land for a trenching ground.

This effort at local self-help amongst the Muslim community is praiseworthy, and it is hoped that not only will it turn out to be a success, but that it will also be a commendable example for others to follow.

At Kurunegala the method of trenching night soil has been improved. The old system of conveying the daily collections in out-of-date tank-carts and dumping them into borrow-pits to be covered with coconut leaves and coir dust—a practice which led to the unintentional preparation of breeding grounds for flies and rats—has been done away with through the energy of the Deputy Chairman of the Local Board, and the more satisfactory system of daily trenching has been adopted. Trenches for use on the following day are prepared under careful supervision. The contents of the pails are collected in suitable buckets with air-tight lids. These are brought in



handcarts to convenient depôts, from where they are removed to the trenching grounds in motor lorries. The contents are carefully deposited in the trenches to a depth of 6 inches and are immediately covered up with previously pulverised and dried earth which is heaped up in mounds over the covered trenches. The empty buckets are then removed to a paved platform near a well built for the purpose, washed, swabbed with crude petroleum, and transferred into the lorries to be returned to the respective depôts.

*Scavenging and Disposal of Refuse.*—The following methods have been employed in different areas:—(1) Dumping on the banks of a river; (2) spreading over grass fields; (3) burial in trenches around coconut trees; (4) burying in selected areas; (5) incineration.

Of the above, such unsatisfactory methods as dumping, spreading over grass fields, trenching around coconut trees (the two latter for manuring purposes) led invariably to the breeding of flies and vermin. This, in turn, gave rise to the persistence of fly-borne diseases, which are common in Ceylon. Such methods are in vogue in backward and rural areas. Disposal of refuse by incineration is therefore to be preferred.

In the larger Sanitary Board towns incineration has been adopted. The largest number of incinerators has been installed in the Central Province. Incineration under proper supervision is the ideal method for dealing with refuse. It is gratifying to note that this system is being adopted where funds and other circumstances permit. The initial cost and maintenance of incineration is comparatively greater than that of other methods; such expenditure, however, has to be regarded in the nature of a sound investment and should not deter local authorities from adopting incineration.

*Drainage: Western Province.*—Built roadside drains are urgently required for bazaar areas in urban and rural districts.

*Southern Province.*—Lack of proper drainage has been noted at Dikwella, Hakmana, Hambantota town, Beliatta-Kahawatta area, Walasmulla, Ambalantota, and Tissamaharama.

*North-Western Province.*—Towards the latter part of the year Kurunegala town was surveyed by the Sanitary Engineer of this Department with a view to recommending an efficient scheme of drainage.

*Northern Province.*—There is no satisfactory drainage to speak of. In some of the large Board towns (1) a low rainfall during the major part of the year, (2) the lack of a common source of water supply, (3) the flat and sandy nature of the land, and (4) the extensive areas of compounds have all contributed towards this.

The necessity for proper drainage is felt only during the rainy season when, throughout the Province, stagnant pools of water can be seen. These inevitably lead to prolific breeding of mosquitoes resulting in a heavy incidence of malaria.

*Central Province.*—In the Nuwara Eliya District in all Sanitary Board towns extensive repairs and extensions to drains have been effected. At Kotagala, back drains have been built to all the tenements. At Talawakele, efficient outlets were provided for the drains. In the Kandy District the drainage is fairly satisfactory in the Local Board towns, but in Sanitary Board towns much work has yet to be effected. In Hatton-Dikoya area, private back drains need alterations. At Gampola, new lengths of drains have been built.

*Province of Uva.*—All the Sanitary Board towns are provided with concrete roadside drains.

*Water Supplies.*—(1) One of the most pressing needs in Ceylon at present is a pure and sufficient water supply, and the demand for it is heard from Municipalities, Urban District Councils, Local Boards, and Sanitary Boards. The recently formed Sanitary Engineering Division has been inundated with applications for the preparation of water supply schemes, and the steps that were taken by that division in 1927 are given in the report of the Sanitary Engineer in the Appendix to this Report.

(2) *Public Wells.*—111 public wells were built during the year throughout the Island as shown below:—

Western Province	..	..	..	5
North-Central Province	..	..	..	1
North-Western Province	..	..	..	22
Province of Uva	..	..	..	6
Province of Sabaragamuwa	..	..	..	9
Eastern Province	..	..	..	10
Northern Province	..	..	..	11
Southern Province	..	..	..	10
Central Province	..	..	..	37
Total				111

(3) *Private Wells.*—

(a) Number of inspections made	..	..	79,779
(b) Number found unprotected	..	..	54,620
(c) Number of notices served for improvement	..	..	278
(d) Number improved	..	..	1,206
(e) Number prosecuted for non-compliance with notices	..	..	95
(f) Number convicted	..	..	63

(4) *Examination of Water Samples.*—

Number of water samples sent for—

(i.) Bacteriological examination	..	..	24
(ii.) Chemical examination	..	..	22

Number of samples found unfit for drinking purposes—

(i.) Bacteriologically	..	..	7
(ii.) Chemically	..	..	8



Necessary action has been taken to improve some of the sources of unsuitable supplies.

Generally speaking, in the mountainous parts of the country, water for human consumption is easily available from hill streams. In the plains, water is taken from streams and rivers and from wells when available.

In some Provinces, such as Uva, wells are scarce, and in such areas wells have been built by Government.

Province of Uva.—Sites for public wells have been selected in the following villages:—Pelwatta, Hingurugamuwa, Deliwa, Kolladeniya, Degalarambe, Balaharuwa, Pangarammana, Pattiyakumbura, Idemegama, Bogahapelessa, Talawagama, Meegawewa, Suriya-ara, Hambegamuwa, Baduluwela school, Nape, Bullama, Mariarawa.

In the dry zone of the Province some of the human habitations are situated no less than a mile away from the nearest water supply.

Northern Province.—In the peninsula of Jaffna wells form the only source of potable water, but on the mainland water from tanks and streams is used in addition.

At Kayts and Mannar, where scarcity of water is felt yearly, more public wells are needed. In these places, it is stated that during drought people obtain their water by digging in the sea beach. The problem here is a very acute one and needs speedy and satisfactory solution.

In this Province, where surface pollution is great, there is always the danger of unprotected wells being polluted.

Central Province: Nuwara Eliya District.—The water supply of Nuwara Eliya is from three main intakes: Pedro, Lover's Leap, and Water Field. They are fairly well protected by wire fencing and gates, and the water sheds are patrolled and kept under observation.

Kandy District.—The sources of water obtainable in this district are reservoirs, spouts, and public and private wells. All these sources except the public wells are unsatisfactory, and the supply from the latter during the dry season is inadequate.

*Licensed Trades.*—The following is a statement of the applications for licensed trades dealt with:—

(1) *Food and Drink handling Trades.*

Name of Trade.	Number of Applications.		
	Received.	Recommended.	Not recommended.
(1) Bakeries .. ..	446	383	63
(2) Tea and coffee boutiques .. ..	1,222	1,108	114
(3) Eating-houses .. ..	440	407	33
(4) Dairies .. ..	159	128	31
(5) Butchers' stalls .. ..	136	130	6
(6) Fish stalls .. ..	63	60	3
(7) Pork stalls .. ..	4	3	1
(8) Aerated water manufactory .. ..	7	6	1

(2) *Offensive Trade.*

(1) Public galas .. ..	48	41	7
(2) Manure stores .. ..	20	19	1
(3) Soap manufactories .. ..	1	1	—
(4) Hide stores .. ..	6	6	—
(5) Lime kilns .. ..	40	33	7
(6) Brick kilns .. ..	27	26	1
(7) Laundries .. ..	187	162	25
(8) Cabook quarries .. ..	5	5	—
(9) Plumbago sheds .. ..	20	20	—
(10) Metal quarries .. ..	14	14	—
(11) Public bathing places .. ..	7	7	—
(12) Pits for soaking coconut husks .. ..	6	6	—
(13) Fibre mills .. ..	7	7	—
(14) Desiccating mills .. ..	6	6	—
(15) Tanneries .. ..	3	3	—
(16) Gravel quarries .. ..	5	5	—
(17) Storage of raw bones .. ..	1	1	—
(18) Fat melting .. ..	1	1	—

Maintenance of sanitary condition of licensed trade premises—

(a) Number inspected .. ..	3,873
(b) Number of notices served for breach of rules .. ..	784
(c) Number voluntarily complied with .. ..	567
(d) Number prosecuted .. ..	502
(e) Number convicted .. ..	419
(f) Number warned and discharged .. ..	37

Licensed trades within Sanitary Boards are controlled by regulations. All applications for conducting licensed trades are, in the first instance, referred to the Sanitary Inspectors, who have been instructed not to be too stringent in the enforcing of the by-laws, but at the same time to use tact and persuasion in obtaining an improvement in the premises where trades are carried on, so that by a gradual process the sanitary defects may be remedied without crippling such trades.

Trade premises in village areas are seldom found in a satisfactory state. This is mainly due to the lack of any regulations in such areas. Beyond the enforcing of ordinary cleanliness no control can be exercised on these trades unless and until effective regulations are framed in



respect of each of the trades under some suitable Ordinance, such as the Village Committees Ordinance. Every attempt to improve such premises, however, has been made by means of persuasion and advice, and some response, though feeble, has been evoked in certain areas.

The licensed premises were regularly visited by the Inspectors throughout the year and whenever necessary minor sanitary defects or breaches of the by-laws have been rectified.

Puttalam and Chilaw Districts.—Towards the middle of the year under review, sets of by-laws were passed for the control of bakeries, tea and coffee boutiques, butchers' stalls, and laundries.

Jaffna District.—Owing to the lack of by-laws controlling trade premises outside the Urban District Council area it has been found difficult to maintain such premises in a satisfactory state.

*Sanitary Inspections.*—The following is a statement of inspections done:—

(a) *Private Premises*—

Number of inspections made during the year	..	..	619,940
Number found insanitary	..	..	146,135
Number of mosquito breeding places detected	..	..	12,045
Number of notices served to abate nuisance	..	..	9,642
Number voluntarily complied with	..	..	10,873
Number prosecuted	..	..	1,324
Number convicted	..	..	1,101
Number warned and discharged	..	..	143

(b) *Railway Premises*—

(1) *Of Stations.*

	Inspected.	Defective.	Improved.
Premises .. ..	4,676	1,712	562
Drains .. ..	7,072	254	179
Latrines .. ..	4,234	417	299
Mosquito breeding places	347	144	133
Water supply	2,044	211	123
Scavenging	2,394	369	138
Conservancy	2,720	165	125

(2) *Of Bungalows.*

Premises .. ..	3,482	578	446
Drains .. ..	3,274	299	182
Latrines .. ..	4,186	400	262
Mosquito breeding places	573	93	171
Water supply	2,573	414	88
Scavenging	2,879	516	182
Conservancy	2,994	154	58

(3) *Of Cooly Lines.*

Premises .. ..	5,193	758	596
Drains .. ..	3,840	1,064	742
Latrines .. ..	4,783	1,025	301
Mosquito breeding places	1,215	145	235
Water supply	3,407	412	107
Scavenging	3,394	771	400
Conservancy	2,159	170	108

(c) *Licensed Trade Premises*—

Number inspected	..	..	3,873
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Sanitary Inspectors are repeatedly reminded to get house premises cleaned up in their presence whenever possible and to utilize every opportunity that presents itself for explaining to the villager the necessity of keeping his premises clean.

A statement of offences against sanitary regulations, other than those detailed above, is given below:—

Offences.	Prosecuted.	Convicted.
Unauthorized buildings	110	78
Failing to demolish temporary sheds	2	2
Occupying buildings after closing	1	1
Occupying buildings without certificate of conformity	36	33
Failing to repair house	1	1
Deviating from approved plan	17	12
Failing to provide drains	2	2
Faecal pollution	99	77
Unlicensed trades	125	123
Food unfit for human consumption	91	81
Depositing rubbish on drains	58	47
For not paying conservancy fees	325	301
Throwing rubbish on public roads	18	16
Sinking wells without the permission of Chairman, Sanitary Board	2	1

### 3.—School Hygiene.

*History.*—Early in 1919 the work of medical inspection of schools was started with one Medical Officer who was appointed to visit schools and examine children in the whole Island. His headquarters were in Colombo. In 1921 a second Medical Officer was appointed—a lady—Dr. Aldons. In 1925 a Medical Officer was appointed for the inspection of schools in the Northern



Province, and in the year under review, 1927, two more officers were appointed—one for the Central Province and one for the Southern Province. The first school nurse was appointed in 1920 for Colombo town, a second in 1924 for Jaffna, and in 1927 two other nurses were appointed, so that 4 school nurses were then employed—one for each of the four divisions: Western Province, Southern Province, Central Province, and Northern Province.

The results have been encouraging in many ways—the school authorities have given wholehearted support to the medical examination of the children, and the children themselves have not been opposed to it. The greatest difficulty has lain in the lack of response from the parents, many of whom because of ignorance or prejudice or poverty or lack of interest make no attempt to carry out the recommendations made by the School Medical Officers in respect of their children. On the other hand, a certain percentage of ailing cases have received treatment, and once the importance of such treatment is more widely recognized, as the sanitary education of the people of Ceylon improves, there should be less cause for complaint in this respect. Moreover, results have been obtained in the amelioration of the sanitary conditions of certain schools; latrines have been provided in some cases, overcrowding has been reduced, and the provision of drinking water has been arranged for. An impetus has been given to the training of school teachers in hygiene, in the Western Province particularly, by the delivery of a series of 10 lectures to the teachers of Anglo-vernacular and vernacular schools at a number of centres in the Western Province and at Galle.

*Work in 1927.*—During the year 1927 the—

Total number of schools inspected was	..	..	..	819
Total number of pupils inspected was	..	..	..	62,680
Total number of defects noted was	..	..	..	28,254

From these figures it appears that just over 45 per cent. of the children inspected suffer from defects of one kind or another. The following table furnishes particulars:—

	Colombo.	Lady Doctor.	Galle.	Kandy.	Jaffna.	Total.
Schools inspected ..	77	68	108	202*	364	819
Pupils examined ..	8,404	4,096	16,388	15,808	17,984	62,680
Defects—						
Dental caries ..	1,247	224	2,174	2,521	2,248	8,414
Defective vision ..	105	111	82	347	150	795
Enlarged tonsils ..	212†	168	2,037	514	1,055†	3,986
Anchylostomiasis ..	825	21	1,853	5,565	2,335	10,599
Malnutrition ..	—	95	—	15	143	253
Adenoids ..	—	150	73	55	—	278
Skin diseases ..	—	49	648	135	548	1,380
Malaria ..	—	—	—	—	2,273	2,273
Defective hearing ..	25	23	62	12	154	276
Total of defects noted ..	2,414	841	6,929	9,164	8,906	28,254

\* Eighty-three schools were visited for inspection of premises only.

† Includes adenoids.

*Dental Caries.*—From these figures it is evident that one of the most common defects is dental caries, and in this connection it is to be noted that the School Medical Officers report that this defect is prevalent in schools situated in or near towns, whereas in remote village schools it is comparatively uncommon. This is no doubt due to the fact that the town child has more opportunity of eating articles of diet that are injurious to the teeth.

*Hookworm.*—Hookworm is the most common defect in spite of the fact that the Anchylostomiasis Campaign covered most of the schools in the Island in its treatment programme during the two years 1926 and 1927. The School Medical Officers endeavour to persuade school children who suffer from the disease to seek treatment at neighbouring Government hospitals or dispensaries, and there is no doubt that this disease will become less prevalent as the benefits to be derived from treatment come to be recognized. Teachers in village schools have reported that children who have been treated have improved in their general health and in their studies, and such results will do much to remove any prejudice against the treatment that may exist.

Full details of the work done by the Anchylostomiasis Campaign Officers are given in the Appendix to this Report; here it may be noted that almost 75,000 school children were given treatment by the Campaign Officers during the year 1927.

*Malaria.*—In the Northern Province malaria is very common among the school children, and the School Medical Officer reports that its incidence is as high as 100 per cent. in some districts judging from the spleen index. Good results have been obtained from the prophylactic administration of quinine in certain schools and a decided improvement in the general appearance of the children was noted. In some places there is considerable opposition on the part of parents to their children being given quinine prophylactically.

*Correction of Defects.*—School clinics were maintained for the Colombo schools at the Eye Hospital, the Dental Institute, and at the Anti-Tuberculosis Institute during the year.

The attendances at these clinics were as follows:—

Eye Hospital—	
Eye ..	254 pupils paid 642 visits
Ear, nose, and throat ..	154 pupils paid 262 visits
Dental Institute ..	882 pupils paid an average of 3 visits each
Anti-Tuberculosis Institute ..	165 pupils paid 375 visits

Outside Colombo facilities for the treatment of defects are incomplete as regards dental work especially. Eye clinics are established in towns like Colombo, Galle, Jaffna, and Batticaloa, and the Department proposes to establish clinics in other provincial centres in due course. It



is no doubt due to this lack of suitable facilities for treatment that so little is done by parents to carry out the recommendations made by the School Medical Officers regarding the correction of defects, but it must also be noted that many parents make no attempt to get their children's defects remedied so long as the children are not actually on a sick bed or quite evidently ill, as the result of these defects.

*Follow-up Work.*—In the towns especially follow-up work is of primary importance not only in getting defects corrected, but also in enabling the school to make contact with the home, so that the general health habits of the child may be influenced along right lines and the interest of the parents in the general well-being of the child may be maintained at a high level. In Ceylon, the majority of parents are ignorant of the fundamental essentials of the child's welfare, and a tactful school nurse is a very valuable asset in helping to render to the school child the best service possible as regards its health and physical well-being.

The work of the present school nurses is very valuable in this respect, and it is hoped to increase their number in the near future.

*School Buildings.*—There is still room for considerable improvement in the buildings that are used for schools. No particular standard type or types are laid down, and often schools are housed in dwelling-houses by no means suitable for the purpose. The School Medical Officer, Southern Province, reports that overcrowding is common in a large number of village schools, that light and ventilation are often not all that could be desired, and that in many cases inadequate and in some cases no latrine accommodation is provided. In the Northern Province school buildings range from modern two-storeyed buildings with all the necessary sanitary conveniences to mere cadjan sheds with sandy floors and no sanitary arrangements whatsoever. In 87 of the 364 schools inspected by the School Medical Officer, Northern Province, latrine accommodation is satisfactory, in 157 it is defective, and in 98 schools no provision at all is made. In 2 schools latrines of the dry earth type were kept under lock and key. In the Central Province many of the schools are not satisfactory from a sanitary point of view. In Colombo town the sanitary condition of the schools is on the whole satisfactory, and the same applies to schools of the Western Province to a smaller extent.

*Water Supply.*—The water supply in many schools is not yet adequate; for example the School Medical Officer, Northern Province, reports that there was provision of drinking water in only 70 of the 364 schools inspected. The provision of an adequate supply of good drinking water and of suitable vessels in which to keep and distribute it is essential.

*School Furniture.*—Most of the English schools and a few of the vernacular schools are provided with adequate furniture, but in a large number of the vernacular schools the importance of providing suitable desks and benches is not realized. In only a very few schools are the essential hygienic requirements of seats and desks being sufficiently observed.

*General.*—The following extract from the report of the Senior School Medical Officer—the School Medical Officer, Colombo—is of interest:—

"The functions of the School Medical Service in Ceylon, where the sanitary education of the people has not kept pace with the general progress of the country, have to be conceived with a wider outlook; they may be discussed under three heads: Preventive, Educative, and Curative.

"The amount of contagious disease spread through the medium of the class room will always be a matter for speculation. Children are at present in the schools with chronic forms of conjunctivitis (which with the seasonal influx of the transmitting agents may give rise to epidemics), scabies in its varied manifestations, impetigo and even parangi; they return to school without proper certification after such infections as measles and whooping cough; these are conditions which call for the interference of the School Medical Service, and they can only be dealt with by legislation and a proper organization.

"There can, however, be no doubt as to the degree of adult loss of efficiency and impaired physique, directly traceable to the defective conditions in the personal life of the child, and in his environment both at home and at school. We find scores of children in the schools, some of them travelling long distances, after a morning meal of only a hopper or even less, and going through the whole routine of the school day till one o'clock in the afternoon when they are free to go home for their first meal of the day; such a routine may breed some sort of tolerance, but the years of growth and suggestibility are undermined by an unhealthy habit against which the schools should take efficient action.

"The educational part of the programme has been done by the School Medical Officers by formal lectures and health talks in the course of their inspections. Formal courses of lectures have been delivered by the officers of the Sanitary Branch to groups of teachers, and examinations held, on the results of which certificates have been issued. Class room lessons on hygiene are also on the time table of the schools, and a variety of small manuals prescribed for use. But there is certain evidence that these do not 'grip,' and I feel that the health teaching in schools should be brought into line with modern methods, and children provided with opportunities of cultivating health habits, and coming into daily contact with sanitary models. 'So far as concerns the younger child hygiene should be taught in no other way than by the provision of arrangements for its practice, and by the teacher or some other responsible person seeing that the child makes use of them, and where necessary is taught how to make use of the facilities provided.' (Report of the Chief Medical Officer of the Board of Education, 1923.) Or again 'class room lessons on hygiene to younger children are probably valueless and may even prove harmful, the child disregarding the matter as unimportant.' (*Ibid.*)

"These involve certain fundamental changes in school house construction, which I am glad to be able to report have the approval of the Director of Education. Another matter on which action has been promised by the Education authorities is in regard to the lectures on physiology and hygiene given in Teachers' Training Institutions; I have submitted that it



would be very useful to have a medical man, who would be better able to correlate them to the circumstances of one's daily environment, giving them, as is being done in the Colombo Training College; here again I feel that it is also essential to provide them with all the facilities for the practice of hygienic principles and also surround them with a model sanitary environment in the school.

"Regarding the curative part of the scheme, the facilities are gradually being developed, and eye clinics have been started in Jaffna and Batticaloa. A vote of Rs. 600 has been given by Government for the provision of free spectacles during the financial year October, 1927-September, 1928, and I trust that the conditions I have laid down will prevent any abuse of this privilege."

#### 4.—Labour Conditions.

Manual labour in Ceylon may be considered under two main heads—immigrant and indigenous labour. For the most part immigrant labour is unskilled labour, supplying workers for the estates in Ceylon; whereas indigenous labour includes both skilled and unskilled workers. This Department is more directly concerned with the sanitary conditions of immigrant labourers on estates than of indigenous labourers as such, because the medical wants of estates are governed by Ordinance No. 9 of 1912, whereas there is no Ordinance dealing with the medical wants of indigenous labour as such. The care of the sanitary environment of indigenous labourers is a matter that comes within the purview of the sanitary authorities of the locality in which they reside, and the hospital and dispensary facilities provided by Government for the people of the Island are at their disposal.

At present there is no legislation, analogous to the Medical Wants Ordinance, dealing with the sanitary and medical care of industrial labour, which includes not only indigenous labour but a large portion of imported labour, skilled and unskilled. No doubt in the future this is a matter which will receive attention.

Before immigrant labourers come to Ceylon they are detained in quarantine at Mandapam Camp. The following reports—(1) Report on Mandapam Camp for the year 1927 and (2) Medical Wants on estates in 1927—show that immigrant labourers are very well looked after, both at Mandapam and on estates in Ceylon.

#### (1) REPORT OF THE SUPERINTENDENT, MANDAPAM CAMP, FOR 1927.

(Dr. H. J. de Saram.)

##### I.—IMMIGRATION.

During the year under review the number of immigrants passed to Ceylon was 219,906, consisting of—

Estate labourers .. .. .	159,399
Miscellaneous passengers .. .. .	60,507
Total .. .. .	219,906

The number of estate labourers passed is the highest since the opening of the Camp, the increase over 1926 was 57,653, and in the past record year, i.e., 1924, the number was 153,989, which is 5,410 less. This increase is due to the improved conditions in Ceylon and increased recruiting effort on the part of the estates, combined with a period of agricultural depression in the recruiting districts in India.

Owing to want of accommodation in the ferry steamer the departure of estate labourers was regulated for about two months during the busy season, and on May 6 labourers were despatched by 2 steamers.

##### II.—WORKS.

All buildings and roads were maintained in excellent order. The following works were completed during the year:—

- (1) Bakery.
- (2) Cement rendering wards and latrines.
- (3) Cooking stoves for Quarantine Medical Officer's and Assistant Ceylon Labour Commissioner's bungalows, Farmers' boilers, Staybrite steam cookers, and pepper water storage pots for the Hindu kitchen.
- (4) Two boilers for disinfecting.
- (5) Glass shutters to cholera hospital.

The following works at a cost of Rs. 102,010 have been sanctioned for 1927-28:—

- (1) New fresh water scheme.
- (2) Bacteriological laboratory.
- (3) Boundary wall round the Spencer's Manager's bungalow.
- (4) Additional bath and lavatory for Quarantine Medical Officer, Assistant Medical Officer, and Assistant Ceylon Labour Commissioner.
- (5) Improvements to Junior Clerks' quarters.
- (6) One block of 1 unit for Assistant Electrical Foreman.
- (7) Fan for rice cooling room, Hindu kitchen.

##### III.—WATER SUPPLY.

The fresh water supply was fairly satisfactory. Six water coolies were employed for nine months during the year.

When the new fresh water scheme is completed the supply should be ample and of better quality.

The supply of sea water used for flushing the latrines continues to be satisfactory.

##### IV.—ELECTRIC LIGHTING.

The lighting in Camp was maintained in good order. The question of installing an additional high power plant is under consideration.



## V.—SEWAGE DISPOSAL.

The water carriage system continues to work satisfactorily.

## VI.—SANITATION.

The sanitation of the Camp was kept in excellent condition throughout the year under the supervision of the Sanitary Inspector and two Overseers.

## VII.—FEEDING.

The contract continues to be in the hands of Messrs. Spencer & Co., and the food supply was ample and of excellent quality. The estate labourers are provided with bread for their travelling diet since September 21, 1927.

## VIII.—RAINFALL.

The rainfall during the year was poor although there has been a slight increase of 1.70 inches over the previous year. April recorded 7.38 inches, a very rare occurrence during the dry season.

The following is the distribution:—

	Inches.
1st Quarter .. .. .	5.30
2nd Quarter .. .. .	8.84
3rd Quarter .. .. .	0.21
4th Quarter .. .. .	15.02
Total .. .. .	29.37

## IX.—CLAIMED AND REFUSED CASES.

2,499 cases were dealt with during the year as compared with 1,183 in the past year:—

Rejection on medical grounds .. .. .	297
Rejection by Protector of Emigrants, including claimed and refused cases ..	2,202
Total .. .. .	2,499

## X.—STEAMER CREWS.

2,006 crews for 57 steamers who arrived from Bombay and Calcutta were passed after vaccination and disinfection.

## XI.—GENERAL.

(a) *School*.—There were four visits of inspection by the Educational Officers of the Indian Government, who recorded very good opinions of the institution. On their recommendation a 5th teacher has been appointed. The number of pupils at the end of the year was 142. A sum of Rs. 542.25 was paid by the Madras Educational Department as grant for the school.

Boy Scout and Girl Guide movements continue to work satisfactorily. The question of the construction of a proper building for the school is under consideration.

(b) *Reading Room, Library, and Sports Club*.—These were maintained in good condition.

(c) *Planting*.—Mahogany and ingasaman plants are growing well. Also casuarina and coconut trees.

(d) *Benevolent Fund*.—A sum of Rs. 299.56 was spent under this head; Rs. 34.56 having been paid on account of 7 stranded Ceylonese. Four persons are paid a monthly allowance of Rs. 5 each from this fund.

(e) Thirteen cents per head per diem was the cost incurred by Government on 219,906 immigrants, and 27 cents per head per diem on 46,170 passengers passed after quarantine.

A detailed statement of expenditure appears in Table No. 2 annexed.

## XII.—VISITORS.

The following visited the Camp during the year. A few extracts from their remarks are given in Table No. 1. Only one non-official visitor appointed by the Government of Madras visited the Camp once:—

(a) *From Ceylon*.

- (1) His Excellency Sir Hugh Clifford, Governor of Ceylon.
- (2) The Chairman, Board of Immigration and Quarantine.
- (3) The Hon. the Director of Medical and Sanitary Services.
- (4) The Director of Public Works.
- (5) The Hon. the Controller of Indian Immigrant Labour.
- (6) The Government Agent, Northern Province.
- (7) The Assistant Government Agent, Mannar.
- (8) The Chairman, Planters' Association of Ceylon.

(b) *From India*.

- (1) Hon. Sir Mohamed Habibullah, Member, Viceroy's Executive Council.
- (2) The Public Health Commissioner with the Government of India.
- (3) The Surgeon-General with the Government of Madras.
- (4) The Commissioner of Labour, Madras.
- (5) The Controller of Labour, Malaya.
- (6) The Emigration Commissioner, Malaya.
- (7) Mr. J. A. Milligan, Superintendent, Assam Tea Districts Association.
- (8) The Ceylon Emigration Commissioner.



- (9) The Emigration Agent of the Government of India.
- (10) The District Medical Officer, Ramnad.
- (11) The Sub-Collector, Ramnad.
- (12) The Protector of Emigrants, Madras Government.
- (13) The Medical Inspector of Emigrants, Madras Government.

## XIII.—MEDICAL REPORT.

The general health of the Camp continues to be satisfactory as also the treatment of labourers for anchylostomiasis. During the busy season one of the Junior Medical Officers was assisting in the anchylostomiasis work.

## XIV.—STAFF.

The work and the staff connected with the Immigration Fund were handed over to the Ceylon Emigration Commissioner with effect from October 1, 1927.

Dr. T. K. Jayaram took over charge as Quarantine Medical Officer from Dr. V. Vaithialingham, who left here on January 20, 1927, on transfer to Ragama. Dr. A. W. Rasiah acted as Assistant Medical Officer from January 20, 1927, to June 17, when Dr. A. Suppiah relieved him.

The whole staff, I am glad to say, worked loyally and willingly throughout the year as usual.

I appreciate the Medical Officer's kind co-operation in the administration of the Camp.

## Table No. 1.—Extracts from Visitors' Book.

I visited the Mandapam Emigration Camp to-day and went thoroughly into all details with Major Scoble Nicholson (Ceylon Labour Commissioner and Emigration Commissioner). I was much struck with the high standard of efficiency that prevailed throughout all departments of the Camp. The admitting of the Tamil labourers for Ceylon estates, their feeding and care after admission, and their final despatchment were all carefully explained and gone into, and one is left wondering whether any other emigrants in the world are so carefully advised, looked after, and provided for as are the emigrants proceeding to Ceylon.

January 22, 1927.

GEORGE BROWN,  
Chairman, Planters' Association of Ceylon.

Visited the Camp and was shown all the arrangements in great detail. I have never seen a better organized and better managed Camp. The arrangements for food are splendid and the emigrants seem to put on considerable weight during their period of detention. During my stay I saw no fly, which is a striking testimony to the cleanliness of the Camp.

January 26, 1927.

F. H. G. HUTCHINSON, Major-General, I.M.S.  
Surgeon-General with the Government of Madras.

I visited this Camp at the invitation of and under the guidance of Dr. Bridger, Director of Medical and Sanitary Services, and in company with Mr. Tyrrell, C.C.S.

I had often heard of its organization; but was hardly prepared to find such a carefully planned and efficiently organized Quarantine Camp.

I spent 22 hours in the Camp, and so was able to follow the emigrant régime from arrival to departure, and to see immediately every important activity in the Camp.

I was especially impressed with the great amount of thought expended on trying to perfect the procedure and to meet the prejudices and habits of the different castes and races of emigrants.

The feeding arrangements seemed excellent and the quality of rations good, while the additions possible at small cost to the basic diet were noteworthy, and apparently appreciated.

Everywhere the convenience of the emigrant seemed to be studied whether in regard to housing, feeding, disinfection, hospital treatment, or transit movements.

Structurally this Camp does not require criticism; while the system of sewage disposal has eliminated all fly nuisance with its attendant risks.

Systematic mass anchylostomic treatment is invaluable and appreciated.

The discipline and régime are in the nature of a valuable hygienic demonstration to any one, and especially so to the emigrant to labour conditions in Ceylon.

I would take this opportunity of expressing my thanks to the Director of Emigration and the Director of Medical and Sanitary Services, Ceylon, and to all the staff of the Camp for their courtesy and assistance at my visit.

January 26, 1927.

J. D. GRAHAM, Lieut.-Colonel, I.M.S.  
Public Health Commissioner with the Government of India.

Yesterday afternoon and this morning I devoted rather more than four hours to a thorough inspection of this Camp; and it is to the best of my recollection the only occasion upon which I have made such an inspection and, at the end of it, have no adverse criticism of any kind to offer, and nothing but praise and satisfaction to record. The Camp has cost, I am informed, nearly Rs. 2,000,000; but I regard the money so spent upon it as money very soundly invested. The extraordinary completeness of the Camp—which is the feature of it that strikes me more forcibly—shows that the planning of it was made the subject of really careful thought and of painstaking study. The work is eminently satisfactory.

Next financial year provision should be made for improvement—or rather for the enlargement—of the water supply. The present reservoir is only some 40 feet above the general level of the Camp. The new water-tower should, I consider, be not more than 100 feet above mean level, as that high land which is peculiarly suitable for the erection of quarters which are now needed can be put to their use and at the same time be given a sufficient water supply. The pressure secured to-day for the existing 40 feet high reservoir is not enough to be really effective in the event of an outbreak of fire.

April 30, 1927.

HUGH CLIFFORD,  
Governor of Ceylon.



Table No. 2.—Statement of Expenditure on Mandapam Camp from January to December, 1927, and Cost per Head.

Sub-head.	Expenditure.	Total Expenditure.	Rate per Head per Day.	Total Cost per Head for 7 Days.	Remarks.
	Rs. c.	Rs. c.	Rs. c.	Rs. c.	
A.—Government vote—					
(1) Emoluments ..	105,066 78				
(2) Travelling ..	595 62				
(3) Maintenance of camps, &c. ..	11,872 64				
Stationery ..	304 9				
(4) Stores and fuel for disinfecting station ..	2,682 71				
(5) Drugs, medicines, &c. ..	3,657 29				
Customs, &c., charges for medicines for anchylostomiasis treatment ..	382 5				
(9) Uniforms ..	1,191 70				
(10) Maintenance of and minor improvements to buildings and works at Mandapam ..	24,322 68				
(11) Cost of working water, sewage scheme, &c., Mandapam ..	25,334 42				
(12) Incidental expenses ..	593 25				
Special expenditure ..	30,261 78				
(13) New fresh water scheme, Mandapam Camp ..	86 35				
(14) Bacteriological laboratory ..	2 56				
(15) Boundary wall round Spencer's Manager's bungalow ..	868 47				
(16) Additional bath and lavatory for Q. M. O., A. M. O., and A. C. L. C. ..	173 35				
(17) Improvements to junior clerks' quarters ..	14 6				
		207,409 80	0 13	0 94	cost to Govern-ment
Paid by Immigration Fund—					
B.—Diets to labourers, plates, &c., excluding train fare ..	—	463,323 53	0 42	2 91	cost to Immi-gration Fund
Paid by Passengers—					
C.—I.e., Cash to contractors for meals ..	—	74,827 94	0 27	1 62	(for 6 days) Cost to public
Total number of estate labourers for 1927 ..				—	159,399
Number of passengers passed through direct ..				14,337	
Number of passengers passed after quarantine in Camp ..				46,170	
					60,507
Total passed through ..					219,906

## (2) MEDICAL WANTS ON ESTATES IN 1927.

The medical wants of estates are provided for by Ordinances Nos. 9 and 10 of 1912.

*Hospitals and Dispensaries.*—In 1927 no increase took place in the number of Government hospitals in the planting districts of Ceylon or in the number of Government dispensaries for the use of labourers on estates. The numbers remain at 62 and 100 respectively. The number of estate hospitals, however, increased from 78 to 80, and the number of estate dispensaries increased from 645 to 659. These estate institutions are built and equipped at the expense of the different estates, and it is gratifying to find that they are being improved year by year and are slowly increasing in numbers. The majority of the estate hospitals are well built and suitably equipped, and reflect great credit on the management of the estates concerned. As an aid to the maintenance of estate hospitals, the proprietors of estates which have hospitals are given by Government a free supply of drugs, and also a rebate on the duty paid by them on the export of the products of the estates, amounting to 15 cents on every 100 lb. of tea and cacao, and 75 cents on every 100 lb. of rubber. In the case of estates with dispensaries, a free supply of drugs to the value of 50 cents per labourer per annum is given by Government. Estate dispensaries serve a very useful purpose and more and more estates are building and equipping dispensaries every year. Although there is a Government type plan of estate dispensary with dispenser's quarters, shelters for patients, store room, &c., attached, which can be obtained by superintendents of estates on application to the Inspecting Medical Officer of the Province or from the Director of Medical and Sanitary Services, it is to be noted that even at present dispensaries of a not altogether satisfactory type are being erected in some cases. The Inspecting Medical Officer, Colombo, reports that out of 63 dispensaries inspected by him last year many are badly housed and badly equipped.

*Dispensers.*—There still exists a great need for the improvement in the professional qualifications of persons employed by estates as dispensers. Until the estate is prepared to pay a higher wage and provide better accommodation it is hardly to be expected that the proper type of officer will become available. It cannot be too often stressed that the raising of the status and standard of the estate dispensers will directly benefit the estate in the direction of more efficient service.

*Inspecting Officers.*—The work of visiting estates and inspecting lines devolves on three Inspecting Medical Officers, each of whom has an Assistant. These officers are engaged all the year round in visiting estates and advising superintendents regarding the best methods of improving the sanitary conditions and housing on their estates. This staff is not adequate for the work to be performed; many estates remain unvisited for too long a time, and it is impossible for the Inspecting Officers to visit every estate in their districts once a year.



The total number of estates visited by the three Inspecting Medical Officers and their Assistants in 1927 was 566; 205 estates by the Inspecting Medical Officer, Colombo, and his Assistant; 199 estates by the Inspecting Medical Officer, Uva, and his Assistant; 162 estates by the Inspecting Medical Officer, Central Province, and his Assistant.

*Progress made in 1927.*—In the year under review good progress has on the whole been made in the sanitary conditions of most estates, and particularly on those under Company management. Progress was generally slower and not so satisfactory on many privately owned properties, and especially on those of small acreage. Some of the larger estates have practically completed their building programme, and it is hoped that most estates will complete their programme by 1930. The Inspecting Medical Officers paid many advisory visits to estates for the purpose of choosing line sites, of selecting water supplies, and similar purposes.

The sanitary condition of 200 estates visited during 1927 in the Central Province and in the Province of Uva is shown in the following table:—

Sanitary Conditions found by the Inspecting Medical Officers on 200 Estates visited by them in 1927 in the Central and Uva Provinces.

Province.	No. of Estates visited.	Population.	No. of Latrines. Compartments.		General Sanitary Condition.						* Dispensers Employed.		
			Found.	Required.	Very Good.	Good.	Very Fair.	Fair.	Poor.	Bad.	Yes.	Shared.	None.
Central ..	162..	45,275..	2,950..	1,508..	3..	27..	23..	49..	36..	24..	38..	35..	89
Uva ..	38..	15,187..	1,232..	358..	4..	17..	—..	17..	—..	—..	17..	—..	21
Total ..	200	60,462	4,182	1,866	7	44	23	66	36	24	55	35	110

*Structure of Lines.*—The Inspecting Medical Officer of the Central Province reports that the cooly lines erected in the year under review in his Province were mostly constructed of rubble masonry, though concrete for walls was being more freely used than in 1926. Lines built of concrete are in his opinion excellent, being difficult to damage and much appreciated by the labourers. Their cost, if clean sand is available, compares most favourably with the cost of stone buildings. A defect common to the majority of the lines built of rubble masonry was that the inside walls were only mud plastered and lime washed. The Inspecting Medical Officer, Colombo, reports that most of the new lines in his district were generally well constructed of stone and mud walls, lime plastered and lime washed, with "tagaram" roof. Cement concrete lines are also in existence on several estates. In some cases lines which are better than the standard laid down by Government are built, showing that some estate managements realize the importance of well constructed and hygienic estate lines.

Generally speaking the dimensions of rooms, the height of walls, the width of verandahs, &c., were almost always in accordance with the rules, but in a fairly large number of cases it was found that the doors and windows were not in accordance with the requirements of the Ordinance. It would be advisable if all superintendents acquainted themselves with the standard laid down by the Ordinance, and if they accepted nothing less than this minimum from the various contractors and masons employed by them.

*Water Supplies.*—Good progress has to be reported in the matter of the protection of drinking supplies to cooly lines. Of the estates inspected in the Central Province, 49 had supplies entirely protected, 32 partly protected, and 73 unprotected. The Inspecting Medical Officer, Uva, reported that piped water service to estate lines was being substituted for supplies obtained from open hill-side streams, where the water was open to pollution, and that 150 estates had entirely protected supplies, 53 had supplies partly protected, and 43 had supplies that were unprotected. The Inspecting Medical Officer, Colombo, reports that in his district water supply generally comes from wells with no covering, but on the larger estates wells are protected with a circular wall, circular paving, and outlet drains and covers.

It is hoped that the need for protecting all unprotected water supplies, in view of the danger to health that arises from unprotected supplies and the occurrence of cases of diarrhoea and dysentery among labourers from the use of polluted water, will be fully realized on all estates.

*Latrines.*—Although more attention is being paid to the provision of adequate and suitable latrine accommodation on estates, there is room for much improvement still in this direction. Of the estates inspected in the Central Province, it was found that 32 had sufficient latrines for the labourers, 26 had latrines but not in sufficient numbers, while in 52 cases there were no latrines at all. Of the 205 estates inspected by the Inspecting Medical Officer, Colombo, 54 were not provided with latrines, while 48 had an insufficient number of latrines. The Inspecting Medical Officer, Uva, reports that in his area the construction of new permanent latrines is being pushed on rapidly, the old and dilapidated wooden latrines being replaced, and that 99 estates had a sufficient number of latrines, 124 had an insufficient number of latrines, and 23 estates had no latrines.

It was noticed in some cases that existing latrines did not receive the necessary attention, and were kept in an unclean and insanitary condition. This might be due to a variety of causes, such as an insufficient scavenging staff, an estate dispenser who did not consider that it was his duty to inspect latrines regularly and supervise the work of coolies, difficulty about water for washing out the latrines and drains, or merely a lack of interest on the part of every one concerned in matters affecting the health and well-being of the labour force. There is no doubt that labourers are now getting into the habit of using latrines, and it is a pity that this should not be encouraged in every way. It is obvious that if latrines are not kept clean labourers will be discouraged from using them.



There are many types of latrines on the market, but it may be stated that labourers seem to prefer latrines in which each compartment has its own door, in which lighting arrangements are satisfactory, and in which the compartment is sufficiently wide for a person to squat comfortably. It is understood, of course, that latrines for the two sexes should be entirely separate and apart.

*Accommodation.*—Further improvement was noticed as regards the adequacy of the accommodation provided, and there was less overcrowding in estate lines, although this, however, still existed to some extent. Of the estates inspected in the Central Province, there was no overcrowding in 102, slight overcrowding in 14, and overcrowding in 45 cases. In the area inspected by the Inspecting Medical Officer, Colombo, only 7 estates had all lines up to Government standard, and in the case of 61 estates there was overcrowding. The Inspecting Medical Officer, Uva, reports that on 134 estates there was no overcrowding, on 40 there was slight overcrowding, and on 72 there was overcrowding.

*Proposed New Rules regarding Cooly Lines Construction.*—Many incorrect statements have been made at meetings of Planters' Associations in the Press and elsewhere to the effect that constant changes are being made in the regulations under Ordinance No. 10 of 1912 dealing with the construction of cooly lines on estates. This has been the cause of a large volume of adverse criticism directed against the Department and Government, who are characterized as health faddists making unreasonable demands.

It appears, therefore, desirable that the facts should be stated, and the falsity of what has passed current for truth should be exposed. Ordinance No. 10 of 1912 came into operation in that year, but the first and only regulations dealing with line construction saw the light of day only in 1923. As a result of the working of these 1923 regulations, the Medical Department found that certain anomalies and difficulties existed owing primarily to the vagueness and indeterminate character of the phrasing of these regulations. The Department, therefore, in 1926 submitted to Government for consideration draft amended regulations to take the place of those which became law in 1923.

The Government forwarded this draft to the Medical Wants Committee for an expression of its views. The Medical Wants Committee, before expressing any opinion, sent copies of the draft to each Planters' Association for comment.

This draft, much the worse for wear, and more than less in a condition of shreds and tatters, was returned in due course to the Medical Wants Committee. This Committee having patched it up and made it presentable returned it to Government, with whom it rests at the moment, still a draft and not yet a statutory document. It should in this connection be stated that the principal opposition to the draft as submitted by the Department lies in the desire to perpetuate the present practice of building back to back lines and to reduce to 20 feet the existing statutory requirements of 40 feet of clear space around a cooly line.

It is to say the least of it extraordinary that there should exist in Ceylon in 1927 a body of educated opinion supporting the construction of a type of habitation that has been the object of condemnation by sanitarians for the last many years.

*Vital Statistics.*—There has been no improvement as regards infantile mortality, the rate in 1927, viz., 228, being higher than in 1926, viz., 209. In 1927 2,845 male infants died on estates and 2,644 female infants, a total of 5,489. The infant death rate of the different estate districts for 1925, 1926, and 1927 is given below:—

			1925.		1926.		1927.
Kandy	..	..	257	..	224	..	250
Matale	..	..	245	..	225	..	231
Nuwara Eliya	..	..	245	..	225	..	259
Badulla	..	..	203	..	212	..	216
Ratnapura	..	..	219	..	192	..	208
Kegalla	..	..	145	..	151	..	177
Colombo	..	..	185	..	158	..	221
Kalutara	..	..	157	..	149	..	150
Galle	..	..	199	..	225	..	228
Matara	..	..	246	..	242	..	250
Kurunegala	..	..	162	..	258	..	256

The causes of death were as follows:—

Causes.	Three Months and under.	Over Three Months but under One Year.	Total under One Year.	Percentage of Deaths to Total Estate Infant Deaths.	Corresponding Percentage for the Island.
Convulsions ..	706	263	969	17.7	29.3
Tetanus ..	1	—	1	.02	.1
Diarrhoea ..	26	57	83	1.5	1.4
Bronchitis ..	53	58	111	2.0	.7
Pneumonia ..	85	228	313	5.7	2.7
Enteritis (excluding gastro-enteritis) ..	3	7	10	.2	.7
Debility* ..	—	—	2,845	51.8	22.3
Prematurity* ..	—	—	791	14.4	6.4
Other causes* ..	—	—	366	6.7	36.4

\* Figures are not available separately for infants under three months and those over three months but under one year.

It is to be noted that convulsions and debility are the two chief causes of death.

The Inspecting Medical Officer, Central Province, reports that the care of new born children did not receive sufficient attention on all the estates inspected by him. The Inspecting Medical Officer, Colombo, reports that in spite of better housing and better pay, and in consequence better food and clothing, there has been little improvement in infantile mortality since 1923. He suggests that if the educated women on groups of estates combined to carry on maternal



and infantile welfare work with the midwife and dispenser better results could probably be obtained. He reports that good work is being done by the Medical Officers of districts who have clinics in their hospitals, and lecture to mothers in the vernacular regarding the welfare of children. The Inspecting Medical Officer, Uva, reports that the superintendents and managers of estates in his district have given attention to this matter of child welfare. In almost every estate expectant mothers are granted release from work when they wish it, and free rations are supplied or light work is arranged for them close to their lines. At the birth of a child an allowance of rice and a cash bonus are given, and an attendant is provided during the lying-in period. On estates with hospitals a midwife is employed and a maternity ward is available for confinement cases. After the birth of a child working mothers are granted facilities for the frequent suckling of their infants by the provision of crèches or depôts in the working areas or fields, in charge of a woman or nurse with experience of children. Weak children are provided with milk or other nourishment suitable to their age.

As was remarked in this Report in 1926, it is hoped that estates will do their utmost to induce mothers to attend clinics in district hospitals and dispensaries and form welfare centres in their own estates. Government Medical Officers will always give what assistance they can to any estate that desires help in this direction.

A step in the right direction is the employment of more trained midwives on estates. This was urged by the Inspecting Medical Officers, and there seems to be a greater readiness on the part of the managers of the larger estates to employ qualified midwives. The smaller estates employing two or three hundred labourers each should amalgamate with their neighbours and employ one midwife between two or three of them.

The ignorance shown by the ordinary cooly mother in the care of her own child is colossal. The new born child is not allowed any sustenance till the third day after its birth. Doses of castor oil are poured down the infant's throat, and under this drastic treatment it is not surprising that many children die in the first week of life. There is no doubt that if qualified midwives were more largely employed a large percentage of these early deaths could be prevented.

Amongst adults dysentery and pneumonia are the two principal causes of death. Improved water supplies will make the former disease a less frequent cause of death, and it is satisfactory to note the progress that is being made in this direction. Pneumonia can be combatted by clothing the labourers more warmly, by providing them with better facilities for drying their clothes, and by supplying them with a more stimulating diet.

Figures showing the principal causes of deaths amongst Indian immigrant labourers on estates are given in Section II., Vital Statistics.

*Epidemic Diseases.*—The estates were singularly free from cholera, smallpox, &c., and this was largely due to the effective quarantine established at Mandapam Camp, the first line of defence against epidemics from India. A few cases of chickenpox and measles were reported amongst coolies in the Central Province. Malaria was bad in the Matale valley during the last two months of the year. The Inspecting Medical Officer, Colombo, reports that in the estates in his district there was a decrease in the cases of malaria.

*Anchylostomiasis.*—A full account of the work done on estates by the Anchylostomiasis Campaign Officers is given in the report of the Director of Anchylostomiasis Campaigns, in the Appendix to this Report. 189,617 treatments were given by the Campaign Officers in 1927, and 89,113 treatments are reported to have been given by estate staffs. Estate dispensers are now more or less conversant with the combined carbon tetrachloride and chenopodium oil treatment, and in many cases the work was carried out by estates with their own staff.

*General.*—The general health of estate labourers has improved in the past few years, and this is due chiefly to better housing, better drainage of lines, better water supplies, the increasing use of latrines, and the diminution of soil pollution.

### 5.—Housing and Town Planning.

The procedure adopted for enforcing the provisions of the Housing Ordinance, No. 19 of 1915, was described in my Report for 1926. The same procedure was carried out during the year under review, and the following is a statement of work done under the Housing Ordinance:—

#### (1) *New and Re-constructed Buildings.*

Number of applications received and dealt with in respect of—				New.	Reconstruction and Repairs.
(a) Dwelling houses	..	..	..	1,258	621
(b) Other buildings	..	..	..	1,097	57

#### (2) *Insanitary Buildings.*

(a) Number of insanitary buildings reported upon during the year	..	321
(b) Number of closing orders obtained	..	123
(c) Number improved	..	137
(d) Number of demolition orders obtained	..	25*
(e) Number demolished	..	85

\* Sixty were voluntarily demolished.

### 6.—Food in Relation to Health and Disease.

There is a general provision in the law by which food unfit for human consumption can be seized and dealt with, but for the efficient control of food a specific Pure Food Act is needed and is long overdue.

All food-handling establishments in areas controlled by local authorities have to be licensed, and such licences are granted on the recommendation of the Medical Officer of Health, whose duty it is to see that they conform with the requirements of the appropriate by-laws. A statement relating to the work done in this connection is given under licensed trades.



*Milk Supply.*—In the absence of a Pure Food Act no standards are in existence in the Island. However, when milk is found to be grossly adulterated, action is taken under existing by-laws and the vendors are prosecuted. The adulteration and illicit sale of milk are being carried on extensively and the vigilance of Sanitary Inspectors has helped but little. If the public refused to deal with unlicensed vendors, the work of improving the milk supply and minimizing the illicit sale of milk could be carried out with a better chance of success.

At present analysis of milk is carried out only in Colombo. Considerable difficulty has been encountered in despatching to Colombo samples taken in remote places. Facilities for the analysis of milk should be available in at least the capital of each Province for speedier and more effective work to be carried out.

The controlling of the milk supply in the rural areas is an equally urgent necessity, but in the absence of the necessary legislation nothing can be done.

The following is a statement of work done in connection with milk control:—

(a) Number of samples taken and sent for analysis	..	257
(b) Number of samples found adulterated	..	136
(c) Percentage of water added varied from	..	5 per cent. to 73 per cent.
(d) Average adulteration	..	52.8
(e) Number prosecuted	..	141
(f) Number convicted	..	106
(g) Number warned and discharged	..	6
(h) Amount of fines realized	..	Ra. 2,004

*Meat Inspection.*—All cattle slaughtered in areas controlled by local bodies are inspected before slaughter, which takes place in slaughter-houses provided by the local bodies, and the meat is sold in licensed stalls.

For sale of meat, fish, vegetables, and fruit markets are generally provided in areas under local bodies.

Markets are necessary at Eheliyagoda, Balangoda, Rakwana, Dehiowita, Yatiyantota, Rambukkana, Hatton-Dikoya, Polgahawela, and Talawakele.

Sanitary improvements are necessary for the existing markets at New Bazaar in Nuwara Eliya, Welimada, Lunugala, Moneragala, Hali-ela, Dondra, Gandra, Kottegoda, Dikwella, Walasgalla, Hakmana, Rattota, Ahangama, Akuressa, Mirissa, and Hikkaduwa.

Markets are under construction at Nawalapitiya and Gampola.

Experimental temporary markets have been established by private individuals at Welitara and Batagedera.

By-laws for the control of markets in the Sanitary Board towns in the Northern Province are urgently needed.

Foods, other than meat, fish, vegetables, and fruits, that were exposed for sale were regularly inspected, and prompt action was taken under the provision of the general law which prohibits the sale of food unfit for human consumption.

The storage of rice is controlled by specific regulations in certain towns as a precautionary measure against plague.

#### B.—MEASURES TAKEN TO SPREAD THE KNOWLEDGE OF HYGIENE AND SANITATION.

(1) *Health Lectures.*—A series of 10 lectures was delivered to the teachers of Anglo-vernacular and vernacular schools at the following centres:—Government Training College, Colombo, St. John's College, Panadure, Padukka, Beruwela, Gampaha, and Galle, at the end of which cinema films on malaria and hookworm were shown.

The classes were started on May 7 and were continued for three months. An examination was held on September 17; 1,138 sat for the examination, of whom 637 passed.

Lectures were also delivered to school children in Nuwara Eliya and Kurunegala Districts, and to the police at Kurunegala and Ratnapura.

Lectures illustrated with lantern slides were delivered at Egoda Kolonnawa, Padukka, and Homagama. Lectures illustrated with cinema films on malaria and hookworm were delivered at the following places:—Egoda Kolonnawa, Kalapaluwawa, Panadure, Panthiya estate (Matugama), Koralawella, Ratnapura, Hatpattu, Negombo, Kochchikade, and Gampaha.

At the Health Unit, Kalutara, 17 lectures were delivered to teachers and parents, 10 lectures were given to the headmen, and 5 lectures on pure milk, illustrated by the cinema, and several informal talks were given at the various schools.

(2) *Articles on Health to the Press.*—Articles on health subjects were published weekly in the local morning and evening newspapers. The first of these appeared on June 25. Arrangements are being made to have these articles translated and published in the vernacular newspapers as well.

(3) *Radio Talks.*—Beginning from September 30 14 of the articles on health that appeared in the English papers were weekly released from the Broadcasting Studio.

(4) *Health Unit, Kalutara.*—Dr. S. F. Chellappah, Senior Medical Officer of Health, who collaborated with Dr. W. P. Jacobs, Director, Anchylostomiasis Campaigns, Ceylon, in the organization of the Health Unit, was in charge of the Unit during the early part of the year. At the beginning of July the work was taken over by Dr. W. G. Wickramasinghe, Medical Officer of Health.

A summary of the work done at the Health Unit during the year is included in the Appendix.



(5) *Special Reports*.—During the year under review the following special reports were submitted by the officers of the Department:—

- (1) Report on the epidemic of dysentery in Gandolaha pattu, by Dr. L. J. Kahawita, at the request of the Assistant Government Agent, Kegalla.
- (2) Report on the sanitary arrangements and medical facilities during the season of pilgrimage to Adam's Peak, by Dr. L. J. Kahawita, at the request of the Hon. the Colonial Secretary.
- (3) Report on the sanitary condition of the town of Kegalla, by Dr. L. J. Kahawita, at the request of the Chairman, Local Board, Kegalla.
- (4) Report on the organization of a child welfare and maternity centre, by Dr. L. J. Kahawita, at the request of the Ratnapura Social Service League.
- (5) Report on smallpox at Kotagaloluwa, by Dr. Merl Perera, at the request of the Government Agent, Central Province, and the Director of Medical and Sanitary Services.
- (6) Reports on plague at Gampola, Rahatungoda, Kotabogoda, Hantane, Nugawela, and Bopitiya, by Dr. Merl Perera.
- (7) Two reports on St. Anne's festival and one report on Munnessaram festival, by Dr. C. T. Williams, at the request of the Director of Medical and Sanitary Services.
- (8) Report on the general health of the district, by Dr. C. T. Williams, at the request of the Assistant Government Agent, Puttalam.
- (9) Report on Ragama water supply, by Dr. N. Kelaart, at the request of the Director of Medical and Sanitary Services.
- (10) Report on Gampaha water supply, by Dr. N. Kelaart, at the request of the Director of Medical and Sanitary Services.
- (11) Report on police station and premises, Talpe, by Dr. B. C. Das Gupta, at the request of the Superintendent of Police, Southern Province.
- (12) Report on dysentery outbreak at Nagoda, Udugama, by Dr. B. C. Das Gupta, at the request of the Government Agent, Southern Province.
- (13) Report on sanitary survey of Panadure, by Dr. D. M. de Silva.

#### C.—TRAINING OF SANITARY PERSONNEL.

A training class for Sanitary Inspectors was started on September 1 with 23 students. The course of instruction lasted 6 months. At the close of the course 20 students sat for the examination (3 having dropped out during the period of training for various reasons) and passed, thus qualifying for appointment as probationary Sanitary Inspectors.

#### D.—RECOMMENDATIONS FOR FUTURE WORK.

The appointment of Medical Officers of Health to all important revenue districts will enable them to develop health work on modern lines by devoting time to the promotion of the welfare of the individual in addition to improvement of the sanitary condition of his environment.

Much general sanitary work has still to be done, however, particularly in rural areas.

It is the intention of the Department to establish a number of Health Units in suitable areas each year, provided the necessary funds and trained personnel are available.

It is proposed that the Sanitary Branch should supervise the campaign against anchylostomiasis next year as this work has now been placed on a permanent footing. The direct control of this work by the Sanitary Branch will ensure more effective co-ordination of mass treatment with measures for the prevention of soil pollution.

As the co-operation of the public health work can only be inspired by the removal of ignorance and prejudice, it is hoped to make health education a special feature more than ever next year. With this object in view the necessary appliances and material in the form of balopticons, local lantern slides on health subjects, cinema films, posters, charts, &c., are being procured.

It is also hoped to train a staff of lecturers for systematic health education work in the vernaculars in rural areas.

### IV.—PORT HEALTH WORK AND ADMINISTRATION.

*Colombo Port*.—During the year 2,923 British and foreign vessels and 266 Indian sailing crafts called at the Port of Colombo, as against 2,753 and 306, respectively, in 1926.

*Infected Vessels*.—Four vessels arrived infected with smallpox and one with typhus fever. They were placed in strict quarantine until the usual control measures were carried out.

Six cases of smallpox and one case of typhus fever were landed and sent to the Infectious Diseases Hospital.

*Suspected Vessels*.—Four vessels which had landed cases of smallpox at previous ports, another which had landed a case of suspected cholera, and another in which a case of plague had occurred were pronounced suspect and held in strict quarantine until the usual control measures were carried out.

*Plague and Cholera*.—No vessels infected with these diseases arrived at this port during the year. One vessel, the ss. "Porthos," arrived on May 23 from Djibouti. The ship's surgeon reported that a case of plague died on May 21 after 36 hours' illness. The deceased was an Arab, one of 30 Arabs who had embarked at Djibouti. The other 29 Arabs who had been inoculated with vaccine against plague by the ship's surgeon were sent to the Infectious Diseases Hospital. They did not subsequently develop plague. No mortality of rats was observed during the voyage.



Throughout the year under review plague was present in a sporadic form in the city of Colombo. There has been no relaxation of the measures taken against plague at this port. Regular trapping for rats in all warehouses and Customs premises was carried out and fumigation of all lighters performed in rotation throughout the year.

No vessels arriving in the port during the year reported any mortality among rodents, although they confessed to their presence in some cases in unusual numbers.

All vessels reported that traps and poison baits were freely used for their destruction. There was no record in the declarations of health submitted that frequent deratization of vessels by fumigation was undertaken.

*Water Boats.*—Water boats, when cleaned and freshly cemented, are inspected and passed by the Port Surgeon's staff every quarter. Lighters are regularly inspected and fumigated by the Inspector of Fumigation.

Ten prosecutions were entered against boats kept in an insanitary condition and Rs. 100 recovered in fines and credited to revenue.

7,365 cargo boats were fumigated with sulphur, and 877 rats destroyed against 7,073 and 710 respectively in 1926.

*Vaccination.*—851 persons were vaccinated at the Port Surgeon's Office and Disinfecting Station during the year, as against 4,286 in 1926 and 6,611 in 1925.

These were mostly coolies and tally clerks who worked in vessels strictly quarantined for smallpox. A few were recent arrivals from India *via* Tuticorin and Mandapam. The marked decrease in vaccination every year is due to the fact that vaccination is now being done freely at Mandapam and Tuticorin.

*Disinfection.*—The disinfection of 192,324 persons and their clothing was carried out during the year at the Port Disinfecting Station, as against 176,566 in 1926.

These persons comprise 3rd class passengers, cargo, coal coolies working on ships, tally clerks, ships' crews, and dhobies.

The report of the work done at the Port Venereal Clinic is given in Section VI., Venereal Clinics, of this Report.

*Galle Port.*—During the year 130 steamers and 23 sailing vessels called at the port and were inspected, as compared with 121 and 18 respectively in 1926. Of these 1 steamer arrived infected with smallpox and was placed in strict quarantine. The only infected case was sent to the Infectious Diseases Hospital. The vessel was disinfected and the crew vaccinated. No fresh cases occurred.

9,036 persons and their clothing were disinfected during the year; the figures for the previous year were 7,563.

309 cradles of soiled linen from quarantined vessels were disinfected at the Disinfecting Station during 1927.

Water is carried to steamers in barrels loaded in cargo-lighters. The barrels are washed regularly.

## V.—MATERNITY AND CHILD WELFARE.

There is no doubt that there are signs of a great awakening in the interest displayed in Ceylon in maternity and child welfare. The Social Service Leagues which have come into existence in various parts of the country have stressed these branches of social work. The field is a wide one and the need is urgent. Government is doing its share by its policy of providing maternity annexes to Government hospitals and by the training of midwives. One of the principal objects of the enlargement of the De Soysa Lying-in Home in Colombo is to provide for the training of an increased number of midwives. The gradual elimination of the ignorant midwife and her replacement by trained ones available to the people in their homes will be a far more important factor in reducing infantile mortality and maternal disability than the building of Lying-in Homes. Normal labour should be treated at home, and hospital provision should be essentially for difficult labour.

Last but not least in this connection must be mentioned the fact that an important function of the Health Unit is the welfare of the mother and infant by means of the employment of public health nurses and midwives.

(a) *Ante-Natal and Baby Clinics.*—In 1924 medical officers in charge of hospitals to which a matron was attached were instructed to start ante-natal and baby clinics, and although the response has not been universally encouraging some of the centres are able to show very satisfactory results. These centres are the De Soysa Lying-in Home, Colombo, Moratuwa, Matara, Badulla, Kurunegala, Peradeniya, and the Health Unit area at Kalutara. (Details of the work there are given in the report of the work at that Unit in the Appendix.) As stated in last year's Report, medical officers take advantage of the attendance of pregnant mothers and of children at hospitals as ordinary out-patients to give instruction and treatment, and more women than formerly are admitted to the maternity wards of hospitals for their confinement.

In Colombo the most important ante-natal clinic is attached to the De Soysa Lying-in Home, and the following figures show a steady increase in the numbers attending during the past three years:—

					Number of Expectant Mothers.	Number of Visits.
1925	..	..	..	..	707	713
1926	..	..	..	..	948	1,038
1927	..	..	..	..	1,589	1,731

(b) *Training of Midwives.*—The training of midwives continues to be carried out at the De Soysa Lying-in Home, Colombo, and the number applying for such training is greatly in excess of the accommodation available. It is hoped to obviate this by extending the Lying-in Home, and proposals regarding this are now before Government. These midwives undergo a six



months' course of training, and when they pass out they are employed in the various Government hospitals, or on estates, or in Local and Sanitary Board towns. Some start practice for themselves and settle down in urban or rural centres, thereby gradually displacing the unqualified and ignorant village midwife.

Fifty-eight midwives were employed in Government hospitals during 1927, as against 38 in 1926. The number of maternity blocks added to hospitals during the year was 6, with a provision of 22 beds. All hospitals in the Island are gradually being provided with a midwife each.

(c) *Social Service Work*.—This is being carried on with increasing zeal, principally in the provincial towns by Social Service Workers' and Ladies' Leagues, generally in co-operation with the Government medical officers, who give lectures and informal talks regarding maternity and child welfare at the various clinics, at the same time affording medical advice and relief to those requiring them. Milk depôts have been installed in various outstations by Social Service Leagues for the free distribution of milk to necessitous cases. Baby Shows were held at some centres, notably Badulla, where prizes were awarded for regular attendance and the "Best Baby."

One ventures to point out that an excellent opportunity for carrying out maternity and child welfare work remains practically untouched. As will be seen from the details given in the next paragraph, not only is the infantile mortality rate amongst Indian immigrant labourers on estates higher than that amongst the rest of the population, but it has not shown, during the past few years, as steady a decrease as that other rate has evidenced. One may be permitted to express the hope that ladies in planting districts may see their way to forming maternity and child welfare organizations to ameliorate the lot of the Indian immigrant mother and child on estates and so reduce the high infantile mortality rate. It may be said that by the provision of midwives estates are already attending to this work, but it has been found, in Ceylon and elsewhere, that it is the personal touch, in matters of this kind, that counts for so much.

(d) *Infantile Mortality*.—The infantile mortality rate continues to compare unfavourably with that of Western countries, but signs are not lacking that this rate is steadily diminishing. The following statement shows the infantile mortality rate and the number of infant deaths in the 33 principal towns of the Island during the past ten years:—

Statement showing the Infantile Mortality Rate and the Number of Infant Deaths in the 33 Principal Towns of the Island during the past Ten Years.

	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927.
Infantile mortality rate ..	252 ..	259 ..	228 ..	238 ..	240 ..	258 ..	235 ..	216 ..	208 ..	191
Number of infant deaths ..	4,330 ..	4,263 ..	4,285 ..	5,324 ..	4,574 ..	5,073 ..	4,385 ..	4,401 ..	4,544 ..	4,159

It will be seen from the above figures that there has been a marked decrease in the rate during the past four years.

The rate for the whole Island is better than the rate for the 33 principal towns, as the following statement will show:—

Statement showing the Infantile Mortality Rate for the whole Island and Number of Infant Deaths in the past Ten Years.

	1918.	1919.	1920.	1921.	1922.	1923.	1924.	1925.	1926.	1927
Infantile mortality rate ..	188 ..	223 ..	182 ..	192 ..	188 ..	212 ..	186 ..	172 ..	174 ..	160
Number of infant deaths ..	34,461 ..	35,941 ..	29,792 ..	35,325 ..	33,803 ..	38,467 ..	33,350 ..	33,221 ..	36,024 ..	32,959

From this statement one realizes that the rate in the rural areas must be less than the rate in the urban areas, and in that connection the following statement which gives the rate and number of deaths in the rural areas, that is to say, the whole Island, exclusive of the 33 principal towns, for the three years 1925, 1926, and 1927, is of interest:—

Statement showing the Infantile Mortality Rate and the Number of Infant Deaths in the Rural Areas (*i.e.*, the whole Island, exclusive of the 33 Principal Towns) for the Three Years 1925, 1926, and 1927.

	1925.	1926.	1927.
Infantile mortality rate ..	167 ..	162 ..	157
Number of infant deaths ..	28,820 ..	31,480 ..	28,802

As regards races, the infantile mortality rate amongst the Indian immigrant population on estates compares unfavourably with the rate for the rest of the population. The following statement shows the rate during the last three years amongst the Ceylonese population, the European population, and the Indian immigrant population on estates:—

Statement showing the Infantile Mortality Rate amongst the Ceylonese, European, and Indian Immigrant (Estate) Population for the last Three Years.

	1925.	1926.	1927.
Ceylonese population (that is, the whole population, less the Indian immigrant population on estates and the European population) ..	167 ..	169 ..	142
European population ..	15 ..	26 ..	24
Indian immigrant (estate) population ..	216 ..	209 ..	228



*Causes of Death.*—The following table showing the chief causes of infantile death amongst the total population of the Island for the year 1927 is of interest:—

Table showing the Chief Causes of Death amongst the Total Population of the Island for the Year 1927.

Causes.	Three Months and under.	Over Three Months and under One Year.	Total under One Year.	Percentage of Deaths to Total under One Year.
Convulsions	7,010	2,634	9,644	29.3
Tetanus	41	3	44	.1
Diarrhoea	121	326	447	1.4
Bronchitis	109	138	247	.7
Pneumonia	240	664	904	2.7
Enteritis (excluding gastro-enteritis)	83	143	226	.7
Debility	—	—	7,352	22.3
Prematurity	—	—	2,105	6.4
Other causes	—	—	11,990	36.4
	25,459	7,500	32,959	

It will be noted that convulsions and debility are the two chief causes of death.

The causes of death amongst infants on estates are given in the section on Medical Wants on Estates in Section III. of this Report. The figures given there show that convulsions and debility are the two chief causes of death.

## VI.—HOSPITALS, DISPENSARIES, AND VENEREAL CLINICS.

*General Remarks.*—In 1927 there were 86 Government hospitals with provision for 6,677 beds, the accommodation varying from 8 beds in smaller outstation hospitals to 839 beds in the General Hospital, Colombo. In addition to the above-mentioned 86 hospitals the following special hospitals were maintained:—A Lying-in Home with 100 beds, an Eye Hospital with 58 beds, a Women's Hospital of 41 beds, a Children's Hospital of 67 beds, a Female Venereal Hospital of 29 beds, a Police Hospital of 31 beds, a Prison Hospital of 180 beds, a Tuberculosis Hospital (for chronic cases) of 338 beds, a Tuberculosis Sanatorium of 72 beds, and an Infectious Diseases Hospital of 154 beds.

In addition to Government hospitals and dispensaries, 80 estate hospitals and 659 estate dispensaries were maintained during the year by the proprietors of estates.

There were 543 Central and Branch Dispensaries provided and maintained by Government in different parts of the Island in 1927, and in addition to these the following special institutions were maintained for the treatment of out-patients:—King Edward VII. (Memorial) Anti-Tuberculosis Institute, Colombo; Grenier Eye, Ear, Nose, and Throat Infirmary, Colombo; Dental Institute, Colombo; and special dispensaries at Kandy, Galle, Jaffna, and Batticaloa for the treatment of eye diseases.

The total number of in-patients treated in the various Government hospitals was 200,770, with 12,158 deaths, giving a mortality rate of 6.05 per cent., as against 205,529, 12,745, and 6.20, respectively, the previous year. In the Government dispensaries and at the out-patients' departments of Government hospitals 2,759,403 patients who paid 4,205,220 visits were treated, as against 2,864,733 patients and 4,102,466 visits the previous year.

The following are some of the more important buildings that were completed during the year:—Dental Institute (two-storey building), Colombo; Kilinochi Hospital consisting of 6 wards, with a total of 54 beds, administration block, quarters for the full staff; new children's ward 16 beds, Kandy Hospital; new two-storey ward of 40 beds, quarters for 14 nurses, 2 apothecaries, 2 stewards, and administration block, Mahamodera Hospital, Galle; Dispensary and Apothecary's quarters at each of the following places: Eriyagama, Uhana, Gomarankadawela, Ichalam-pattai, Anavilundawa, and Nivitigala; Maternity wards for the hospitals at Ingiriya 4 beds, Deltota 2 beds, Madulkele 4 beds, Agrapatna 4 beds, Kitulgala 4 beds; Infectious Diseases Hospital 4 beds, Dimbulla; Female ward 12 beds, Mihintale Hospital; Female surgical ward 12 beds, Isolation ward 4 beds, and District Medical Assistant's quarters, Passara Hospital; Apothecary's quarters, Hiripitiya Dispensary; 2nd Apothecary's quarters, Batticaloa Hospital; Isolation ward 6 beds, and 2 rooms for nurses' quarters, Kahawatta Hospital; Isolation ward 6 beds, Kitulgala Hospital; Isolation ward 4 beds, Deniyaya Hospital; Medical Officer's quarters, Tirukkivil Dispensary.

The following are some of the major improvements that were also carried out during the year:—Additions and improvements to nurses' quarters, Batticaloa, Chilaw, and Badulla Hospitals; to District Medical Assistant's quarters, Badulla, Haputale, and Karawanella Hospitals; to Medical Officer's quarters, Chilaw Hospital; to Apothecary's quarters, Haputale Hospital; improvements to water supplies of Nikaweratiya, Moneragala, Madagama, and Kegalla Hospitals; additions and improvements to latrines of Badulla, Marawila, and Karawanella Hospitals, and Polpitigama, Hiripitiya, and Wellawaya Dispensaries.

Many other works were begun but are not yet completed.

### *Report on Colombo Hospitals.*

A brief summary of the work done in the chief Colombo hospitals is given hereafter.

*General Hospital, Colombo.*—The following is a summary of the chief features of the report of the Medical Superintendent, General Hospital, Colombo:—

873 patients remained in hospital on December 31, 1926, 65 in the paying section and 808 in the non-paying section. During the year 19,770 patients were admitted, 18,144 to the non-paying wards and 1,626 to the paying wards. At the out-patient department 44,387 persons were



treated representing 147,028 attendances, i.e., a daily average attendance of over 400, which is an increase of more than 100 over the daily average attendance of the previous year. The busiest month was August with an average attendance of 528 cases daily.

Of the 1,691 patients under treatment in the paying section, 1,509 were discharged, 117 died, and 65 remained under treatment on December 31, 1927.

Of the 18,952 patients under treatment in the non-paying section, 16,131 were discharged, 1,973 died, and 848 remained on December 31, 1927.

The daily average sick in hospital was 81.64 in the paying section and 863.42 in the non-paying section.

The maximum and minimum numbers of patients in hospital on any one day during the year 1927 in the paying and non-paying sections, respectively, were as under:—

<i>Paying Section.</i>			
Maximum	..	..	.. 99 on August 1, 1927
Minimum	..	..	.. 65 on December 31, 1927
<i>Non-paying Section.</i>			
Maximum	..	..	.. 863 on October 10, 1927
Minimum	..	..	.. 650 on April 17, 1927

Of the 18,144 admitted in 1927 to the non-paying section, 8,172 were surgical cases and 9,972 were medical cases. The number of surgical operations performed in 1927 was 2,502, exclusive of 200 minor operations performed in the out-patient department. 2,059 operations were performed in the non-paying section with 131 deaths, giving a mortality rate of 6.5 per cent. In the paying section the number of operations was 487 with 19 deaths, giving a mortality rate of 3.9 per cent.

The facilities afforded to the public by the appointment of highly qualified surgeons to several provincial hospitals are not taken full advantage of, as evidenced by the large number of outstation patients who seek admission to this hospital.

The following table gives the figures for the past three years of the cases under treatment in hospital in the paying and non-paying sections respectively:—

<i>Paying Section.</i>				
Year.	Cases under Treatment.	Deaths.	Percentage Mortality.	Daily Average Sick.
1925	1,331	121	9.0	70.53
1926	1,649	109	6.6	77.35
1927	1,691	117	6.9	81.64
<i>Non-paying Section.</i>				
1925	18,331	1,948	10.62	782.48
1926	20,792	1,996	9.63	875.98
1927	18,952	1,973	10.41	863.42

As regards particular diseases the following figures are appended showing their prevalence and mortality during the last three years:—

	1925.	1926.	1927.
<b>Anchylostomiasis—</b>			
Cases ..	595	574	533
Deaths ..	71	106	71
<b>Appendicitis—</b>			
Cases ..	165	162	189
Deaths ..	5	3	3
<b>Dysentery—</b>			
Cases ..	375	312	343
Deaths ..	96	90	55
<b>Enteric—</b>			
Cases ..	373	356	330
Deaths ..	121	116	79
<b>Malaria—</b>			
Cases ..	1,980	2,220	2,445
Deaths ..	23	34	27
<b>Parangi—</b>			
Cases ..	301	295	232
Deaths ..	—	—	—
<b>Pneumonia—</b>			
Cases ..	627	893	1,055
Deaths ..	189	325	300
<b>Pulmonary Tuberculosis—</b>			
Cases ..	530	630	750
Deaths ..	297	278	276

Malaria has shown an increase of more than 200 cases in 1927 over the 1926 figures, just as the 1926 figures exceeded the 1925 figures by over 200. There has also been an increase in cases of pneumonia, the 1927 figures showing an increase of 428 cases over the figures for 1925. Both lobar and lobular pneumonia are included under this head. The annual outbreaks of influenzal-pneumonia account for this yearly increase. There has been a steady increase in the number of cases of pulmonary tuberculosis—the 1927 figures being over 40 per cent. higher than the 1925 figures. There has been a slight fall in the number of cases of enteric and anchylostomiasis, and a slight rise in the number of admissions for dysentery, with a lower mortality rate.



*Staff.*—Dr. H. U. Leembruggen assumed duties on August 4, 1927, as Medical Superintendent, *vice* Dr. V. van Langenberg appointed Deputy Director of Medical and Sanitary Services. A Surgical Registrar was appointed during the year and the post was filled by Dr. M. Paul, M.B. & M.R.C.P. (London) and F.R.C.S. (England).

*Expenditure and Receipts.*—The receipts during the last financial year October 1, 1926–September 30, 1927, from patients in the paying section amounted to Rs. 193,509.12 and in the non-paying section to Rs. 5,115.75. The approximate expenditure during the same period was Rs. 93,012.15 in the paying section and Rs. 217,105.42 in the non-paying section. The expenditure in both sections does not include the salaries of the Medical and Nursing staffs or the cost of drugs and dressings.

*X-Ray Department, General Hospital.*—There is available for patients practically every kind of electrical treatment, namely, galvanism, faradism, diathermy, high frequency, ultra-violet light, and radiant heat.

During the year the work in this department increased considerably. The demand for therapeutic and diagnostic aid increases every year.

During the year 1,863 patients in the non-paying section and 301 patients in the paying section, a total of 2,164, underwent X-Ray examination, as against a total of 1,651 cases in 1926. On the electric-therapeutic side 2,281 sittings were given to non-paying patients and 381 to private patients, making a total of 2,662.

*Dental Institute, Colombo.*—This institute was formally opened on March 16, 1927. It is housed in a new two-storey building having up-to-date sanitary arrangements, and built for the special purpose of a Dental Institute. It is equipped with all the latest dental appliances, and is in charge of Dr. Balendra, a qualified dentist and surgeon.

During the period under review 9,591 patients were treated. The average number of visits per patient was 5. This represents a total of 47,955 attendances. During the previous year 4,340 dental cases received attention at the Dental Clinic, then attached to the Out-patient Department, General Hospital, Colombo.

Not only are the poorer classes taking full advantage of the facilities provided, but there is the usual tendency to exploit free dental aid by those who can afford to pay for it. A system of numbered tickets issued in rotation to patients as they come and the adoption of a form to be filled in with a statement of income by those seeking treatment will, it is hoped, control this evil and restrict the treatment to those for whom the Dental Institute is intended.

*The De Soysa Lying-in Home.*—The number of cases under treatment during 1927 was 4,349, as against 3,976 the previous year, 3,604 in 1925, 3,045 in 1924, 2,934 in 1923. The daily average in hospital for the year under review was 115.96. The mortality rates for the last five years (1923–27) are 2.55, 3.27, 3.24, 3.18, and 2.4 respectively. There were 111 deaths during the year; and of these, 28 were due to accidents of child birth, 26 to puerperal causes, and 57 to intercurrent diseases, such as heart failure, pulmonary thrombosis, ankylostomiasis, pneumonia, acute pulmonary oedema, &c. The number of live births was 2,749; of these infants, 2,601 left the hospital alive and 148 died after delivery, as against 3,194, 3,057, and 137, respectively, in 1926. Sixty-five pairs of twins and one set of triplets were born in 1927, as against 66 and 2, respectively, in 1926. 338 obstetric operations were performed during the year, including the use of forceps in 109 cases, decapitation in 5 cases, bi-polar podalic version in 7 cases, internal podalic version in 30 cases, evacuation of uterus in 93 cases, manual extraction in 5 cases, and 31 other operations. Labour was classified as normal in 2,565 cases. There were 753 cases with other presentations. In 49 cases of placenta praevia, 15 infants were born alive, 31 were born dead, and 3 were undelivered; 39 mothers recovered and 10 died. In the 64 cases of puerperal eclampsia, 58 mothers recovered and 6 died; 28 infants were born alive, 23 were born dead, and 13 mothers left hospital, after recovery from eclampsia, before delivery.

The training of midwives was carried on as usual during the year. Seventy women were admitted for training and 51 passed the examination held at the end of a six months' course of training. Of the 51 who passed, 12 were nurses of the Department sent for training in maternity.

*The Victoria Memorial Eye Hospital and the Grenier Ear, Nose, and Throat Infirmary.*—25,702 new cases paid 89,871 visits to the out-patient department during the year, as against 24,087 and 62,684 in 1926 and 22,801 and 63,451 in 1925 respectively. Of the new cases treated during the year, 20,972 were eye cases, 3,572 ear, 764 throat, and 394 nose cases.

There were 92 in-patients remaining in hospital at the beginning of the year. 1,598 in-patients were admitted during the year, as against 1,544 in 1926 and 1,462 in 1925. Of the total treated, 1,591 were discharged and 7 died. All the deaths were due to extreme debility and malnutrition. The daily average in hospital was 96.56 in 1925, 104.99 in 1926, and 106.33 in 1927.

The total number of operations performed on in-patients during the year was 753 and on out-patients 2,049, the corresponding figures for the previous year being 807 and 2,163 respectively. 1,250 refraction cases were attended to. The above figures for operations are exclusive of cataract, leucomata, and such cases.

A school clinic continues to be held every Tuesday and every Friday in the evening.

Dr. E. W. Arndt, D.O.M.S., was appointed as Surgeon-in-Charge of the Hospital on April 5, 1927, *vice* Dr. S. P. Joseph deceased.

*The Lady Havelock Hospital for Women and Lady Ridgeway Hospital for Children.*—The total number of admissions in 1927 was 3,034, and with the 90 cases remaining from the previous year the total treated during the year was 3,124. The corresponding figures for 1926 were 2,387 and 2,477 respectively. The daily average sick in hospital was 113.8. The



number of paying patients admitted was 122, of whom 25 were maternity cases. The total number of deaths was 507, 419 children and 88 women. The mortality rate was 16.2, as against 18.12 the previous year. The large number of deaths among children was due to the fact that the majority of them were brought to hospital in a moribund condition. Fifty-eight cases of enteric fever with 13 deaths, 149 cases of advanced ancylostomiasis with 34 deaths, 246 cases of pneumonia with 107 deaths, 107 cases of puerperal septicaemia with 16 deaths, and 56 cases of babies suffering from congenital syphilis were among those treated during the year. All patients in the non-paying section were treated for ancylostomiasis with oil of chenopodium and carbon tetrachloride as a matter of routine. The number of cases of puerperal septicaemia is increasing year by year, showing that there is no improvement in the methods adopted by the untrained Ceylonese midwives who attend these women. Such patients are usually brought into hospital in a very serious condition.

The number of surgical operations performed was 774, a very large increase over all previous years. Of these, 626 were major, and 148 minor operations. The former included 74 abdominal sections. The operation mortality was 26 deaths, or 3.3 per cent., as against 1.8 per cent. the previous year.

Forty-three pupils were admitted to the training school for nurses during the year. Of these, 8 resigned and 8 were found unfit. Two examinations were held during the year; 16 pupils passed and 1 failed. At the end of the year there were 54 pupils in training; but of these, 20 were on acting duty at different outstation hospitals.

*The Police Hospital, Borella.*—The number of patients treated during the year was 1,744, as against 1,606 in 1926. The principal diseases treated were:—Influenza 483 cases, malaria 63 cases, dengue 84 cases. The daily average in hospital was 29.90. There was only one death in 1927, as in 1926.

In 1927 7,623 patients who paid 10,798 visits, as against 5,098 patients who paid 7,159 visits in 1926, were treated at the out-patient department of the hospital and by the Assistant Police Surgeon at the City Police Stations on his visits. The general increase in the number of in-patients and out-patients was due to the prevalence of influenza and its sequelae. The Police Surgeon and his Assistant are in medical charge of about 1,500 officers of all ranks and their families in Colombo and its suburbs.

*Infectious Diseases Hospital (Angoda), Colombo.*—As was reported in last year's Report this institution is located in extensive grounds at Angoda, 6 miles away from Colombo. It is available for cases of infectious diseases from Colombo and its suburbs and from ships arriving at the port.

The total number of cases treated during the year was 1,271 with 77 deaths, or a mortality rate of 6.4 per cent., as against 1,238 cases, 23 deaths, and a mortality rate of 1.43 per cent. the previous year.

Of the 10 cases of smallpox dealt with in 1927, 8 were admitted during the year and the other 2 remained over from last year. Two cases of a confluent type in unvaccinated subjects proved fatal. Of the other 8 cases, 3 were discrete, 3 were confluent, and 2 modified. No cases of smallpox occurred in Colombo town. This seems to show that Colombo is protected by vaccination.

Thirty-four cases of plague (33 bubonic and 1 septicaemic) were treated during the year, with 28 deaths, as against 7 cases with 6 deaths the previous year. The one case of septicaemic plague was one of the fatal cases. All the cases were from the town of Colombo; 32 were males and 2 females. Of the 33 bubonic cases, 23 had groin, 6 axillary, and 4 cervical buboes. Of the recovered cases, 2 had groin, 2 axillary, and 2 cervical buboes.

It is noteworthy that no cases of cholera occurred during the year, though cholera was raging in the Madras Presidency during the latter part of the year. Of the other infectious diseases treated, there were 135 cases of enteric with 30 deaths, 21 cases of diphtheria with 1 death, 830 cases of chickenpox with 1 death, 59 cases of measles with 4 deaths, and 33 cases of mumps.

141 plague contacts and 28 smallpox contacts were under surveillance in the year under review.

A sum of Rs. 7,193.45 was realized from paying patients, as against Rs. 4,015.85 the previous year.

*Medical Institutions Aided by Government.*—The following institutions were aided by Government during the year:—

(1) The Victoria Home for Incurables; (2) Wiseman Hospital, Welimada; (3) McLeod Hospital, Inuvil; (4) Jevon's Dispensary, Puttur; (5) The Wesleyan Medical Mission Hospital, Batticaloa; (6) The Wesleyan Medical Mission Branch Dispensary at Kattankudy; and (7) The Denepitiya Medical Mission Hospital, Southern Province. Nos. (1) and (7) are for males and females; Nos. (2) to (6) for females and children only.

*Victoria Home for Incurables.*—Eighty-four patients remained on December 31, 1926, and 29 were admitted during the year; of these, 18 died, 10 were discharged, and 82 remained at the end of the year; as against 83, 25, 12, 11, and 82, respectively, reported in the previous year.

The general condition of the Home was satisfactory.

This institution is managed by a Committee of Government officials and members of the public.

*Wiseman Hospital, Welimada.*—370 patients were treated in hospital during the year, including 48 maternity cases. Of these, 8 died, 357 were discharged, and 5 remained at the end of the year. 1,809 out-patients who paid 4,611 visits were treated at the dispensary. The chief diseases treated were dysentery, burns, scalds, pneumonia, vermes, malaria, ancylostomiasis, scabies, and bronchitis.



*McLeod Hospital, Inuvil, Jaffna.*—The total number of in-patients treated during the year was 3,410 with 107 deaths, and a mortality rate of 3.14 per cent., as against 2,806 with 123 deaths and a mortality rate of 4.38 per cent. the previous year.

The number of maternity cases treated was 892 in hospital and 102 in villages, as compared with 739 and 109, respectively, in 1926.

Pupil midwives are being trained for service in the villages. Eight pupil midwives presented themselves at the examination held in the De Soysa Lying-in Home, Colombo, in March, 1927. All were successful and obtained certificates in midwifery.

5,930 out-patients paid 11,251 visits, as against 4,967 and 8,503, respectively, the previous year. The above figures include a considerable number of expectant mothers who came up for ante-natal treatment.

*The Jevon's Dispensary, Puttur, Northern Province.*—Much educational work as regards maternal and infant welfare and home nursing was done during the year in Puttur and the surrounding villages by the Sisters of the Wesley Deaconess Order. Advice and treatment were eagerly sought by the patients. 112 lectures on health topics, illustrated by charts, diagrams, lantern slides, and little anecdotes of personal experience were given to the village women. 2,177 visits to the dispensary were paid by patients in 1927, as against 2,263 in 1926.

*The Wesleyan Medical Mission Hospital, Batticaloa.*—892 women and children were treated as out-patients during the year. Thirty-six in-patients and 69 maternity cases were treated in the hospital. Midwifery is the most important work done by the Mission in Batticaloa at present, and the results are satisfactory. The Mission realizes that its work does not lie so much in treating diseases, now that more Government dispensaries have been opened, as in nursing sick patients and in the training of Ceylonese nurses, who are especially needed for private nursing.

*The Wesleyan Medical Mission Branch Dispensary, Kattankudy.*—It is to be noted that the work among women at Kattankudy is flourishing. Ante-natal and maternity work have met with success, and the help of the Lady Missionary is sought in difficult midwifery cases. During the year 2,728 out-patients who paid 4,484 visits and 263 patients in their homes were attended to by the Medical Missionary Lady-in-Charge of the hospital at Batticaloa.

*The Denepitiya Medical Mission Hospital.*—This hospital is maintained by the members of the Anglo-Catholic Union, Ceylon, and is in charge of a qualified Medical Officer, Dr. D. R. Peiris, L.M.S. (Ceylon), assisted by an apothecary, a matron, and a trained midwife. 5,152 cases who paid 19,647 visits were treated during the year. Of these, 289 were cases of parangi and received 462 injections, 350 were ancylostomiasis cases, and 218 malaria.

#### Venereal Clinics.

There are three Venereal Diseases Clinics in the town of Colombo, viz., one at the General Hospital (out-door); one at the Port Surgeon's Office (out-door); and one at the Female Branch Hospital (out-door).

*Venereal Diseases Clinic, General Hospital, Colombo.*—The cases treated in the clinic for the last 3 years are as follows:—

Cases.	1925.	1926.	1927.
Syphilis .. .. .	480	781	877
Soft sores .. .. .	126	28	43
Gonorrhoea .. .. .	336	530	423
Yaws .. .. .	61	67	29
	<u>1,003</u>	<u>1,406</u>	<u>1,372</u>

From the above figures it will be seen that syphilis cases have slightly increased since last year while the number of cases of gonorrhoea have diminished.

In spite of verbal advice and free distribution of leaflets in English and the vernaculars, there are many patients suffering from syphilis who do not attend regularly enough to complete a course of treatment. Many keep away after a few injections and as soon as their genital sores have healed.

*Port Venereal Clinic for Seamen.*—Sixty-nine cases of syphilis were treated by intravenous injections in 1927, as against 106 in 1926 and 56 in 1925; 4 cases of acute and 1 case of chronic gonorrhoea were treated, as against none in 1926; 25 cases of gonorrhoea and 4 cases of soft chancres were seen on board ship by the Port Surgeon's staff.

Seamen suffering from gonorrhoea do not usually apply for injections at the clinic, as they generally regard the disease as a minor ailment, and are quite satisfied with drug treatment orally.

Leaflets on the subject were regularly distributed to ships, and the commanders of vessels were personally informed of the existence of this clinic.

*Female Branch Hospital, Borella.*—The following cases have been treated at the above-mentioned hospital in the past three years:—

Cases.	1925.	1926.	1927.
Syphilis .. .. .	284	244	233
Gonorrhoea .. .. .	189	244	327
Rheumatism (gonorrhoeal) .. .. .	—	8	3
Other venereal diseases .. .. .	—	6	9
	<u>473</u>	<u>502</u>	<u>572</u>



836 out-patients were treated for primary, secondary, tertiary, and congenital syphilis and 1,097 out-patients for gonorrhoea during the year. For treatment of syphilis neo-salvarsan was being used exclusively. Every case was given an initial course of ten injections at intervals of five days. In resistant secondary cases, tertiary cases, and congenital cases Bismuth in the form of Bismostab was used.

Congenital syphilis is seldom recognized by the parents of children on account of the disease being classified in Sinhalese with a variety of skin diseases as the "Red Disease" (ratha rogaya). Usually the cases that are brought for treatment are from Colombo town.

Much valuable "Follow-Up" work was done by the probation officer and by the Salvation Army.

Besides the particulars given above in respect of the three clinics, 8,204 in-patients (with 92 deaths) in the various hospitals and 17,144 out-patients at dispensaries and at out-patient departments of hospitals in the Island were treated for venereal diseases during the year, as against 8,694, 100, and 17,256, respectively, the previous year.

#### *Charts, Hospital Returns, &c.*

*Charts.*—The following charts are given at the end of this Report, *vide* Table IV. (a)-(d):—

- (a) Chart showing the general systemic and preventable diseases treated at the Government hospitals during the year 1927.
- (b) Chart showing deaths from general systemic and preventable diseases treated at the Government hospitals during the year 1927.
- (c) Chart showing cases of infectious diseases treated at the Government hospitals during the year 1927.
- (d) Chart showing deaths from infectious diseases treated at the Government hospitals during the year 1927.

*Hospital Returns.*—The following Hospital Returns, extracts from the Ceylon Blue Book for 1927, are given at the end of this Report:—

- (1) Details regarding hospitals (patients, attendants, &c.) in each Province.
- (2a) Return of Diseases—Cases treated, according to districts.
- (2b) Return of Diseases—Cases treated, according to diseases.
- (3) Special Diseases.
- (4) Water supply, &c., at hospitals.

*Table.*—Table III. gives a return of diseases (out-patients).

## VII.—PRISONS AND ASYLUMS.

### PRISONS.

Prisons were maintained at the following places during the year 1927:—Welikada, Bogambra, Mahara, Anuradhapura, Badulla, Batticaloa, Galle, Jaffna, Negombo, Hulftsdorp, and Kandy (old jail). The last-mentioned two are for remand prisoners only.

The number of convicted prisoners in those prisons on December 31, 1926, was 2,973 (2,896 males and 77 females). During the year under review 7,864 males and 351 females were admitted, 8,555 males and 353 females were discharged, and 37 males died during the year. There were no deaths among females. On December 31, 1927, there were 2,168 males and 75 females remaining in the prisons.

In 1927 there were 10 hospitals for prisoners, *viz.*:—

The Prison hospital at Welikada	..	..	180 beds (for males)
Do.	..	..	12 beds (for females)
The Mahara Prison hospital	..	..	114 beds
The Negombo Prison hospital	..	..	16 beds
The Bogambra (Kandy) Prison hospital	..	..	35 beds
The Jaffna Prison hospital	..	..	12 beds
The Galle Prison hospital	..	..	5 beds
The Anuradhapura Prison hospital	..	..	12 beds
The Badulla Prison Hospital	..	..	4 beds
The Batticaloa Prison hospital	..	..	5 beds
Total	..	..	395 beds

The health of the prisoners in all the prisons in the Island was good, and the sanitary condition of the prisons was on the whole satisfactory.

At Bogambra and Galle Prisons mass treatment for anchylostomiasis was administered by the Medical Officers in charge regularly on every Saturday of the year. In this way, all the new admissions and other prisoners who had not been previously treated for anchylostomiasis were given treatment. The prisoners were allowed to rest on the day of treatment and on the following day, Sunday. 591 prisoners at Bogambra and 536 at Galle received treatment in this way, and the results were gratifying.



The following is a brief statement concerning each prison:—

Name of Prison.	Daily Average in Prison.	Daily Average Sick in Hospital.	Total Number of In-Patients Treated.	Total Number of Out-Patients Treated.	Total Number of Deaths.	Death Rate Per Cent. of Persons Treated in Hospital.	Chief Disease Treated (for meaning of Figures please see Table X).
Prison Hospital, Welikada	971	50.35	1,838	14,770	19	1.03	1, 2, 3, 5, 8, and 9
Female Jail Hospital, Welikada	55	1.26	46				2 and 5
Mahara	736	13.65	562	1,746	2	.35	1, 2, 3, 4, and 5
Bogambra	520.15	12.12	514	4,428	3	.58	1, 2, 3, 5, 8, and 10
Jaffna	316.16	10.18	324	4,016	11	3.40	1, 2, 3, 5, and 11
Negombo	85.01	6.62	154	1,783	3	1.95	1, 2, and 6
Galle	58.96	1.90	118	783			1, 3, 5, and 7
Anuradhapura	131.29	5.66	339	374	2	.59	1, 2, and 3
Badulla	19.41	.15	13				1 and 2
Batticaloa	37.70	1.45	49				1, 3, 4, and 10
Total	2,930.68	103.34	3,957	27,900	40	1.01	

Table X.

1. Malaria	4. Eye diseases	7. Enteritis	10. Skin diseases
2. Diarrhoea	5. Influenza	8. Conjunctivitis	11. Enteric
3. Dysentery	6. Bronchitis	9. Chickenpox	

A tabulated statement showing the cause of each death is given hereafter:—

Statement showing Causes of Death.

Name of Prison Hospital.	Malaria.	Dysentery.	Leprosy.	Pneumonia.	Diarrhoea.	Anchylostomiasis.	Cirrhosis of Liver.	Nephritis.	Enteric.	Cerebral Haemorrhage.	Enteritis.	Valvular Disease of Heart.	Toxaemia.	Chickenpox.	Intestinal Obstruction.	Total.	Death Rate Per Cent. of Persons Treated in Hospital.
Prison Hospital, Welikada	1	7	1	2	1	1	1	1				1	1	1	1	19	1.03
Mahara	2															2	.35
Bogambra		1		2												3	.58
Jaffna		4		1	1				4	1						11	3.40
Negombo											3					3	1.95
Anuradhapura				1	1											2	.59
Female Prison Hospital— Badulla Galle Batticaloa																	
Total	3	12	1	6	3	1	1	1	4	1	3	1	1	1	1	40	1.01

### ASYLUMS.

(a) *Lunatic Asylum, Angoda.*—There is one Lunatic Asylum in the Island, at Angoda, some 6 miles from Colombo. The Asylum and the House of Observation contain 1,728 beds and are provided with quarters for majority of staff.

*Asylum.*—The year opened with 1,090 males and 567 females in the Asylum, 430 males and 212 females were admitted during the year, and the total number treated in 1927 was 1,520 males and 779 females, as against 1,324 males and 669 females in 1926 and 1,120 males and 648 females in 1925. 254 males and 95 females were discharged during the year. Of these, 148 males and 62 females were discharged as recovered, giving a recovery rate per cent. of 34.4 and 33.5, respectively, on the total number of patients in the Asylum, as compared with 30.7 and 29.5, respectively, in 1926. Eighty-four males and 40 females died during the year, giving a mortality rate per cent. of 5.7 and 5.3, respectively, as against 7.31 and 8.07, respectively, in 1926. 1,133 males and 619 females remained at the end of the year, as against 1,041 males and 542 females the previous year.

*Causes of Death.*—The chief causes of death among patients in the Asylum were as follows:—

	Number of Deaths.	
	Males.	Females.
Dysentery	17	13
Phthisis	18	5
Senile debility	5	1
Pneumonia	4	1
Influenza	5	1
Diarrhoea and debility	10	6
Debility	8	1

The average daily number in the Asylum was 1,093.45 males and 576.58 females, as against 901.74 males and 500.49 females in 1926 and 827.67 males and 493.65 females in 1925.



**House of Observation.**—In the House of Observation 51 males and 23 females remained at the end of the previous year, 543 males and 247 females were admitted during the year, and 594 males and 270 females were under observation during the year, as against 421 males and 225 females in 1926. Of the persons observed, 213 males and 85 females were transferred to the Asylum, 281 males and 146 females were discharged, and 12 males and 7 females died. The deaths in 1926 were 11 males and 12 females. There were 88 males and 32 females remaining on December 31, 1927. The daily average in the House of Observation was 50.49 for males and 23.43 for females, as compared with 53.36 and 24.86, respectively, during 1926.

The daily average for both institutions together was 1,116.52 for males and 600.24 for females, as against 955.10 and 525.36, respectively, the previous year. The largest number resident in both institutions on any one day during the year was 1,870 and the lowest 1,647, as compared with 1,663 and 1,349, respectively, in 1926.

**Official Visitors.**—The following were official visitors during the year:—Messrs. R. N. Thaine, Government Agent, Western Province; H. E. Newnham, the Mayor of Colombo; L. Macrae, the Director of Education; H. E. Beven, the Registrar-General; W. T. Stace, Acting Mayor of Colombo; C. Coomaraswamy, the Registrar-General; E. R. de Silva, the Assistant Registrar-General. They visited in turns monthly and submitted 366 reports on males and 70 on females, the reports being duly forwarded to Government.

**Occupations.**—An average of 55 males was employed in gardening, 20 in trade, and 180 in household work, *i.e.*, 255 males in all. Of the women, an average of 45 was employed in gardening or outdoor work, 11 sewing and rope-making, and 112 in household work, making a total average of 168 in all.

**Amusements.**—Several cricket matches were played by the inmates against teams brought by the Colombo "Toc H" Branch, and in most cases the Asylum team won. Volley ball is popular, and tennis is played by a few who know the game.

The daily newspapers, magazines, and periodicals were supplied by Government, the publishers of the "Ceylon Observer" kindly supplied their paper free, while the Medical Superintendent also supplied periodicals and daily papers.

**Staff.**—Dr. L. D. Parsons, the Medical Superintendent, was on long leave out of the Island, from May 11, 1927, to December 26, 1927, and Dr. W. S. Ratnavale acted for him during that period. Dr. C. O. Perera who went on study leave to England in 1924 returned to the Island and resumed duties at the Asylum on May 6, 1927, having obtained, *inter alia*, a Diploma in Psychological Medicine of the London University during his leave. A much-needed addition to the staff was an Agricultural Overseer who assumed duties on November 6, 1927. He is, under the Medical Superintendent, in charge of the cultivation of the extensive grounds in which the Asylum is situated.

(b) **Leper Asylums.**—There are two Leper Asylums—one on the island of Mantivu, some 3 miles from Batticaloa in the Eastern Province, and the other at Hendala, some 10 miles from Colombo.

**Mantivu.**—There were 135 lepers on Mantivu island on December 31, 1926. Nineteen were admitted during the year, 6 died, 1 was discharged, 6 absconded, and 141 remained on December 31, 1927. Of the admissions, 16 were new cases and 3 readmissions. The daily average in the Asylum during the year was 139.75, and the percentage of deaths 3.9, as against 5.88 the previous year.

The following particulars regarding the treatment of the disease by injections may be given:—

Specific treatment with E.C.C.O. injections was given to those patients who desired to receive it. Treatments were given twice a week and the dosage varied from  $\frac{1}{2}$  to 5 c.c.

A marked improvement was noticeable in the case of some of those who had regular injections over a period of a year. Aches and pains were reduced, sores healed up, thickenings and nodules of the skin were lessened, and anaesthesia was considerably diminished.

**Hendala.**—The following are the details for Hendala for the year under review:—

	Males.	Females.	Total.
Remaining on December 31, 1926 .. ..	429	120	549
Admitted during 1927 .. ..	157	23	180
Discharged during 1927 .. ..	82	9	91
Died during 1927 .. ..	40	7	47
Remaining on December 31, 1927 .. ..	464	127	591

Of the 180 admissions 119 were new cases, and they were in the following stages of the disease:—Tubercular 26, anaesthetic 37, and mixed 56. The new admissions were from the following Provinces:—Western 47, Central 13, Southern 24, Northern 14, North-Central 1, North-Western 4, Sabaragamuwa 15, and Eastern 1.

The number of deaths was 47 (males 40 and females 7). The percentage of deaths to the total of patients treated was 6.04, as against 10.25 the previous year.

As regards the specific treatment of leprosy in 1927 with E.C.C.O. injections the following statistics may be given:—197 patients (103 males and 94 females) were treated with E.C.C.O. injections during the year 1927. The injections were given hypodermically twice a week.



The following tabulated statement shows the results of the treatment:—

	Males.					Females.				
	Results on the Patients who received Injections.					Results on the Patients who received Injections.				
	Times 50 and over.	Times 50-25.	Times 25-10.	Times 10 and under.	Total.	Times 50 and over.	Times 50-25.	Times 25-10.	Times 10 and under.	Total.
Marked improvement	2	2	—	—	4	3	1	—	—	4
Slight improvement	5	7	—	—	12	7	5	1	—	13
No visible improvement	12	24	32	18	86	14	26	22	10	72
Gone worse	1	—	—	—	1	2	3	—	—	5
Total	20	33	32	18	103	26	35	23	10	94

From the above statement it will be seen that the majority of the patients were not regular in taking the injections. The statement also shows that the best results were obtained in the case of those who received a considerable number of injections. Towards the end of the year arrangements were made with the Director, Bacteriological Institute, for him to examine bacteriologically a number of patients who showed improvement as a result of these injections. Sixteen of those tested were on three occasions found negative as regards *Lepra Bacilli* in their nasal secretions and were considered fit for discharge. They were accordingly discharged on condition that they reported themselves every three months to the nearest Medical Officer for further examination.

### VIII.—METEOROLOGY.

The following report was prepared by the Superintendent, Colombo Observatory:—

**Rainfall.**—The rainfall of 1927 was above average in most of Uva and the Eastern and Southern Provinces and in rather more than half of the Western and Central Provinces.

Deficits preponderated slightly in the North-Western Province and rather more definitely in the North-Central Province, while they were very marked in the Northern Province and the northern and central parts of Sabaragamuwa.

Padupola heads the list with 233.6 inches or 14.1 above its own average, Watawala being next with 227.7. Carney, Ingoya, and Blackwater, which are the stations with the highest averages, failed to reach their averages this year though all three recorded over 200 inches. The biggest offsets above their average were at stations on the other side of the hills at which the north-east monsoon forms the more important factor.

At the other extreme Mannar waterworks only recorded 24.68, closely followed by Elephant Pass Saltern 25.15 and Ponparippu 25.6. Marichchukaddi had 31.4 this year and still holds the lowest average, namely, 34.6.

The chief features of the distribution through the year were the unusually heavy rain of March and the deficiency in October. The south-west monsoon after a very wet beginning in May and early June gave less than average rainfall in July and August.

**Temperature.**—Temperature variations were not particularly well marked in 1927. In most cases the maxima were a trifle lower, and the minima a trifle higher than those in 1926. Nuwara Eliya showed the biggest variation (+ 0.8), a nominally greater value at Hakgala being not truly comparable owing to a recent change in the site of the shed.

The station showing the highest mean shade temperature for the year was Trincomalee 82.9° F., and lowest Nuwara Eliya with 60.1° F. The figures for Colombo and Kandy were 81.0° F. and 77.0° F. respectively.

The highest shade temperature in air recorded during the year was 98.2° F. at Anuradhapura on September 3. The highest on record is 103.7° F. at Trincomalee on May 12, 1890. The lowest this year was 34.6 at Nuwara Eliya (6,000 feet above sea level) on April 13, at which station 27.1° F. was recorded in 1914. The highest shade temperature in Colombo in 1927 was 91.4° F. on April 20, and the lowest 66.9° F. on January 10.

The mean daily range, i.e., the difference between the mean of the maximum and the mean of the minimum, was highest at Badulla, 17.5° F., and lowest at Galle, 8.0° F. At Colombo and Kandy it was 12.0° F. and 14.8° F. respectively. The absolute range for the year, i.e., the difference between the highest and the lowest readings actually recorded at any one station, was greatest at Nuwara Eliya, 42.3° F. and lowest at Galle, 18.0° F.

**Returns.**—Meteorological returns are given at the end of this report for the towns of Colombo, Jaffna, Galle, Nuwara Eliya, Kandy, and Batticaloa. (*Vide* Table II. (a)-(f).)

### IX.—SCIENTIFIC.

#### (1) Government Bacteriological and Pasteur Institutes.

The report of the Director, Dr. L. Nicholls, for the year 1927 is as follows:—

**A.—BACTERIOLOGICAL INSTITUTE: Routine Work.**—The number of specimens examined during the year 1927 (including number of vaccines prepared) was 21,981. This is an increase of nearly 5,200 specimens over 1926.

The fees received at the Bacteriological Institute totalled Rs. 7,512.50, and the Pasteur Institute Rs. 3,767.36, making a total of Rs. 11,279.86.



The character of the examinations carried out is shown in the following table:—

Specimens.	Official.	Private.	Total.	Positive.	Negative.
Blood for typhoid (Widal) ..	1,974	46	2,020	830	1,190
Blood for paratyphoid A (Widal) ..	912	30	942	6	936
Blood for paratyphoid B (Widal) ..	911	22	933	—	933
Blood for Wassermann test ..	1,802	186	1,988	—	—
Blood for malarial parasites ..	26	19	45	8	37
Blood for filaria ..	2	—	2	—	—
Human material for <i>B. pestis</i> ..	58	—	58	35	23
Rats for <i>B. pestis</i> ..	4,873	—	4,873	42	4,831
Sputa for tubercle bacilli ..	132	30	162	32	130
Sputa for pneumococci ..	6	—	6	2	4
Faeces for amoebae ..	11	73	84	13	71
Faeces for dysenteriae ..	4	3	7	1	6
Faeces for anchylostomiasis ova ..	5	18	23	4	19
Faeces for <i>B. typhosus</i> ..	13	1	14	—	14
Secretions for gonococci ..	26	8	34	3	31
Secretions for <i>B. diphtheriae</i> ..	109	22	131	52	79
Secretions for <i>B. leprae</i> ..	89	4	93	32	61
Scrapings for spirochaetes ..	2	4	6	1	5
Evacuations for cholera vibrios ..	235	—	235	7	228
Urine for microscopical examination ..	11	13	24	—	—
Urine for chemical examination ..	3	6	9	—	—
Urine for bacteriological examination ..	53	10	63	—	—
Water for examination ..	44	23	67	—	—
Miscellaneous specimens for examination ..	112	3	115	—	—
Auto vaccine ..	38	12	50	—	—
Typhoid vaccine (doses) ..	1,980	1,238	3,218	—	—
Gonococcal vaccine (doses) ..	3,691	—	3,691	—	—
Streptococcal vaccine (doses) ..	42	—	42	—	—
Cholera vaccine (doses) ..	—	2,980	2,980	—	—
Plague vaccine (doses) ..	25	—	25	—	—
Staphylococcal vaccine (doses) ..	12	10	22	—	—
<i>B. Coli</i> vaccine (doses) ..	19	—	19	—	—
<b>Total</b> ..	<b>17,220</b>	<b>4,761</b>	<b>21,981</b>	<b>—</b>	<b>—</b>

*Research Work.*—The permanent Director was away on leave in England for the greater part of the year 1927 and no research work was carried out.

*B.—PASTEUR INSTITUTE.*—The number of patients who were treated at the Pasteur Institute during 1927 was 1,083, this being an increase of 126 over the previous year. The number of dogs examined for rabies during 1927 was 254, which is an increase of 59 over the previous year.

There can be no doubt that rabies has been greatly on the increase during the year. Table I. shows the Provinces from which the patients came for treatment, and Table II. shows the results of the examination of the brains of dogs sent to the Institute.

Table I.

Province.	Patients.	Province.	Patients.
Western ..	575	Uva ..	26
Central ..	173	North-Central ..	2
Southern ..	110		
Sabaragamuwa ..	97	<b>Total</b> ..	<b>1,083</b>
Northern ..	61		
North-Western ..	39		

Table II.

Province.	Positive.	Negative.	Unfit for Examination.	Total.
Western ..	52	45	14	111
Central ..	27	28	20	75
Eastern ..	12	7	5	24
Sabaragamuwa ..	9	2	7	18
Northern ..	2	3	4	9
North-Western ..	4	6	2	12
Uva ..	3	1	—	4
North-Central ..	—	1	—	1
<b>Total</b> ..	<b>109</b>	<b>93</b>	<b>52</b>	<b>254</b>

*Branch Laboratories.*—There are nine branch laboratories in the Provinces equipped from the Bacteriological Institute and staffed by trained laboratory assistants who work under the supervision and control of the Medical Officer in charge of the hospital to which the laboratory is attached. These laboratories are attached to hospitals in the towns shown below, and the work done during the year is shown against each of them:—

	Total Number of Specimens Examined.		Total Number of Specimens Examined.
(1) Anuradhapura ..	4,082	(6) Jaffna ..	3,601
(2) Badulla ..	5,070	(7) Kandy ..	6,011
(3) Batticaloa ..	3,064	(8) Kurunegala ..	10,283
(4) Chilaw ..	2,658	(9) Ratnapura ..	5,921
(5) Galle ..	12,849		

## (2) Interesting Hospital Cases, &c.

*Kandy Hospital.*—Dr. F. N. Spittel, Surgeon, reports an extremely interesting case of *uterus didelphys with double vagina*, with an 8 months' pregnancy in the right horn successfully treated by Caesarean Section, as the narrowness of the vaginal canal prevented any internal



manipulations; a case of a strangulated left-sided inguinal hernia with the appendix and a mobile caecum within the sac; a case of ruptured haemorrhagic ovarian cyst of a rare type, simulating acute appendicitis; and a carcinoma in a young man of 21 supervening on a scar after removal of buboes only 6 months previously.

*General Hospital, Colombo.*—Dr. Cooke, Physician and Acting Gynaecologist, reports an interesting case of an enormous ovarian cyst which contained 25 pints of fluid, successfully treated by operation. Two photographs showing the condition before and after operation are given on the opposite page.

Dr. Alles, Surgeon, reports two interesting cases of pyometra, a condition of some rarity, both of which were successfully treated.

Dr. R. L. Spittel, Surgeon, reports several cases of liver abscess treated by aspiration of the abscess and emetine injections. His results were very successful. From one of the patients, who recovered, 10½ pints of pus were evacuated. He also reports an interesting case of phos-phatic calculus the size of an almond lodged in the fossa navicularis urethrae and removed at operation; a case of irreducible dislocation of the shoulder successfully treated by excision of the head of the humerus; a case of a hand almost completely severed by a sword-cut just above the wrist, and hanging only by a tag of skin, two tendons and the radial artery, which by a painstaking operation was rejoined to the arm with a fair measure of success; and a most remarkable case of Recklinghausen's disease in which the left lower extremity assumed gigantic proportions—after amputation the limb was found to weigh 35 lb., and the rest of the patient 65 lb. The patient survived.

Dr. Blazé, Physician, reports six cases of post-encephalitis Parkinsonism, and remarks that encephalitis lethargica appears to be on the increase in Ceylon. He also reports two cases of cerebral tumour, a case of true bulbar paralysis, and a case of Hodgkin's disease in a boy of 12 with a typical Pel-Ebstein Chart.

Dr. Lionel de Silva, Physician, reports the clinical test by him of Plasmochin and Plas-mochin Compound in malarial fever in which he did not find it any more efficacious than quinine. He comments on the remarkable infrequency of the classical diarrhoea in the cases of typhoid fever that came under his observation, and also on the comparatively high incidence of hydrophobia, about a dozen cases having been admitted under his care during the year.

Dr. H. O. Gunewardena, Radiologist, reports very satisfactory results from the treatment by X-ray of menorrhagia due to uterine fibroids. A few cases of betel-chewers' cancer treated by diathermic cauterisation gave such striking results as to warrant the hope that this form of treatment may give not only considerable relief but even a prospect of cure in this distressing condition. Nearly 3,000 patients received electrical treatment for various ailments.

Dr. Cyril Fernando, Medical Registrar, comments on the vast amount of clinical material available, and regrets that it cannot be utilized for research owing to insufficient facilities. He reports 4 cases of enlargement of the liver, 2 of which were the result of congenital syphilis, the etiology of the other two, both in children, being obscure; 4 cases of polyserositis, 2 definitely tuberculous in origin, the third, in which there was a large pericardial effusion, being probably tuberculous, while the origin of the fourth was probably toxic; an interesting case of rat-bite fever in which the patient's condition was improving with injections of neo-salvarsan at the time of his removal from hospital by his relatives before the cure could be completed; a case of malarial cirrhosis of the liver and of carcinoma of the gall-bladder; a case of heart block and another illustrating Stokes-Adams Syndrome; a case of haemorrhage into a cerebral tumour in a young subject followed by death; a case of Sydenham's chorea; a case of Facial Diplegia and total deafness of syphilitic origin and improving on anti-syphilitic treatment; a case of mediastinal lympho-sarcoma; a case of spontaneous rupture of the heart; a case of severe unaccountable hyperpyrexia (axillary temperature 107.5°) following intravenous injection of normal saline with 10 per cent. glucose; a case of tuberculous meningitis; and an interesting case of Purpura rheumatica.

*McLeod Hospital, Inuvil.*—Dr. (Miss) Isabel M. Curr reports an interesting case of exomphalos complicated by marginal placenta praevia, delivered by podalic version: the patient, a primipara, made a good recovery. The child, a monstrosity (anencephalus), had hare-lip and cleft palate, deformed anus, talipes, spinal curvature, besides protrusion of intestines, liver, and other organs.

*Lady Havelock Hospital, Colombo.*—Dr. (Miss) Catherine Anderson, Medical Officer-in-Charge, reports a successful operation for strangulated umbilical hernia in a stout female patient, who consented to the operation only 3½ days after the strangulation occurred. She also reports a case of chronic inversion of the uterus, which had occurred after an abortion 3 years previously, successfully treated by Spinelli's operation; a case of ileo-colic intussusception in an adult successfully treated by operation; and a case of pregnancy complicated by a large multilocular pseudo-mucinous ovarian cyst, and further complicated by anchylostomiasis and ascariasis, in which the cyst was successfully removed at operation without interference with the pregnancy.

*Civil Hospital, Galle.*—Dr. G. Wickremasuriya, Surgeon, reports several interesting cases, one of particular interest from its rarity being a case of full-term secondary abdominal pregnancy with twins and hydramnios, successfully treated by operative removal, and followed by recovery of the patient. Among others he reports an undoubted case of ruptured ectopic gestation in which the patient was admitted to hospital in a moribund condition, but made a remarkable recovery without operation; a case of ovarian cyst complicating pregnancy, which had not interfered with labour and was removed on the second day of the puerperium; and a case of rupture of the uterus in a twin pregnancy, treated by an Ayurvedic Physician, in which the patient was admitted to hospital in a moribund condition with the uterus ruptured and the head of the second child left behind. Immediate operation was performed, but the patient succumbed from peritonitis 3 days later.





Condition of a patient before operation for an Ovarian Cyst.





Condition of the same patient after operation.



*De Soysa Lying-in Home, Colombo.*—Dr. S. L. Navaratnam, Assistant Obstetrician, reports an interesting case of twin pregnancy in which one ovum had become a vesicular mole, and the other had developed into a foetus. He also reports another case of hydatidiform mole; a case of full-term abdominal pregnancy; a case of pelvic cellulitis which occurred nearly 4 weeks after delivery in a patient who had had a normal delivery and an uncomplicated puerperium, on the 12th day of which she had been discharged from hospital; and a case of brow presentation in which conversion to a face was successfully performed, and the delivery of a live child brought about.

### (3) *Clinical Laboratory (General Hospital, Colombo).*

In the Clinical Laboratory, General Hospital, 21,007 specimens were examined, as against 19,544 in 1926 and 15,513 in 1925.

### (4) *Special Reports.*

The following reports are given in the Appendix:—

- (1) Report of Dr. W. P. Jacocks, Director of the Anchylostomiasis Campaign, Ceylon, for the year 1927.
- (2) Report of Mr. H. F. Carter, Medical Entomologist, for the year 1927.
- (3) Report of Dr. K. J. Rustomjee, Superintendent, Anti-Malaria Campaigns, for the year 1927.
- (4) Summary of the Annual Report, by Dr. W. G. Wickremasinghe, Medical Officer of Health, on the Health Unit, Kalutara Badda, for the year 1927.
- (5) Report of Mr. B. R. Dyer, Sanitary Engineer, July 30 to December 31, 1927.

## X.—MISCELLANEOUS.

### (1) *Ceylon Medical College.*

The following extracts from the report of the Registrar of the Ceylon Medical College, Dr. F. O'B. Ellison, for the year 1926-27 are given:—

The Ceylon Medical College provides the complete course of instruction required for the practice of modern medicine, surgery, and midwifery. Including the course of preliminary or pre-registration work in Physics, Chemistry, and Biology, which is provided by arrangement at the University College, Colombo; the whole course takes 6 years. At the end the Diploma in Medicine, Surgery, and Midwifery is conferred and under the designation of L.M.S. (Ceylon) is recognized by the General Medical Council of the United Kingdom, and entitles the holder to be registered and to practise his profession in Great Britain and throughout the British Empire.

In addition to the complete Medical curriculum, the College provides a course of instruction for a minor grade of Medical Practitioners known as Apothecaries who receive a 2 years' course of instruction.

#### *General.*

The building of the new three-storey block was begun, to accommodate the entire Physiology Department, College Officers, Library, and Students' Common Room. The convenience of having all these under one roof will be very great. At the time of writing, the work on the building is proceeding rapidly.

When the new Physiology Department is completed the Anatomy and Physiology equipment will be entirely modern, and then whole-time professional teachers in both subjects will provide facilities for the instruction of students in these subjects comparing favourably with any to be encountered East of Suez.

Owing to the increasing demand of the Department of Medical and Sanitary Services for qualified Apothecaries, and very restricted accommodation available in the existing Chemistry and Pharmacy Laboratory, it was found necessary to duplicate the classes in these subjects, and Government sanction was obtained to incur the necessary expenditure on teaching and equipment. About 50 students are now in training in this class.

Under the scheme for Free Bursaries for poor students set up last year, 4 appointments were made in September, 1927; 3 of the successful candidates are at present studying in the Pre-medical class in University College and 1 entered the Medical College on October 1.

The following appointments and changes were made in the staff during the year:—

A whole-time Professor of Anatomy has been appointed on a salary of £800—£1,150, and Archibald Gordon Smith, M.B. (Glas.), F.R.C.S. (Eng.), selected for the post by the Secretary of State, took up duties early in January, and already a notable advance in the teaching of Anatomy has resulted.

Dr. G. S. Sinnatamby was appointed Lecturer in Operative Surgery; Dr. E. W. Arndt as Lecturer in Ophthalmology; Dr. R. Jayatilake on Hospital Forms; Dr. E. C. Alles on Venereal Diseases (Clinical); Dr. A. M. de Silva on Diseases of the Ear, Nose, and Throat; Dr. R. L. Spittel on Dermatology; and Dr. E. G. Mack and Dr. E. C. Spaar as Joint Lecturers in Medicine.

#### *Academical.*

Seventeen students passed and qualified for L.M.S. Diploma during the year 1926-27, and 18 new students were admitted on passing the Pre-medical examination.



*Distribution of Medical Students.*

				October, 1926.	May, 1927.
First year ..	..	..	..	15	18
Second year ..	..	..	..	24	23
Third year ..	..	..	..	2	5
Fourth year ..	..	..	..	21	20
Fifth year ..	..	..	..	53	45
				<hr/> 115	<hr/> 111

### Results of Examinations.

		December, 1926.		March, 1927.		July, 1927		Total.	
		Sat.	Passed.	Sat.	Passed.	Sat.	Passed.	Sat.	Passed.
Final	..	27	5	31	5	31	7	89	17
Second Professional	..	..	..	14	8	19	6	33	14
First Professional	..	..	..	14	6	15	7	29	15

		March.		September.			
		Sat.	Passed.	Sat.	Passed.	Sat.	Passed.
Pre-medical	..	..	..	35	11	30	7
						65	18

*Apothecary Students.*

Admitted during the year October, 1926-27	..	..	..19
		Classes.	
		October.	May.
First year	..	29	27
Second year	..	23	33

#### Results of Examinations.

	December, 1926.		March, 1927.		July, 1927.		Total.	
	Sat..	Passed.	Sat.	Passed.	Sat.	Passed.	Sat.	Passed.
Second Apothecaries	5	4	6	3	16	14	29	21
First Apothecaries	—	—	25	17	9	3	34	20

## Finance.

	FINANCE.		Rs.
Revenue received during the year	..	..	36,120
Expenditure incurred	..	..	87,556

(2) *King Edward VII. (Memorial) Anti-Tuberculosis Fund.*

The report of the Secretary of the Fund for the year 1927 is as follows:—

*New Sanatorium at Kankasanturai.*—The acquisition of the necessary land for the erection of a sanatorium at Kankasanturai was completed in June, 1927. Out of the sum of Rs. 100,000 voted by the Sub-Committee of the King Edward VII. (Memorial) Anti-Tuberculosis Fund for the erection of this sanatorium, a sum of Rs. 5,015.10 has been spent on the acquisition of the necessary land, and the sum now remaining for expenditure on the building is Rs. 94,984.90. The Director of Medical and Sanitary Services states that a further sum of Rs. 25,015.10 is required to complete the building according to the plans which have been drawn up by the Public Works Department, but, as the funds at the disposal of the Sub-Committee are not sufficient to meet this additional sum, it has been decided that, before any further action is taken, tenders should be called for from private firms for the construction of the sanatorium at Kankasanturai. Plans and specification for this work are being prepared by the Public Works Department, and, on receipt of these, tenders will be called for.

*Works Proposed.*—The following questions were also considered by the Sub-Committee during the year 1927, but owing to lack of funds their further consideration has been deferred until the tenders for the construction of the sanatorium at Kankasanturai have been considered :—

- (a) Provision of an ambulance for the transmission of patients between Colombo, Ragama, and Kandana.
- (b) Provision of a special children's ward at the Kandana Sanatorium for those susceptible.
- (c) Provision of electric light at Ragama Hospital.
- (d) Provision of conservancy arrangements (on the water carriage system) at the Ragama Hospital.

*Health Letters.*—The series of seven health letters dealing with the incidence, spread, and prevention of tuberculosis, which were published annually in the English and vernacular newspapers in Colombo and Jaffna, have been rewritten by the Medical Department, and they are now being translated into Sinhalese and Tamil. They will shortly be published in the newspapers weekly as in previous years.

*Members.*—By the death of the Hon. Sir S. C. Obeyesekere, Kt., and the Hon. Sir A. Kanagasabai, Kt., during the year, the Sub-Committee has been deprived of the very valuable services of two gentlemen who had been members of the Sub-Committee since the inception of the King Edward VII. (Memorial) Anti-Tuberculosis Fund in 1910, and who had always been closely identified with the Anti-Tuberculosis Campaign in the Colony. The help and advice readily given by the late Sir Christoffel Obeyesekere and the late Sir Ambalavanar Kanagasabai were of the greatest value in the Campaign.

*Finance.*—The accounts of the Fund have been audited by the Colonial Auditor's Department, and a certified statement of receipts and payments showing the working of the Fund during the year 1927, together with a statement of receipts and payments from the inception of the Fund up to December 31, 1927, is attached.



## KING EDWARD VII. ANTI-TUBERCULOSIS FUND

Summary of Statement of Receipts and Payments for the Year ending December 31, 1927.

RECEIPTS.	Rs.	c.	PAYMENTS.	Rs.	c.
To balance on December 31, 1926 ..	110,708	65	By payment to Messrs. F. J. G. de Saram on account fee in connection with the deed of assurance in respect of the land gifted by Mr. A. E. de Silva for the Kandana Sanatorium ..	38	50
Refund of unexpended balances per Director of Public Works ..	1,955	72	Balance on December 31, 1927—		
Interest on current bank account ..	301	25			
Interest on fixed deposit ..	5,392	24			
			Rs. c.		
			Current account ..	3,353	91
			Fixed deposit ..	114,965	45
				118,319	36
	118,357	86		118,357	86

H. N. COLLYER,  
Honorary Treasurer.

Audited and found correct :

F. G. MORLEY,  
Colonial Auditor.

## KING EDWARD VII. ANTI-TUBERCULOSIS FUND.

Summary of Receipts and Payments up to December 31, 1927.

RECEIPTS.	Rs.	c.	PAYMENTS.	Rs.	c.
To Donations, subscriptions, and sundry collections ..	392,141	11	By *Cost of erection of hospital, sanatorium, apparatus, fittings, &c. ..	412,389	51
Interest—			Honorarium to Secretary and bonuses to clerks for auditing and clerical work ..	4,187	84
	Rs. c.		Advertising, printing, stationery, travelling expenses, &c. ..	2,360	96
Current account ..	7,615	46	Balance (with Imperial Bank)—		
Fixed deposits ..	59,791	44			
On donation by the late Mr. J. N. and Mrs. Campbell ..	77,657	24	On current account ..	3,353	91
On advance to contractor ..	52	42	On fixed deposit ..	114,965	45
	145,116	56		118,319	36
	537,257	67		537,257	67

\* The amount shown in 1926 statement is reduced by Rs. 1,955.72, being refund of unexpended balances by the Director of Public Works.

Audit Office,  
Colombo, February 4, 1928.F. G. MORLEY,  
Colonial Auditor.

## (3) Civil Medical Stores.

The report of the Acting Superintendent, Civil Medical Stores, is as follows:—

During the year the work in all branches has considerably increased and larger supplies of drugs and instruments have been indented for and supplied to hospitals and dispensaries, especially to those dispensaries where qualified Medical Officers have been appointed.

Drugs and dressings ordered by supplementary indents did not arrive in good time and much inconvenience was caused thereby during the 4th quarter of the year.

Several new institutions in the Civil and Estate Branches were opened during the year.

Drugs and instruments were purchased at a cost of Rs. 795,418.64. A sum of Rs. 164,460 was spent on quinine and quinine tablets. 8,478 lb. and 12 oz. quinine and 1,602,824 quinine tablets were issued during the year, costing Rs. 183,535.80.

Free drugs and instruments were supplied to Government Departments other than the Medical and Sanitary Department to the value of Rs. 18,959.69.

*Opium*.—Opium and its preparations were purchased during the year for Rs. 146,082.24, and the amount recovered by sales of opium preparations amounted to Rs. 4,725.84.

*Canabis Indica*.—None was purchased during the year. Sales amounted to Rs. 34.16 (including duty).

The want of sufficient accommodation in the stores is greatly felt and at times all available space in the stores, even the office rooms, have to be utilized for storing packages of drugs, &c.

There was no increase in the permanent staff except the temporary employment of two packers and a sweeper.

Owing to the increase in the number of institutions in the Civil and Estate Branches the work in all branches has increased considerably, and it is necessary to strengthen the staff, both major and minor, next year to cope with the increased work.

In connection with the above report it may be stated that the work of the Civil Medical Stores was considerably handicapped during the year under review by the absence on sick leave of the Superintendent, Mr. A. D. Cotton, from May 19, 1927, to October 25, 1927. Mr. Cotton was unable to resume duties after his sick leave and was examined by a Medical Board and reported unfit for further service. From October 26, 1927, he was on three months' leave preparatory to retirement. During his long absence, the Assistant Superintendent, Mr. James Fernando, acted as Superintendent.

In November, 1927, a Committee with myself as Chairman was appointed by Government to inquire into and report on certain matters relating to the Department of Medical and Sanitary Services, among the terms of reference being the item "The Organization and Control of the Civil Medical Stores." The Committee after investigation realized that there was room for great improvement in the organization and control of the Civil Medical Stores and that it was very necessary that an able successor to Mr. Cotton should be appointed, and also to Mr. Fernando,



the Assistant Superintendent, who was due to retire on August 1, 1928, on attaining the age of 60 years. It therefore recommended that the salary of the post of Superintendent, Civil Medical Stores, should be raised from the scale £450—25—£650 to the scale £500—30—£800, and that of Assistant Superintendent should be raised from the scale Rs. 3,000—240—Rs. 4,200 to the scale £300—25—£500. Government accepted this recommendation and (it may be stated here although the event comes within the year 1928) Mr. H. R. Thomas, M.P.S., was appointed Superintendent, Civil Medical Stores, on April 1, 1928. A successor to Mr. Fernando has not yet been appointed.

As pointed out in the report of the Acting Superintendent there has been a great increase in the work done in the Stores in recent years, and the present accommodation at the Stores is utterly inadequate. Once the work of the Stores is reorganized under the new Superintendent it will be possible to see what further accommodation is required. It will also be possible to see what further staff is necessary to keep the work of the Stores up-to-date.

#### (4) Government Vaccine Establishment.

The following is a summary of the report of the Officer-in-Charge:—

During the year 475 calves were used for vaccination, and of these 470 were returned to the contractor.

Seed lymph for the vaccination of calves was obtained at intervals from the Lister Institute of Preventive Medicine, London. A certain amount was also prepared in this Establishment.

176,464 tubes of calf lymph sufficient for the vaccination of 529,392 persons were issued during the year. Of this number 1,308 tubes were sold, realizing a sum of Rs. 1,197.85. A large quantity of lymph was also stored in bulk as a reserve supply.

The weekly returns of vaccinators show that 98.96 per cent. of primary vaccinations with calf lymph issued during the year were successful.

#### (5) Sale of Opium to Registered Consumers and Vedaralas.

The number of opium depôts remained the same as during the previous year, namely, 53.

One new consumer, as against 3 in 1926, was added to the register on purely medical grounds under section 11, sub-section (4), of Ordinance No. 5 of 1910. The total number of registered consumers served from the opium depôts in the Island during the year was 6,591, as against 7,165 in 1926, 7,792 in 1925, and 8,323 in 1924. 6,042 of the consumers obtained eating opium and 549 obtained smoking opium, as against 6,583 and 582, respectively, in 1926, and 7,170 and 622, respectively, in 1925. 3,064 vedaralas purchased eating opium, as compared with 2,890 in 1926 and 2,756 in 1925. From the above figures it will be seen that there is a steady decrease in the number of consumers owing to deaths, and an increase in the number of vedaralas to whom opium is issued for medicinal purposes.

3,356 lb. of eating opium and 386½ lb. of smoking opium, which realized Rs. 352,747 and Rs. 54,091.35, respectively, were sold to consumers and vedaralas during the year, as compared with 3,587 lb. of eating and 408 lb. of smoking opium, which realized Rs. 376,761 and Rs. 57,098, respectively, in 1926. The total amount realized by the sale of eating and smoking opium was Rs. 406,838.35, as against Rs. 433,859.95 in 1926. The decrease in the sales during the year was due to deaths among consumers.

There was no change in the selling price of opium. Eating opium was sold at 1½ cents per grain and smoking opium at 2 cents per grain.

No changes in the regulations in force for the control of traffic in opium were made during the year, but an important decision was made by the Government of India to the effect that the quantity of raw opium exported from India should be reduced annually by 10 per cent. so that at the end of 10 years no opium would be supplied to this Government except for scientific and medicinal purposes. As a result of this decision steps have been taken to bring about an annual 5 per cent. reduction on the quantities now drawn by the present registered consumers. It is anticipated that the remaining 5 per cent. necessary for the contemplated reduction will be met by deaths among consumers in the ordinary course of events.

#### (6) Medical Requirements.

(1) Reference was made in my last Annual Report to the scheme for rebuilding the non-paying section of the General Hospital. It was then stated that a series of three-storey blocks would gradually replace the present single-storey wards. The first of these blocks is now well under way and will, it is anticipated, be completed in 1928. The next step in the general scheme of reconstruction is the building of a new Operating Theatre, which will be included in the Estimates for 1928-29. When this has been completed the present theatre will be demolished to permit of the commencement of the construction of the second three-storey block.

(2) Reference was also made last year to the necessity for the provision of a Nurses' Home to afford accommodation for the Nursing Staff of the Hospital and a Training School for Probationers. During the year under review this project has on several occasions been the subject of discussion by the Finance Committee of the Legislative Council. The situation at the end of the year was that the scheme was approved, but it was decided that the plans submitted by the Public Works Department should be revised so that the cost of the home—exclusive of acquisition of land—should not exceed one million rupees. There is every reason to think, therefore, that a beginning will be made with this project next year. When completed it will provide what has been a crying need of our nurses for many years, viz., comfortable quarters with adequate and suitable means of recreation. It is sincerely hoped that there will be no delay in the early fruition of this scheme.

(3) A Casualty Department of the General Hospital. This was also referred to in my last Report. Its inception awaits the setting free of the most suitable site available, viz., the present quarters occupied by nurses, when the Nurses' Home is fit for occupation.

(4) The project for the extension of the Lying-in Home, also mentioned last year, has moved a step further, for plans have been prepared by the Public Works Department. The principal object of this scheme is to increase the facilities for training midwives, enabling a larger number to be turned out each year to replace the ignorant midwife whose practice is responsible for so much infantile mortality.



(5) The following paragraph appeared in my last year's Report—"The necessity for provision of adequate medical research laboratories has been stressed for many years. Government have approved (and the Legislative Council) of such provision being made. The difficulty of obtaining a suitable site at present stands in the way. Every effort should be made to overcome this difficulty as the need is a pressing one, and the scientific work of the Department is seriously hampered by the inadequacy of the accommodation at the Bacteriological Institute, Pasteur Institute, and the Laboratories of the Medical Entomologist and the Government Analyst." It is again applicable this year and the question of site remains the stumbling block. The uncertainty as to the location of the University has had much to do with the delay in determining the site for these laboratories.

(7) *General Remarks.*

(1) During the year under review definite advance has been made in the Colony in matters Medical and Sanitary. Progress has in certain directions not been as rapid as may have been desired, but it has none the less taken place. Slow and sure is a sound policy. I am convinced that the Colony would be immediately the gainer if members of the Civil Service and the Engineers of the Technical Departments were required during their period of leave to take a course of instruction in Tropical Hygiene. Duty leave for this purpose would have to be granted. A six weeks' course of this nature for laymen is shortly to be inaugurated by the London School of Hygiene and Tropical Medicine and has met with the hearty support of the Colonial Office. It is to be hoped that it will not be long before officers from Ceylon will, with their colleagues from other Tropical Colonies, be found attending these courses.

(2) During the year the Department had the misfortune to lose by retirement the valued services of three staff officers. Dr. George Thornton gave 19 years of devoted service to the Department, first as Medical Superintendent of the General Hospital, Colombo, and then as Assistant Principal Civil Medical Officer and Deputy Director of Medical and Sanitary Services. Dr. J. C. Cooke, Assistant Director of Medical Services, had a record of 37 years' service in the Department, during which period he acquired a wealth of experience from which the Department he so much loved derived the greatest advantage. Mr. Howard Tripp served the Department as Accountant for a period of 13 years. Both Dr. Thornton and Mr. Tripp took a deep interest in the Sports Club of the Department, and in the realm of tennis proved a tower of strength in Inter-Departmental Tournaments. The loyalty of these three officers to the service in general and to this Department in particular affords an example worthy of emulation.

Colombo, May 21, 1928.

J. F. E. BRIDGER,  
Director of Medical and Sanitary Services.

The following reports are given in the Appendix:—

- (1) Report of Dr. W. P. Jacocks, Director of the Anchylostomiasis Campaign, Ceylon, for the year 1927.
- (2) Report of Mr. H. F. Carter, Medical Entomologist, for the year 1927.
- (3) Report of Dr. K. J. Rustomjee, Superintendent, Anti-Malaria Campaigns, for the year 1927.
- (4) Summary of the annual report by Dr. W. G. Wickremasinghe, Medical Officer of Health, on the Health Unit, Kalutara Badda.
- (5) Report of Mr. B. R. Dyer, Sanitary Engineer, July 30 to December 31, 1927.



## APPENDIX.

## 1.—Report of the Director, Anchylostomiasis Campaign, Ceylon, for the Year 1927.

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VII.—Latrine over sea in the Northern Province.  
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## Summary Figures.—

## Ceylon Anchylostomiasis Campaigns.

Treatments, 1927.			First.	Total.
Campaign units ..	..	..	299,761	299,761
Other agencies ..	..	..	1,048,341	1,274,194
Total ..			1,348,102	1,573,955

## Persons Treated and Number of Treatments given, 1916-1927.

## By Campaign Units.

	First Treatments.	Total Treatments.		First Treatments.	Total Treatments.
1916-1917 ..	42,427	—	1924 ..	145,991	186,700
1918 ..	50,374	444,695	1925 ..	178,518	186,497
1919 ..	88,602	—	1926 ..	173,307	174,691
1920 ..	126,529	290,732	1927 ..	299,761	299,761
1921 ..	84,617	190,131			
1922 ..	24,136	54,711		1,315,035	1,977,467
1923 ..	100,773	149,549			

## By Other Agencies.

	First Treatments.	Total Treatments.		First Treatments.	Total Treatments.
1921.			1925.		
Estates ..	7,308	—	Government hospitals and dispensaries ..	742,735	914,656
Government hospitals and dispensaries ..	25,284	47,161	Mandapam Camp ..	52,784	52,784
	32,592	47,161		795,519	967,440
1922.			1926.		
Estates ..	18,530	18,530	Government hospitals and dispensaries ..	829,887	1,020,092
Government hospitals and dispensaries ..	219,879	282,770	Mandapam Camp ..	77,278	77,278
	238,409	301,300	Estate staffs ..	64,851	85,840
				972,016	1,183,210
1923.			1927.		
Estates ..	18,000	18,000	Mandapam Camp ..	141,720	141,720
Government hospitals and dispensaries ..	501,537	664,008	Government hospitals and dispensaries ..	832,019	1,039,003
	519,537	682,008	Estate Staff ..	70,245	89,113
			Central Office ..	1,098	1,099
1924.			Kalutara Badda Health Unit ..	3,259	3,259
Government hospitals and dispensaries ..	776,913	980,905		1,048,341	1,274,194



Total, 1916-1927.

			First Treatments.		Total Treatments.
Campaign units	..	..	1,315,035	..	1,977,467
Other agencies	..	..	4,383,327	..	5,436,218
			5,698,362		7,413,685

*Organization.*—The Government of Ceylon and the International Health Division of the Rockefeller Foundation continued the co-operative work for the relief and control of hookworm disease during the year on the same basis as in 1926, and in accordance with the general plan agreed upon by the Anchylostomiasis Committee of Control, at its meeting, December 1, 1926.

*Administrative Organization: Personnel.*—The International Health Division Director, Dr. W. P. Jacobs, continued to serve as State Director of the Campaign during the year. Dr. A. T. Kuriyan remained throughout the year as Assistant Director. Of the junior medical officers, Dr. S. G. Jackson reverted to the Medical Department on June 17, 1927, and Dr. L. O. Abeyratne on September 17, 1927. To replace these two officers, Dr. A. W. Rasiah joined the Campaign on July 4 and Dr. S. F. Jayawardena on September 14. Dr. C. D. Amarasingha was taken on the strength of the campaign, October 13, 1927. Drs. E. Jayatilleke, S. N. Chelliah, P. A. M. Jayawardene, K. Kanagaratnam, and S. C. Manikawasager served in the Campaign throughout the year.

Table No. 1.—Personnel of the Anchylostomiasis Campaign Staff during 1927 by Months.

	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Assistant Directors	1	1	1	1	1	1	1	1	1	1	1	1
Medical Officers	7	7	7	7	7	7	7	7	7	8	8	8
Clerks	4*	3	3	3	3	3	3	3	3	3	3	3
Microscopists	6	6	6	6	6	6	6	6	6	6	6	6
Dispensers	26	27	27	25	27	28	28	28	27	31	34	34
Labourers	11	11	11	11	11	11	12	12	12	12	12	12
Total	55	55	55	53	55	56	57	57	56	61	64	64

\* One clerk was temporarily employed during the month of January.

In addition to the officers mentioned above, Dr. T. K. Jayaram treated labourers passing through Mandapam Camp; Dr. S. F. Chellappah, Senior Medical Officer of Health, Health Unit, Kalutara Badda, and his successor, Dr. W. G. Wickremesinghe, treated villagers and school children in the health unit area at Kalutara; all Government Medical Officers and Apothecaries treated labourers and villagers; and estate dispensers treated labourers.

*Co-operation.*—As in past years the Campaign continued to receive the effective co-operation of the Department of Medical and Sanitary Services, the Department of Education, school managers and teachers, Government Agents, Assistant Government Agents, Mudaliyars, Ratemahatmayas, and headmen in the various Provinces. The Provincial Surgeons have kindly furnished monthly figures of treatments at Government hospitals and dispensaries. The Government Medical Officers and Apothecaries in charge in many remote places were of great help in assisting the Campaign officers and staff in the itinerating work. The Inspecting Medical Officers courteously supplied figures of sanitation on estates. The Controller of Indian Immigrant Labour has given full co-operation in carrying on the work at Mandapam Camp.

*Present Programme of Work.*—The programme of treatment work which was approved by the Anchylostomiasis Committee of Control in December, 1926, and included as a part of the 1926 report has been in operation throughout the year. In general this plan provides, through itinerating field units, for periodic lecture and treatment visits to all schools; for periodic treatments of estate labourers and for a continuation of periodic treatments at Government hospitals and dispensaries and at Mandapam Camp. All fecal examinations are made at the central laboratory in Colombo. The programme has proved effective in its educational and treatment phases, and it is proposed to continue working on these general lines in 1928, as the arrangement offers treatment to all ages and races at stated intervals throughout the entire country, including the remotest districts.

As will be seen from the maps accompanying this report a large section of the country has been reached through schools in 1927. All estates, exclusive of those done in 1926, were reached in 1927, except a few small coconut estates which employed very little imported labour and which will be included in the 1928 programme. In the light of our present knowledge, the programme might be continued until sanitation is so well established that treatment is no longer needed. The effectiveness of the programme depends upon two important factors—

- (a) Educational work in schools.
- (b) Periodicity of treatments.

In regard to (a) fundamental information is being given through school lectures to an age group which is easily impressed. The knowledge so gained will have good effect in securing the interest and co-operation of the coming generation. In regard to (b) it is important to provide for treatments at stated intervals till sanitation is complete. The present programme provides for that periodicity. It also suggests that certain fundamental work be done in the laboratory before a series of treatments should be undertaken.



## TREATMENTS.

Total Work done during 1927.—Including all agencies hookworm treatments were carried on by—

- (1) School units.
- (2) Estate units.
- (3) Mandapam Camp.
- (4) Government hospitals and dispensaries.
- (5) Estate staffs.
- (6) Central office.
- (7) Health Unit, Kalutara.

Table No. 2 gives the numbers treated by these agencies.

Table No. 2.—Total Anchylostomiasis Treatments by all Agencies in 1927.

Campaign Units.	Number of Persons in Census.	Treatments.		Total.
		First.	Subsequent.	
School units .. .. .	139,204*	110,144	—	110,144
Estate units .. .. .	275,026†	189,617	—	189,617
Total by campaign units .. .. .	414,230	299,761	—	299,761
<i>Other Agencies.</i>				
Mandapam Camp .. .. .	159,431	141,720	—	141,720
Government hospitals and dispensaries .. .. .	3,684,334	832,019	206,984	1,039,003
Estate staffs .. .. .	347,249†	70,245	18,868	89,113
Central office .. .. .	1,252†	1,098	1	1,099
Health Unit, Kalutara Badda‡	—	3,259	—	3,259
Total for Other Agencies .. .. .	4,192,266	1,048,341	225,853	1,274,194
Grand Total .. .. .	4,606,496	1,348,102	225,853	1,573,955

\* Census represents average daily attendance during preceding 3 months.

† Census figures are duplicated in part.

‡ Census figures not available.

The census figures while inaccurate as per notations are nevertheless a rough guide for calculations. As shown in the tables the total persons treated 1,348,102 and the total treatments given 1,573,955 represent the greatest amount of treatment work yet done in Ceylon in any single year. As usual, most of the treatments were given by Government hospitals and dispensaries, but an appreciable increase is made in the number of treatments given by estates with their own staff.

*By Campaign Units: Schools.*

The school campaign work, having both educational and treatment aspects, is considered to be most important, as each unit visited every school, however remote, in its district. In many instances this procedure enabled villagers and school children to get their first information about this important public health problem. The school treatment work of the campaign units in each Province follows. (Please also see map following page 61.)

*Northern Province: (a) Jaffna Peninsula and Islands.*—Dr. S. N. Chelliah was in charge of this work which was started in June, 1926, and completed in June, 1927. The work was somewhat delayed owing to the difficulty experienced in reaching the islands, some of which were several miles from the peninsula. Dr. Chelliah visited 171 schools and treated 9,490 children and 1,808 villagers, making a total of 11,298 persons treated.

*(b) Mainland.*—Work in the Northern Province below Elephant Pass was commenced by Dr. K. Kanagaratnam on November 8, 1926, and was completed by him in March, 1927. Travelling in this area was difficult owing to the great amount of jungle and the lack of proper roads. The work was very successful however as more than 98 per cent. of the school children, besides large numbers of pre-school children and adults took treatments. Dr. Kanagaratnam visited 43 schools and treated 1,578 children and 1,963 villagers, making a total of 3,541 persons treated.

*North-Central Province.*—Dr. K. Kanagaratnam started this work in March, 1927, and completed it on July 13. The country consists mainly of jungle land and is sparsely inhabited. To reach remote schools the campaign officers frequently had to travel through thick forests inhabited by wild beasts. Over 92 per cent. of the school children in this Province took advantage of the visits by the campaign staff. The Medical Officer visited 80 schools and treated 4,225 children and 2,766 villagers, making a total of 6,991 persons treated.

*Central Province.*—Work in this Province was started in July, 1926, and was completed by the end of October, 1927, Dr. S. C. Manikawasager being in charge. Much rough and difficult travelling had to be done in Walapane area. The whole Central Province, except Matale, Teldeniya, and Wattegama districts, was covered by his unit during the year, the last named places having been completed during 1926. Dr. Manikawasager visited 216 schools and treated 18,667 children and 3,465 villagers, making a total of 22,132 persons treated.

*Province of Sabaragamuwa.*—This work, begun in October, 1926, was completed in August, 1927, under the continuous charge of Dr. L. O. Abeyratne. Travelling in certain parts of this mountainous area was most difficult. Dr. Abeyratne visited 176 schools and treated 11,082 children and 6,558 villagers, making a total of 17,640 persons treated.

*Western Province: (a) Colombo District.*—To this district which is densely populated and in which campaign work has been carried on, in restricted areas off and on, during the last seven years, more than one officer was assigned. Starting at Avissawella Dr. L. O. Abeyratne worked in Hewagam korale until he was relieved on September 17 by Dr. S. F. Jayawardena, who



continued in the district till the end of the year. Dr. P. A. M. Jayawardena was in charge in the Salpiti korale till November 2, when he was assigned to estate work in Kalutara District. The work in this korale was brought to a close by Dr. S. F. Jayawardena on December 15 after he had completed the Hewagam korale. There was a certain amount of reluctance to treatment in Homagama and Moratuwa areas, but this was largely overcome by educational work. In this district 172 schools were visited and 7,814 children and 1,490 villagers treated, making a total of 9,304 persons treated.

(b) *Negombo District.*—When estate campaigns were temporarily suspended in June, 1927, Dr. E. Jayatilleke, who had been working in the Central Province, was assigned to Hapitigam korale. About the same time Dr. Kanagaratnam, who had completed his school work in the North-Central Province, and Dr. A. W. Rasiah, who was taken on in place of Dr. Jackson, were assigned the Alutkuru korale north. When Dr. Kanagaratnam left for estate work in August, Dr. Rasiah continued in this area until he was assigned on October 15 to do estate work in the North-Western Province. He resumed school work again in the latter part of November. School work in the Western Province was not completed at the end of the year. The Medical Officers visited 160 schools and treated 4,557 children and 1,600 villagers, making a total of 6,157 persons treated.

*Southern Province.*—The work in this Province, originally started on April 17, 1926, was completed on May 26, 1927, by Dr. P. A. M. Jayawardena. Difficulty of travelling was experienced in the Tissamaharama section owing to the dangerous wild beasts which roamed about in the jungle in the neighbourhood of the game sanctuary. In some areas, like Matara, mild opposition was met, while in other areas, like Dikwella, the response was most encouraging. The Medical Officer visited 85 schools and treated 8,203 children and 8,860 villagers, making a total of 17,063 persons treated.

*Province of Uva.*—On completion of the work in the Southern Province, Dr. P. A. M. Jayawardena passed on to Uva in May, 1927, to conduct school campaigns. The country being mountainous in part travelling was difficult and the officers had to engage special guides and coolies to reach remote schools through forests. This work was completed on August 26. Dr. Jayawardena visited 63 schools and treated 1,643 children and 445 villagers, making a total of 2,088 persons treated.

*Eastern Province: Batticaloa District.*—Dr. Chelliah finished his work in the Jaffna peninsula in June, and immediately thereafter began a campaign in the Batticaloa District. This was the first time a hookworm campaign had ever been carried on in the Batticaloa area. There was great demand for treatments on the part of the villagers. Dr. Chelliah finished this work on October 23, 1927. He visited 123 schools and treated 7,591 children and 6,339 villagers, making a total of 13,930 persons treated.

The following table shows the treatments given by school units during 1927:—

Table No. 3.—Treatment Work done by School Units during 1927.

Province.	No. of Schools.		Average Attendance Preceding Three Months (Census).	Treatments.			Per Cent. of School Children Treated of Census.
	In the Province.	Visited.		School Children.	Villagers.	Total.	
Northern (Jaffna Peninsula) ..	368 ..	171 ..	17,317 ..	9,490 ..	1,808 ..	11,298 ..	54.8
Northern (Mainland) ..	80 ..	43 ..	1,608 ..	1,578 ..	1,963 ..	3,541 ..	98.1
North-Central ..	66 ..	80* ..	4,586 ..	4,225 ..	2,766 ..	6,991 ..	92.1
Eastern (Batticaloa District) ..	138 ..	123 ..	9,116 ..	7,591 ..	6,339 ..	13,930 ..	83.3
Central ..	318 ..	216 ..	27,870 ..	18,667 ..	3,465 ..	22,132 ..	67.0
Uva ..	72 ..	63 ..	4,987 ..	1,643 ..	445 ..	2,088 ..	32.8
Sabaragamuwa ..	234 ..	176 ..	20,205 ..	11,082 ..	6,558 ..	17,640 ..	54.8
Western† ..	954 ..	332 ..	37,555 ..	12,371 ..	3,090 ..	15,461 ..	32.9
Southern ..	416 ..	85 ..	15,960 ..	8,203 ..	8,860 ..	17,063 ..	51.4
Total ..	2,646	1,289	139,204	74,850	35,294	110,144	53.8

\* Additional schools have been constructed since Education Department's list has been issued.

† Work not completed.

The percentage of school children treated in the various Provinces (53.8) in respect to the census is encouraging in this first round and will do doubt increase with each succeeding year. The census is taken as the average attendance for the preceding months as it was thought that this figure gave a more accurate indication of what was actually taking place in the schools, rather than to accept enrolment figures which were often large and never attained in any school.

#### By Campaign Units: Estates.

Good progress was made in estate treatment work during the year. This was due to the excellent co-operation which was received from planters and labourers, and was facilitated by arranging a definite programme in the central office late in the year and having it strictly followed. In this way estates were notified well in advance and were prepared for the arrival of the Campaign staff on a stated date. Except for an interruption of two months due to a shortage of carbon tetrachloride the work progressed steadily. Since October, 1926, all estates in the Central, Uva, Sabaragamuwa, North-Western, Western, and Southern Provinces have been offered treatment except a small number of coconut estates which employed few imported labourers. A record of the work done in each Province follows. (Please also see map following page 61.)



*Central Province.*—The present campaign work was first started in Dimbula district in October, 1926, and was continued in Uda Pussellawa, Nuwara Eliya, and Dikoya district till June, 1927, with Dr. E. Jayatilleke in charge. In August treatment work was resumed by him in Bogawantalawa and continued until December 15 in Maskeliya, Maturata, Upper Hewaheta, Galaha, Kandy, Galagedara, Kadugannawa, and Gampola districts. Dr. Manikawasager carried on the work in Ambegamuwa, Dolosbage, Nawalapitiya, Kotmale, and Gampola areas from October 27 to December 15; Dr. S. N. Chelliah in Matale and Hunasgiriya areas from October 24 to December 15; Dr. A. W. Rasiah in Madulkele area in the latter part of November. In the Central Province 419 estates were visited and 100,727 treatments out of a census of 153,885 were given in the Province during the year.

*Province of Uva.*—The work started here on November 20, 1926, and was continued till April, 1927, under charge of Dr. Jackson.

In Uva 127 estates were visited and 35,143 labourers out of a census of 44,146 were treated.

*Province of Sabaragamuwa.*—From Uva Dr. Jackson passed on to Sabaragamuwa starting work in Balangoda area in April, 1927, and continued this campaign till June 17, 1927, when he reverted to the Medical Department. Dr. Kanagaratnam who started work in Avissawella district on September 19, 1927, was responsible for the treatments in Kelani Valley, Undugoda, and Kegalla areas. Aranayake district was worked by Dr. Rasiah from November 12 to November 20.

In this Province 220 estates were visited and 38,691 labourers out of a census of 50,473 were given treatment.

*North-Western Province.*—Dr. Rasiah began and completed the campaign in this Province from October 15 to November 10. He visited 16 estates and treated 2,347 labourers; the census comprised 3,413 labourers.

*Western Province: Kalutara District.*—Dr. P. A. M. Jayawardena worked this area from November 3 to December 15, visiting 45 estates and treating 6,944 out of a census of 12,347 labourers.

*Southern Province.*—Dr. C. D. Amarasingha was assigned to this Province on November 1. He worked Elpitiya, Galle, Udugama, Deniyaya, and Akuressa districts; he visited 43 estates and treated 5,765 labourers; the census totalled 10,762 labourers.

Table No. 4 shows the treatments given by estate units during 1927.

Table No. 4.—Treatments done by Estate Units in 1927.

Province.	Census.	First Treatments.	Total Treatments.
Central .. .. .	153,885 ..	100,727 ..	100,727
Sabaragamuwa .. .. .	50,473 ..	38,691 ..	38,691
Uva .. .. .	44,146 ..	35,143 ..	35,143
Western .. .. .	12,347 ..	6,944 ..	6,944
Southern .. .. .	10,762 ..	5,765 ..	5,765
North-Western .. .. .	3,413 ..	2,347 ..	2,347
Total .. .. .	275,026	189,617	189,617

#### *Treatment Work by other Agencies.*

The greatest number of treatments were given by agencies other than campaign units as will be seen hereafter.

*Estate Staffs.*—In view of the vast importance to estates from an economic standpoint of keeping the labour force in a healthy condition without having to rely upon outside sources for attention, it was suggested that the next two or three treatment visits would be (a) to demonstrate the most recent methods of administration of the drug, and (b) to train or encourage the estate staff to carry on the work at stated intervals without waiting for the campaign workers. Estates readily co-operated in these suggestions. Table No. 5 shows the work which estates reported as having done with their own staff, as based on replies to a questionnaire.

Table No. 5.—Anchylostomiasis Treatments Reported as given by Estate Staffs in 1927.

Number of Letters Sent out.	Number of Answers Received.	Number Reported nil Treatment.	Number Reported Treatment.	Census.	Treatments.		
					First.	Sub.	Total.
1,450 ..	1,237 ..	353 ..	884 ..	347,249*	70,245 ..	18,868 ..	89,113

\* Census of 1,010 estates.

While the figures show no marked increase over the number treated in 1926 (64,851) yet the number of estates reporting treatments is much in excess of the 1926 figures (584). It should be stated that in 1927 practically every estate had an opportunity of getting campaign treatment and this may account for the smaller average number of treatments per estate.

As mentioned in a previous report, there are not a sufficient number of estate dispensers employed on estates to carry on this work; however there appears to be a tendency to increase the numbers. To overcome this difficulty the campaign offered to supply estates for a temporary period with a trained dispenser at cost price to carry on the work. During the year 21 estates have availed themselves of this opportunity. The advantages of such an arrangement are (a) the estate can estimate in advance the exact cost; (b) can name the date when treatment is to be started and ended; (c) does not need to depend on an outside organization which may reach the estate at an inconvenient date (e.g., bad weather, visiting agent's visit, flush season, &c.), with a consequent interruption of the estate routine and necessary disorganization of the working period; and (d) individual labourers can be given especial attention when such is needed.



**Mandapam Camp.**—The practice of treating Indian labourers travelling to Ceylon to work on estates was continued with gratifying results during the year under the direction of Dr. T. K. Jayaram, Quarantine Medical Officer, assisted by Drs. Ratnaser and Hunt, in sequence, from March to November. This represents a longer period than assistants usually remain at Mandapam, but as more labourers (159,431) passed through the camp in 1927 than ever before in a single year this additional assistance was needed. Instead of utilizing the Camp apothecary and compounder as part-time assistants as formerly, an additional full-time dispenser was employed in their place and this arrangement has proved more satisfactory.

Treatment work at the Camp began in 1925 and the figures by years follow:—

Year.	Number Arrived.	Number Treated.	Percentage Treated.
1925 .. ..	122,918	53,187	43.27
1926 .. ..	100,610	76,145	75.68
1927 .. ..	159,431	141,720	88.90

The following table shows the figures of those treated by months:—

Table No. 6.—Number and Percentages of Labourers Treated at Mandapam Camp by Months during 1927.

Month.	Number Arrived.	Number Treated.	Percentage Treated.
January .. ..	4,047	3,499	86.5
February .. ..	8,347	7,182	86.0
March .. ..	12,123	10,727	88.5
April .. ..	16,552	14,756	89.2
May .. ..	26,263	21,579	82.2
June .. ..	23,624	20,445	86.5
July .. ..	19,789	18,220	92.2
August .. ..	11,970	11,087	92.6
September .. ..	11,707	10,924	93.3
October .. ..	8,087	7,519	93.0
November .. ..	9,302	8,655	93.0
December .. ..	7,620	7,127	93.5
Total .. ..	159,431	141,720	88.9

These figures show a steady improvement in percentages. Except for the few medically unfit amounting to about 10 per cent. and including infants under two years, pregnant mothers, nursing mothers, alcoholics, and the old and debilitated, all were treated.

In addition to labourers 149 others were treated as follows:—

Superintendent's staff .. ..	65
Spencers' staff .. ..	79
Medical .. ..	2
Public Works Department .. ..	3
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Opportunity is given the labourers to hear something about hookworm disease and to see pictures of the Ceylon estates on which they are going to live. The Medical Officer has been supplied with a lantern and 100 slides, 75 of which are on hookworm disease and the rest show general Ceylon views. Since May, 1927, 144 lectures were given, attended by the entire labour force in Camp at the time. This useful work is being continued.

**Government Hospitals and Dispensaries.**—As in previous years the largest number of hookworm treatments were given at Government hospitals and dispensaries.

This work was started in 1921 and the figures by years follow:—

Year.	First Treatments.	Total Treatments.
1921 .. ..	25,284	47,161
1922 .. ..	219,879	282,870
1923 .. ..	501,537	664,068
1924 .. ..	776,913	980,905
1925 .. ..	742,735	914,650
1926 .. ..	829,887	1,020,092
1927 .. ..	832,019	1,039,003

In 1926 the outdoor attendance figures were 2,864,328 and this number of people received 1,020,092 treatments. In 1927 1,039,003 treatments were given at outdoor dispensaries as shown in Table No. 7.

Table No. 7.—Hookworm Treatments given at Government Hospitals and Dispensaries by Provinces in 1927.

Province.	Total Attendance.	First Treatments.	Sub Treatments.	Total Treatments.
Western .. ..	712,245	142,800	45,566	188,366
Southern .. ..	568,269	143,733	55,229	198,962
Central .. ..	455,487	134,711	29,786	164,497
North-Central .. ..	180,831	18,530	8,657	27,187
Sabaragamuwa .. ..	381,319	94,585	16,675	111,260
North-Western .. ..	589,872	140,778	17,382	158,160
Eastern .. ..	310,035	78,155	14,782	92,937
Northern .. ..	362,045	46,378	14,104	60,482
Uva .. ..	124,231	32,349	4,803	37,152
Total .. ..	3,684,334	832,019	206,984	1,039,003



A comparison of the treatments given in the various Provinces with the incidence and intensity figures is shown in Table No. 8.

Table No. 8.—Hookworm Treatments given at Government Hospitals and Dispensaries in 1927 by Provinces and Percentages of these Treatments to 1926 Outdoor Dispensary Patients; also Figures for Average Eggs per Gram per Person and Incidence Rates based on 1925 Survey.

Province.	Outdoor Dispensary Patients, 1926.	Hookworm Treatments, 1927.	Percentage.	Average Eggs per Gram of Faeces. (Survey Fig.)	Percentage Infected. (Survey Figures.)
Uva ..	105,830	37,152	35.1	761	84.9
Southern ..	394,053	198,962	50.5	941	90.7
Western ..	562,248	188,366	33.5	956	88.1
Central ..	372,092	164,497	44.2	975	89.3
Eastern ..	240,532	92,937	38.6	1,131	91.4
Sabaragamuwa ..	279,730	111,260	39.8	1,203	90.0
Northern ..	214,333	60,482	28.2	1,345	95.2
North-Central ..	178,782	27,187	15.2	1,527	96.5
North-Western ..	516,728	158,160	30.6	1,567	96.0
Total ..	2,864,328	1,039,003	36.3	1,102	90.5

As in 1926 and preceding years, the Provinces with the highest intensity and incidence report the smallest percentage of treatments. As sanitation will be slow in getting established the only means of keeping the disease in check in these Provinces is by periodic treatments, to be carried on principally by Government hospitals and dispensaries. This method is the cheapest and most effective which can be used and such treatments should be particularly emphasized in the Northern, North-Central, North-Western, and Sabaragamuwa Provinces.

*Central Office.*—At the request of the Principal, Dr. Kuriyan treated 46 school children at the Training Colony, Peradeniya, early in February. In the same month, North Matale estate, where research work is in progress, was visited by Dr. Kuriyan and 841 labourers were treated. (It is expected that a report will be made later on the North Matale work.) At the same visit 210 labourers were treated in one day on Nalande, a neighbouring estate. In addition, treatment was given to two other people who sought advice at the central office.

*Total Treatments by Central Office.*

School children ..	46
Estate labourers ..	1,051
Others ..	2
Total ..	1,099

The administration of treatments at the central office is discouraged as all the staff are occupied in other work and there are no facilities for giving treatments and for after-care. Furthermore, there are many Government hospitals and dispensaries nearby where treatment can be obtained without cost, and patients are advised and encouraged to go to these institutions.

*Kalutara Badda Health Unit.*—A treatment campaign as part of the regular programme was carried on in Kalutara Badda Health Unit during a part of the year. The figures reported are as follows:—

*Hookworm Treatments done by Kalutara Badda Health Unit in 1927.*

First treatments ..	3,259
Total treatments ..	3,259

*Educational Work.*—Lectures, demonstrations with the microscope, and the distribution of literature are some of the educational methods used by school units. The lectures explained the cause, prevention, and cure of hookworm disease. (1) *Chart lectures.*—Every school was visited for the purpose of lecture, which was illustrated by charts. Specimens of roundworms and hookworms were shown to the pupils, who were questioned at the end of lectures to see what impressions had been made on them. They were also given opportunity, which was accepted, to put questions to the lecturer. (2) *Lantern lectures.*—Every Medical Officer was supplied with a balopticon and slides illustrating the geographical distribution of the disease, the eggs, larvae and mature worms, the penetration of larvae through skin, its travel to the intestines, the anatomy of the worm, especially the mouth parts, the method of sucking blood, the effects of infection as shown by local pictures of cases in all stages of the disease, the effects of treatment shown by local pictures before and after treatment, procedure of work in Ceylon as shown by pictures of people gathered for treatment, and prevention of the disease as shown by the various types of latrines. Lantern lectures have always been very popular and crowds gathered at these lectures. (3) *Street lectures.*—When no work could be done in schools as on Saturdays and during school holidays, dispensers addressed gatherings at fairs and markets. (4) *Microscopic demonstrations.*—In addition to the chart lectures, eggs and larvae of hookworms were demonstrated to the teachers and pupils by means of the microscope. (5) *Distribution of pamphlets.*—Illustrated pamphlets concerning all the points mentioned above, printed in English, Sinhalese, and Tamil, were freely distributed to the school children and the general public. Fortunately this essential lecture work was most popular with the people and the campaign staff.



The following table gives the number of lectures and attendance and literature distributed:—  
Table No. 9.—Number of Lectures given by School Units with Attendance and Literature distributed in 1927 by Provinces.

Province.	Lantern.		School.		General.		Total.	
	No.	Attendance.	No.	Attendance.	No.	Attendance.	No.	Attendance.
Northern	—	—	42	3,699	1	250	43	3,949
North-Central	7	1,150	77	7,693	5	754	89	9,597
Western	68	30,365	286	48,624	21	3,600	375	82,589
Jaffna Peninsula*	4	700	148	18,498	9	880	161	20,078
Eastern	10	3,017	147	20,252	—	—	157	23,269
Central	37	8,633	217	26,651	—	—	254	35,284
Sabaragamuwa	24	6,640	176	26,337	7	825	207	33,802
Southern	11	6,254	103	18,876	15	2,445	129	27,575
Uva	4	806	63	6,468	18	1,348	85	8,622
Total	165	57,565	1,259	177,098	76	10,102	1,500	244,765

Number of pieces of literature distributed: 18,113.

\* Work not completed.

*Central Laboratory.*—Laboratory examinations constitute one of the best indicators of the progress which is being made by treatment as well as the efficiency of the dosages given. Both estate and school units collected fecal specimens and posted them to the central laboratory in Colombo for examination. As in 1926, all specimens were examined by the Stoll egg-counting method. Only soft-formed stools were examined—all others being discarded—as this tended to give uniformity in results. Specimens negative by the Stoll method were further examined by the salt flotation method to determine incidence rates. Table No. 10 shows the microscopical work done by the egg-count method.

Table No. 10.—Microscopical Examinations made during 1927 using Egg-Count Method only, both before and 15 Days after Treatment.

	Before Treatment.					After Treatment.				
	No. of Persons Examined.	Total Egg-Count.	Average per Gram per Person.	Positives.	Percentage Infected.	No. of Persons Examined.	Total Egg-Count.	Average per Gram per Person.	Positives.	Percentage Infected.
School Children—										
Central Province	1,997	9,583	719	1,806	90.4	1,397	2,563	261	835	59.8
Jaffna Peninsula	1,390	5,406	583	1,180	84.9	300	365	182	155	51.7
Northern Province	578	1,758	456	425	73.5	97	108	167	48	49.5
Province of North-Central	498	2,929	882	459	92.9	475	586	185	267	56.2
Southern Province	939	3,384	540	781	83.2	361	387	161	200	55.4
Province of Sabaragamuwa	1,817	8,304	685	1,620	89.2	1,760	2,007	171	913	51.9
Province of Uva	123	637	776	109	88.6	179	400	335	116	64.8
Batticaloa District	1,942	11,286	871	1,834	94.4	376	570	227	203	54.0
Western Province	3,051	15,491	762	2,869	94.0	553	962	261	306	55.3
Total	12,335	58,778	714	11,083	89.9	5,498	7,948	217	3,043	55.3

Table No. 10.—Microscopical Examinations made during 1927 using Egg-Count Method only, both before and 15 Days after Treatment.—*contd.*

	Before Treatment.					After Treatment.				
	No. of Persons Examined.	Total Egg-Count.	Average per Gram per Person.	Positives.	Percentage Infected.	No. of Persons Examined.	Total Egg-Count.	Average per Gram per Person.	Positives.	Percentage Infected.
Estate Labourers—										
Dimbula	1,437	3,693	385	1,036	72.1	1,455	1,270	130	697	47.9
Matale	784	3,123	597	668	85.2	220	166	113	111	50.5
Dikoya	811	2,867	530	727	89.6	628	791	118	335	53.3
Maskeliya	681	2,039	449	595	82.1	118	100	127	58	49.2
Nuwara Eliya	469	2,226	711	417	88.9	216	141	98	95	44.0
Uda Pussellawa	271	1,312	726	238	87.8	439	341	116	218	49.7
Maturata	318	1,033	485	266	83.6	—	—	—	—	—
Kandy	803	4,106	766	758	94.4	—	—	—	—	—
Kelani Valley	666	3,140	707	623	93.5	199	264	199	112	56.3
Ratnapura	147	795	811	129	87.8	551	890	242	342	62.1
Kegalla	499	2,585	777	471	94.5	102	234	344	53	51.9
Uva	1,042	2,770	398	768	73.7	249	154	92	126	50.6
Galle	166	728	657	154	92.8	—	—	—	—	—
Kurunegala	359	1,933	807	339	94.4	52	85	245	28	53.8
Kalutara	807	8,343	1,550	742	91.9	52	70	201	33	63.5
Total	*9,260	40,693	659	7,931	85.6	4,281	4,506	157	2,208	51.6
Villagers	†1,460	5,830	599	1,194	81.7	70	52	111	40	57.1
Grand Total	23,055	105,301	685	20,208	87.7	9,849	12,506	190	5,291	53.7

\* 4,150 persons had been treated in previous years. † 210 persons had been treated in previous years.



It will be seen that the average egg-count per gram per person in school children was 714 before and 217 after treatment; for estate labourers 659 before and 157 after; for villagers 599 before and 111 after, and for the country as a whole 685 before and 190 after. All these "after" figures indicate that the treatment has been effective and the disease has been reduced in intensity. In the absence of sanitation, however, these figures rapidly increase with each passing month. The laboratory is thus able to keep a check on the progress which is being made by treatment; and its services may be utilized without charge by any one wishing to have examinations made.

In making hookworm examinations other parasitic ova are found and these are recorded as incidental findings. No definite search is made for other parasites. Table No. 11 shows the incidental findings and the total examinations made during the year.

Table No. 11.—Intestinal Parasites found in the Course of Microscopical Examinations made in the Central Laboratory during the Year 1927. (Incidental Findings.)

	Before Treatment.		After Treatment.	
	Number.	Percentage Infected.	Number.	Percentage Infected.
Total examination: 35,471				
Persons examined ..	24,816	—	10,655	—
Infected with hookworm ..	21,335	86.0	5,701	53.5
Infected with <i>Ascaris Lumbricoides</i> ..	21,495	86.6	8,108	76.2
Infected with <i>Trichuris Trichuria</i> ..	16,189	65.2	5,648	53.0
Infected with <i>Enterobius Verm. (Oxyuris)</i> ..	392	1.6	146	1.4
Infected with <i>Taenia</i> ..	27	.1	24	.2

**Methods of Treatment and Drugs used.**—Carbon tetrachloride and oil of chenopodium were used exclusively as anthelmintics; magnesium sulphate and castor oil as purgatives. As a rule children under 10 were given chenopodium only as that drug is most effective in removing roundworms. For those above 10 years, the combined treatment of carbon tetrachloride and chenopodium was administered in the proportion of 2 to 1 for those up to 18 years of age, and 3 to 1 thereafter, the maximum dose of the combination being 45 minims. The strength of magnesium sulphate solution was 1 part of salts to 3 of water; the maximum dose of the mixture being 3½ ounces. Fresh mixtures of carbon tetrachloride and chenopodium were given in an efficient dose of magnesium sulphate solution usually on an empty stomach. Those who had a morning meal were treated 2 hours thereafter. In most cases only one treatment was given. The dosage table, included in the 1926 Report, is still followed.

For campaign reasons the following persons were usually exempted from treatment:—(1) children under 2 years of age, (2) epileptics, (3) alcoholics, (4) persons suffering from acute febrile diseases or obviously in poor physical condition. Pregnancy is not considered as a contra-indication for treatment; in fact it is sometimes advantageous to treat pregnant women who are heavily infected. Medical Officers will need to use their best judgment in treating such cases.

**After-care of those Treated.**—The difficulties arising from treatment are frequently due to a failure to follow instructions after treatment has been given and the patients have left for home. To overcome that difficulty full instructions are given verbally in English and the vernaculars stressing the importance of purgation and care in diet after treatment. In addition, a special dispenser is left in an area for 48 hours when the campaign moves to another district in order to answer any calls which might need to be made. The medical officer and dispenser are always available in emergencies.

To take care of those who get sick after treatment, the following memorandum on chenopodium and carbon tetrachloride was circulated to all field medical officers:—

#### *Oil of Chenopodium.*

The active principle of the oil of chenopodium is ascaridol and its toxic effect is upon the central nervous system.

Mixed with bile, oil of chenopodium is readily absorbed hence it is best not to starve patients before treatment. Mixed with fats its absorption is retarded. In children under 6 or 7 years it is best to administer the drug *mixed with castor oil*.

It should be remembered that if oil of chenopodium is to be administered, preliminary starvation is not recommended; it would be better to insist on a good evening meal the day previous to treatment.

**Symptoms of Poisoning.**—The mild symptoms are headache, dizziness, deafness, and tingling of the fingers. Symptoms may arise soon after treatment and prostration may follow in a very short time with coma and convulsions and death.

**Treatment.**—When symptoms of poisoning develop it is essential that *immediate* evacuation of the bowels be obtained, and vigorous measures for this purpose should be at once instituted. This can be best achieved by copious and repeated enemas of soapsuds or magnesium sulphate. Success depends solely on the prompt measures undertaken at the very onset of the warning symptoms. Keep the patients warm and quiet, administer stimulants, and symptomatic treatment as indicated.



*General Remarks.*—Insist on a good evening meal the day previous to treatment. Those treated should be kept under observation till everyone has had a free purge. A good evacuation of the bowels should occur within three to four hours after treatment. The interval between treatments of oil of chenopodium should be at least 14 days.

*Carbon Tetrachloride.*—The toxic effect of carbon tetrachloride manifests itself mainly in a central necrosis of the liver. Carbohydrate food gives protection against liver damage and is therefore a prophylactic measure in the administration of this drug.

*Symptoms of Poisoning.*—Symptoms may develop in 24 to 48 hours, such as pain in abdomen, vomiting of bile-colored fluid, headache, elevation of temperature, tenderness in hepatic and epigastric regions, enlargement of liver, jaundice, and sometimes convulsions. The yellow tinge of conjunctiva may be missed unless carefully looked for. Urine may contain albumen, cellular elements, and bile.

*Treatment.*—When symptoms of poisoning by carbon tetrachloride develop treatment must be vigorous and intense. The object is to offset the liver damage by introducing carbohydrates in the form of glucose.

I. (a) Diluted glucose should be administered by mouth, beginning with very small quantities. As the nausea decreases the dosage may be increased. In hospitals, consideration may be given to administering glucose per rectum 5 per cent. or intravenously as indicated.

(b) Soda bicarb. in 30 gr. doses daily may be given to combat acidosis.

II. (c) *Calcium.*—Recently it has been shown in laboratory experiments that carbon tetrachloride poisoning brings about a deficiency of calcium in the blood. Bile pigments combine with the calcium resulting in a depletion of calcium in the tissues and its increased elimination. To offset this calcium deficiency the following procedures have been suggested:—

Calcium chloride or ammon chloride 1 gram (15 gr.) should be given by mouth or stomach tube every 3 or 4 hours for at least 2 days even if symptoms of intoxication disappear. After two days one must reduce the dose if the patient is better and also be on the watch for air hunger and other signs of acidosis.

(d) Parathyroid extract may be given together with the oral therapy by injecting 20 units subcutaneously two or three times a day for not over 3 days. (Prolonged treatment will cause severe calcium poisoning.)

*General Remarks.*—Note that the symptoms of poisoning may be delayed up to 48 hours and that carbohydrate diet gives protection against liver damage. Glucose may be combined with calcium or ammon chloride for administration by mouth. Mal-nourished children may indicate a deficiency in calcium and this deficiency may be a causative factor in the intoxication. Prophylactic calcium may be given to such cases, or treatment with chenopodium may be substituted.

Pregnant women usually react favourably to carbon tetrachloride treatment. Pregnancy need not be considered as a contra-indication to treatment with carbon tetrachloride. Medical Officers may therefore use their best judgment in treating such cases.

#### *Differential points between Chenopodium and Carbon Tetrachloride Poisoning.*

##### *Oil of Chenopodium—*

- (1) Acts on the central nervous system.
- (2) Nervous symptoms more common.
- (3) Symptoms may develop within a short time after administration.
- (4) Rapid evacuation of bowels and symptomatic treatment indicated.

##### *Carbon Tetrachloride—*

- (1) Acts mainly on the liver.
- (2) Abdominal symptoms and jaundice.
- (3) Symptoms may be delayed up to 48 hours.
- (4) Carbohydrate diet, calcium or ammonium chloride, and glucose treatment effective.

In anthelmintic medication dispensers should always have with them in addition to their regular equipment—

- (a) An enema syringe.
- (b) Glucose.
- (c) Soda bicarb.
- (d) Calcium or ammonium chloride.

*Sanitation.*—To quote from the 1926 Report, "All operations against hookworm disease are, and will be, inadequate, unless it is appreciated by those concerned that ultimate control will come only with the establishment of sanitation." Heretofore Campaign medical officers in the course of their usual field duties have not been permitted to introduce essential sanitary measures. This function has always been performed by officers in the Department of the Assistant Director of Sanitary Services. It gives much pleasure therefore to record that from January, 1928, the hookworm work in its entirety, treatment and sanitation, will be taken over and carried on by officers in that Department. This important step gives emphasis to the fundamental fact that hookworm disease throughout the country will henceforth be attacked by vigorous sanitation procedures as well as by treatment, and that the sanitation programme and the treatment programme will be co-ordinated by medical officers who are responsible for both features of the work.



*School.*—Some of the sanitation work done in connection with the school units is shown in the following table:—

Table No. 12.—Sanitation Information Reported by School Units at Schools in Various Provinces in 1927.

Province.	No. of Schools.		Latrines.							*Erected in 1927.
	In Province.	Visited.	No.	Pit.	Bucket.	Other.	Used.	Main-tained.	Evident Soil Pollution.	
N. P. (Jaffna Peninsula)	368..	171..	60..	33..	27..	—	57..	56..	41..	22
N. P. (Mainland)	80..	43..	12..	7..	5..	—	11..	11..	—	—
North-Central	66..	80..	44..	40..	4..	—	44..	44..	—	—
Eastern: Batticaloa										
District	138..	123..	39..	31..	8..	—	36..	39..	—	31
Central	318..	216..	194..	149..	45..	—	191..	180..	6..	9
Uva	72..	63..	59..	48..	11..	—	58..	57..	6..	1
Sabaragamuwa	234..	176..	159..	151..	8..	—	156..	152..	1..	36
Western	954..	332..	281..	199..	73..	9..	275..	270..	24..	49
Southern	416..	85..	73..	62..	11..	—	68..	68..	14..	14
Total	2,646	1,289	921	720	192	9	896	877	92	162

\* Information furnished by the Assistant Director of Sanitary Services.

*Estate.*—The sanitary condition on 200 estates in Central and Uva Provinces is shown in the Table No. 13. This information was furnished by the courtesy of the Inspecting Medical Officers in the Central and Uva Provinces and is based on their routine inspections during the year.

Table No. 13.—Sanitary Conditions found by the Inspecting Medical Officers on 200 Estates visited by them in 1927 in the Central and Uva Provinces.

Province.	No. of Estates Visited.	Population.	No. of Latrine Compartments.		General Sanitary Condition.						Dispensers employed.		
			Found.	Requ-ired.	Very Good.	Good.	Very Fair.	Fair.	Poor.	Bad.	Yes.	Shared.	None.
Central	162	45,275	2,950	1,108	3	27	23	49	36	24	38	35	89
Uva	38	15,187	1,232	358	4	17	—	17	—	—	17	—	21
Total	200	60,462	4,182	1,866	7	44	23	66	36	24	55	35	110

A comparison of these figures with those collected in the Central Province in 1926 is shown.

Table No. 14.—A Comparison of Figures furnished by Inspecting Medical Officers in 1926 and 1927.

Year.	No. of Estates Visited.	Population.	No. of Latrine Compartments.		General Sanitary Condition.						Dispensers employed.		
			Found.	Requ-ired.	Very Good.	Good.	Very Fair.	Fair.	Poor.	Bad.	Yes.	Shared.	None.
1927	200	60,462	4,182	1,866	7	44	23	66	36	24	55	35	110
1926	221	40,509	2,070	2,118	1	22	7	71	24	96	76	144	—

The proportion of the number of latrines found to those required is much higher in 1927 than in 1926. In 1926 the general sanitary condition was as much as fair on 101 estates and poor to bad on 120; in 1927 the figures are 140 and 60 respectively. A fewer number of dispensers are shared in 1927. It would appear that sanitary progress on estates is being continued and improved with each succeeding year.

*Village.*—Special treatment and sanitation work has been done in several small areas in the Western Province in past years. These areas were visited during the year, and the situation found is shown in Table No. 15.

Table No. 15.—Census, Houses, Latrines, and Sanitary Inspectors in Horana, Gampaha, and Veyangoda Village Areas in 1926.

Area.	Census, 1921.	No. of Houses, 1921 Census.	Number of Latrines Built.*				Number of Sanitary Inspectors Employed.*	
			Prior to 1926.	During 1926.	During 1927.	Total.	1926.	1927.
<i>Western Province.</i>								
Horana ..	.. 32,002	.. 6,177	.. 1,492	.. 201	.. 222	.. 1,915	.. 5	.. 6
Gampaha ..	.. 18,718	.. 3,701	.. 1,414	.. 93	.. 17	.. 1,524	.. 5	.. 3
Veyangoda ..	.. 24,871	.. 5,065	.. 2,484	.. 142	.. 63	.. 2,689	.. 8	.. 7
Total	.. 75,591	14,943	5,390	436	302	6,128	18	16

\* Figures were supplied by the Assistant Director of Sanitary Services.



Egg-count figures for Gampaha and Veyangoda are not available, but the average for the Western Province is 762, while that of Horana is 442. This would indicate that sanitation is being maintained at Horana as there is also an increase in the number of latrines erected and in the number of Sanitary Inspectors assigned to the area. No treatment work has been done at Horana since May, 1926.

From January, 1928, the hookworm campaign work will be carried on by the Office of the Assistant Director of Sanitary Services. In view of this proper and important change, there is every reason to conclude that still greater strides will be made in sanitation with each succeeding year.

February 7, 1928.

W. P. JACOBS,  
Director, Anchylostomiasis Campaigns.

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## APPENDIX.

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### ADMINISTRATIVE ORGANIZATION—PERSONNEL.

#### *Assistant Director.*

Dr. A. T. Kuriyan, January 1, 1927-December 31, 1927.

#### *Junior Medical Officers.*

Dr. E. Jayatilleke, January 1, 1927-December 31, 1927.

Dr. L. O. Abeyratna, January 1, 1927-September 17, 1927.

Dr. S. C. Manikavasager, January 1, 1927-December 31, 1927.

Dr. S. N. Chelliah, January 1, 1927-December 31, 1927.

Dr. P. A. M. Jayawardena, January 1, 1927-December 31, 1927.

Dr. S. G. Jackson, January 1, 1927-June 17, 1927.

Dr. K. Kanagaratnam, January 1, 1927-December 31, 1927.

Dr. A. W. Rasiah, July 4, 1927-December 31, 1927.

Dr. S. F. Jayawardena, September 14, 1927-December 31, 1927.

Dr. D. C. Amarasingha, October 13, 1927-December 31, 1927.

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LIST OF MAPS (facing page).

Work done by School Units.  
Work done by Estate Units.

LIST OF PHOTOGRAPHS (facing page).

- I.—Advanced cases of hookworm disease in a boy and girl from an up-country estate.
- II.—Lecturing at market fair.
- III.—Very small estate children taking treatment from Campaign dispenser.
- IV.—Administering treatment—Sanitary Inspector, who is under training for health unit work, learning the methods used in the Campaign.
- V.—Treatment day at Beddewela boys' and girls' school.
- VI.—Estate labourers collected in a specially built shed for treatment.
- VII.—Latrine over sea in the Northern Province.
- VIII.—Public latrine, a type common to Sanitary and Local Board towns.



## SCHOOL UNITS

Area Covered  
During Year

## ANCHYLOSTOMIASIS CAMPAIGNS

## CEYLON

1927

Scale, 24 Miles to an Inch

## REFERENCE

Northern Province	N. P.
North Central Province	N. C. P.
North Western Province	N. W. P.
Eastern Province	E. P.
Central Province	C. P.
Province of Uva	U. V. A.
Western Province	W. P.
Province of Sabaragamuwa	S. A. B.
Southern Province	S. P.

Roads

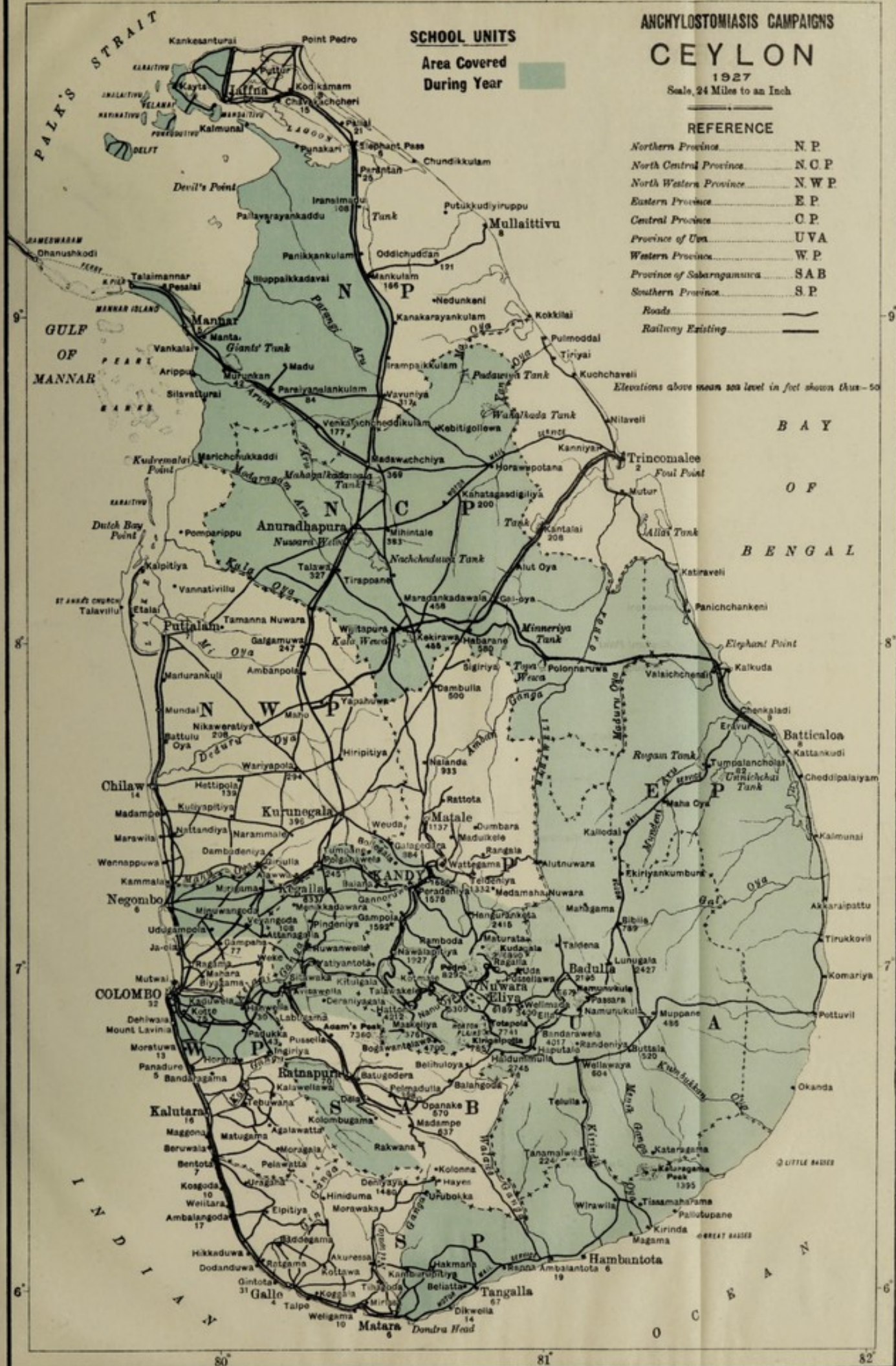
Railways Existing

Elevations above mean sea level in feet shown thus—50

BAY

OF

BENGAL





## REFERENCE

Northern Province  
 North Central Province  
 North Western Province  
 Eastern Province  
 Central Province  
 Province of Uva  
 Western Province  
 Province of Sabaragamuwa  
 Southern Province  
 Islands  
 Railway Ministry

SCHOOL UNITS  
Area Covered  
During Year





## ESTATE UNITS

Area Covered  
During Year

## ANCHYLOSTOMIASIS CAMPAIGNS

## CEYLON

1927

Scale, 24 Miles to an Inch

## REFERENCE

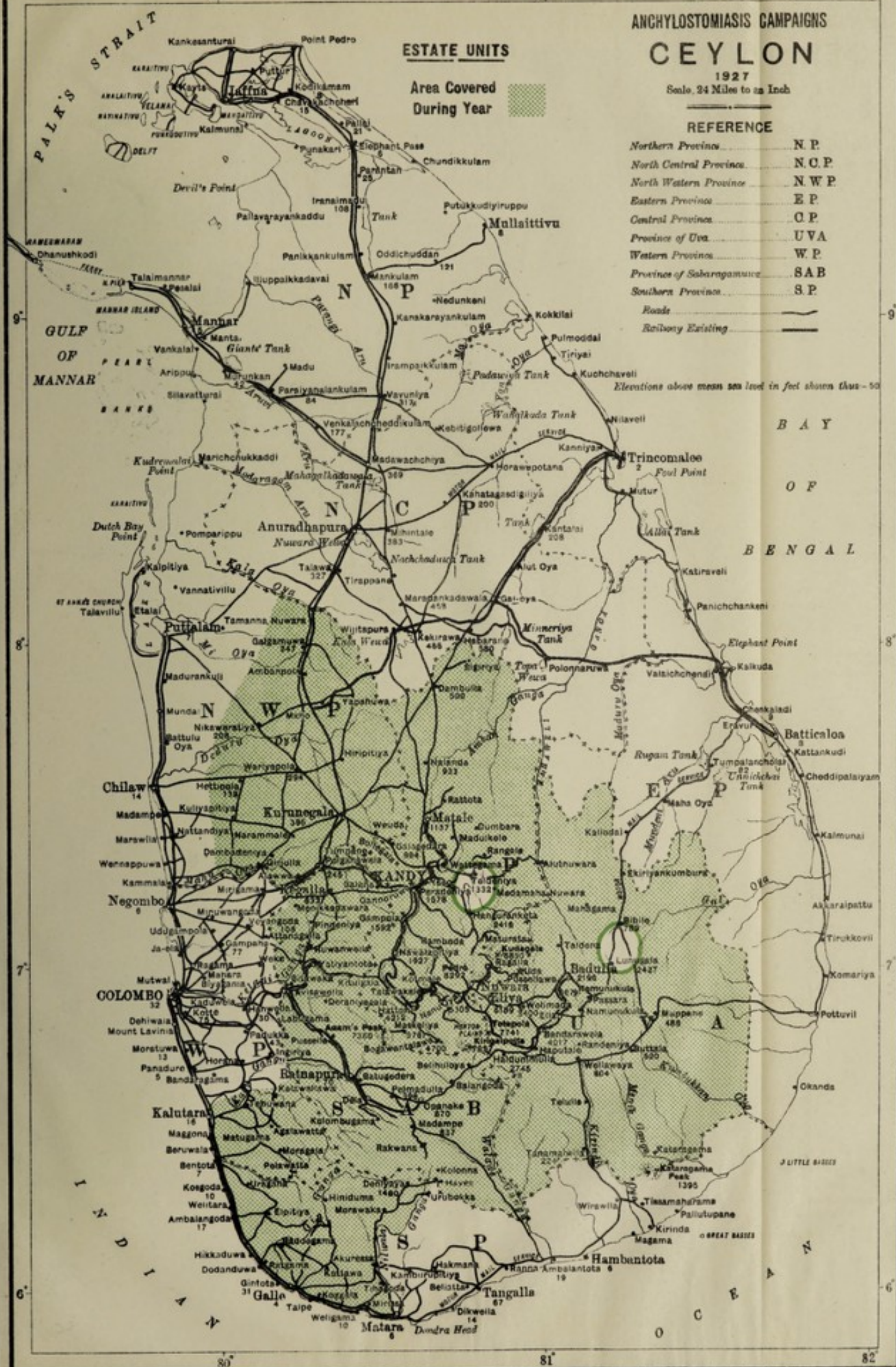
Northern Province	N.P.
North Central Province	N.C.P.
North Western Province	N.W.P.
Eastern Province	E.P.
Central Province	C.P.
Province of Uva	U.V.A.
Western Province	W.P.
Province of Sabaragamuwa	S.A.B.
Southern Province	S.P.
Road	—
Railway Existing	—

Elevations above mean sea level in feet shown thus - 50

BAY

OF

BENGAL





# CEYLON

1927  
Scale 1:100,000

## REFERENCE

- N.P. Northern Province
- N.C.P. North Central Province
- N.W.P. North Western Province
- E.P. Eastern Province
- C.P. Central Province
- U.V.A. Province of Uva
- W.P. Western Province
- S.A.B. Province of Sabaragamuwa
- S.P. Southern Province
- Road
- Railway

## ESTATE UNITS

Area Covered  
During Year







I.—Advanced cases of hookworm disease in a boy and girl from an up-country estate.



II.—Lecturing at Market Fair. Weekly community marketings are popular in Ceylon. Note produce on ground.





III.—Very small estate children taking treatment from campaign dispenser.



IV.—Administering treatment—Sanitary Inspector, who is under training for Health Unit work, learning the methods used in the campaign.





V.—Treatment day at Beddewela Boys' and Girls' School.

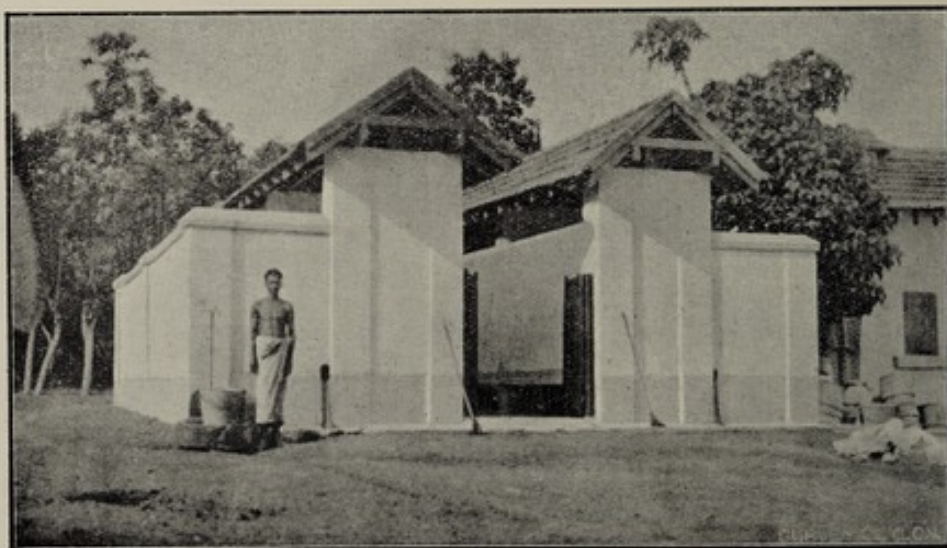


VI.—Estate labourers collected in a specially built shed for treatment.





VII.—Latrine over sea in the Northern Province.



VIII.—Public latrine, a type common to Sanitary and Local Board towns.



7-11110-1

and a "Report on Studies and Experiments in Linguistics" has been submitted to Congress.

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1. The first section of the report is a general statement of the purpose of the study and the results of the investigation. It is followed by a description of the methods used in the study, including the selection of subjects, the design of the experiment, and the procedures for data collection and analysis. The results are then presented in a series of tables and figures, which are accompanied by a detailed discussion of the findings. The report concludes with a summary of the main results and a list of references.



## 2.—Report of the Medical Entomologist for the Year 1927.

**Staff.**—The Medical Entomologist, 8 Entomological Assistants, 2 Laboratory Assistants (Grade II.), 2 Laboratory Attendants, 1 Clerk (Class III.), 6 Field Attendants ('Mosquito Catchers'), and 3 coolies.

The reorganization of the Anti-Malaria Division proposed by the Director of Medical and Sanitary Services and approved by the Malaria Advisory Committee in December, 1926 (see Report for the year 1926), was effected during the current year. The Malaria Departmental Committee, formed for the purpose of inaugurating and administering the various anti-malaria campaigns, held fifteen meetings during the year. Dr. K. J. Rustomjee, who had been recommended for the post of executive officer to the Departmental Committee, was formally appointed Superintendent of Anti-Malaria Campaigns in June, 1927.

The other Medical Officers who had previously been attached to me as Malariologist were transferred to the Campaign Branch, under Dr. Rustomjee, early in the year.

Most of the Entomological Assistants have been stationed throughout the year at the towns—Anuradhapura, Kurunegala, and Chilaw—where malaria preventive work is in progress. Their work has not been confined to entomology owing to lack of trained men for campaign work, and it has been necessary to second some of them for supervision of preventive measures under the Superintendent.

In November, 1927, an additional Laboratory Assistant (Mr. A. L. Johnpulle) was appointed. This appointment was very necessary as the amount of routine work associated with the various mosquito surveys and campaign measures had become excessive and had already reached a stage impossible for Mr. D. de Silva, my capable senior assistant, to cope with in addition to his other numerous duties.

**Lectures, &c.**—During March and April and September and October tuition in medical entomology and blood work was given to two assistants selected in connection with the scheme for the training of technicians for district laboratories.

From June to December a course of lectures relating to Tropical Parasitology was given to students at the Medical College during the absence of Dr. L. Nicholls, on leave.

In December lectures and demonstrations on Insect Carriers of Disease to a Training Class for Sanitary Inspectors held by the Sanitary Division of the Department were commenced.

**Mosquito Ordinance.**—The Sub-Committee appointed by the Malaria Advisory Committee in December, 1926, to consider and revise the draft Ordinance, and consisting of the Hon. Mr. Canagaratnam, the Assistant Director of Sanitary Services, the Director of the Bacteriological Institute, and the Medical Entomologist, met on three occasions and in October submitted their proposals to the Advisory Committee. Subsequently the draft Ordinance as revised was forwarded to Government for approval.

**Publications and Reports.**—During the year the following publications have been issued:—

- (1) Report on Malaria and Anopheline Mosquitoes in Ceylon. Sessional Paper VII. of 1927.
- (2) Report on Malaria and Mosquitoes at Dumbara Valley. In Sessional Paper XXVIII. of 1927 on the proposed University for Ceylon.

And a "Report on Malaria and Mosquitoes at Diyatalawa" has been submitted to Government.

**Research.**—Investigatory work during the year has been directed chiefly towards (a) the definite incrimination of the indigenous malaria-carrying Anopheline mosquitoes and (b) the determination of the entomological factors associated with the dissemination of malaria in those towns in which preventive measures have been inaugurated.

1. **Natural Infectivity of Indigenous Anophelines.**—Much of the work performed in this connection was carried out in collaboration with Dr. W. P. Jacocks (representative in Ceylon of the International Health Division of the Rockefeller Foundation), several villages and estates situated in known malarious areas in the low-country (below 600 feet) being visited in the course of the year. The work was limited to the period of the north-east monsoon. In the majority of cases the investigations were completed on the spot, but in the case of Chilaw, which is within comparatively easy reach of Colombo, the dissections were made at the Central Laboratory.

A total of 1,440 mosquitoes were dissected, and whenever possible the gut and glands of each specimen were examined. These mosquitoes were all captured in village houses or huts or in coolie lines during the mornings; they were then placed in glass cylinders and fed on raisins until ready for dissection. The examinations were commenced two days after capture.

Table I., on page 63, summarises the work done and the results so far obtained.

Of the seven species of Anopheles examined, natural infection with malaria parasites was observed in *A. culicifacies* only. This species, however, was predominant at the time in the huts and lines searched and formed approximately 80 per cent. of those examined. *A. subpictus* was, however, more commonly present than is indicated in the table, and the figures given for village captures of this species are not representative, as selection in favour of *A. culicifacies* was exercised on these occasions. The other species mentioned were not frequently found, and the numbers examined are too small to afford any evidence regarding their relation to the transmission of malaria.

The infection rate (gut and gland infections) in *A. culicifacies* varied from nil in the case of the village examinations to 4.8 per cent., 2.6 per cent., and 7.6 per cent. in the cases of the three estates. The sporozoite rates in the estate series ranged from 0.6 per cent. to 6.1 per cent. Simultaneous infections of the gut and glands were observed in two specimens.

2. **The Prevalence of Anopheline Mosquitoes in Various Types of Resting Places.**—In connection with the above investigations and the difficulty experienced in obtaining suitable supplies of adults of many species for dissection purposes, a series of observations on various



Table I.—Natural Infections of Anopheline Mosquitoes.

Locality.	Date.	A. culicifacies.						A. listoni.						A. subpictus.						Other Species.*					
		Guts.			Glands.			Guts.			Glands.			Guts.			Glands.			Guts.			Glands.		
		No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.	No.	No.	Pos.
Horowpotana village	December, 1926, to January, 1927	367	..	..	345	..	..	20	..	..	18	..	..	180	..	..	152	..	..	49	..	..	48	..	..
Ridigama village	October–November, 1927	138	..	..	136	..	..	..	..	..	..	..	..	3	..	..	3	..	..	..	..	..	..	..	..
Pangala estate (Ridigama)	November, 1927	229	..	8	218	..	4	..	..	..	..	..	..	1	..	..	1	..	..	..	..	..	..	..	..
Ridigama estate	November, 1927	192	..	4	180	..	1	..	..	..	..	..	..	16	..	..	14	..	..	2	..	..	2	..	..
East Lynne estate (Ch'law)	December, 1927	197	..	4	196	..	12	..	4	..	4	..	..	33	..	..	33	..	..	2	..	..	2	..	..
Total		1,123	..	16	1,075	..	17	..	24	..	22	..	..	233	..	..	203	..	..	53	..	..	52	..	..

\* These included *A. barbirostris* (7); *A. hyrcanus* (15); *A. fuliginosus* (17); and *A. jamaesi* (14).



types of apparently suitable resting places of mosquitoes was made. This work was undertaken in several localities whenever opportunity offered, but was done mainly at the towns of Kurunegala and Chilaw.

The observations at Kurunegala were made during the period July to October, and at Chilaw from September to December, 1927; in both cases unfortunately the work had then to be stopped owing to the services of the assistants being required in connection with campaign work. The collection of adult mosquitoes from the different places selected was carried out during the mornings (from 7 A.M. to 9 A.M.); at Kurunegala each situation was examined (10 minutes) three times during the week, and at Chilaw twice each week. So far as was possible the situations selected were distributed evenly throughout the urban and rural or semi-rural areas of each town. The places examined included bungalows, huts, cattle sheds, culverts, the sides of earth drains and cuttings, and undergrowth.

A total of 5,869 mosquitoes (Kurunegala 2,921, Chilaw 2,948) were collected and identified. Of these, approximately 87 per cent. were Culicines, the most abundant species being *Culex fatigans*, *C. sitiens* (at Chilaw), *C. tritaneniorhynchus*, *C. vishnui*, *C. gelidus*, and *C. (Lophoceratomyia) minutissima*. The Anophelines obtained numbered only 791, of which 126 were found at Kurunegala and 665 at Chilaw. The predominating species in each town was *A. subpictus*, of which over 500 specimens were obtained. *A. barbirostris* (170 examples) was not infrequently found in bungalows and huts at Chilaw during November and December. Other species captured were *A. listoni*, *A. culicifacies*, *A. hyrcanus*, *A. tessellatus*, *A. jamesi*, *A. maculatus*, *A. fuliginosus*, and *A. Karwari*; none of these were numerous at any time during the period of observation. The great majority of the Anophelines obtained were found in bungalows, huts, and in an enclosed cattle shed at Chilaw. Open cattle sheds (the usual type in Ceylon) were not productive situations. Natural resting places in the vicinity of houses, such as culverts, cool, moist places on the sides of drains and cuttings, and undergrowth did not, on the whole, appear to offer very suitable conditions for shelter; and except in certain earth drains at Kurunegala very few specimens were found. This, however, may be due to the increased chances of dispersion which offer outside buildings, and to the greater difficulties attending detection and capture. In two or three of the drains under observation at Kurunegala, and in others at the village of Giriulla, several species—including engorged females—of *Anopheles* were caught, notably *A. listoni* and *A. tessellatus*.

Further observations on these lines will be made when opportunity occurs, and if possible they will be carried on throughout a complete year. Those recorded above had unfortunately to be discontinued either shortly before or at the commencement of the rainy season.

3. *Anopheline Survey of Chilaw*.—A detailed survey for breeding places of Anophelines, preparatory to the introduction of preventive measures, was undertaken at Chilaw during the period March to July, 1927. For this purpose the town was divided into 8 sections and 24 sub-sections; all potential breeding places were examined and the larvae forwarded to the Colombo laboratory for identification. The findings were indexed and subsequently recorded on large scale maps.

Summaries of the results are given in the following tables:—

Table II.—Breeding Places of Anopheline Mosquitoes, Chilaw, March to July, 1927.

Type of Breeding Place.	Number Examined.	Number with Anopheles Larvae.	Per Cent. with Anopheles Larvae.
Pools .. ..	243	177	73.0
Swamps .. ..	40	29	72.5
Streams* .. ..	17	13	76.5
Puddles .. ..	38	13	34.2
Earth drains .. ..	59	39	66.0
Coconut trenches .. ..	335	216	64.5
Borrow pits .. ..	142	89	62.6
Gala wells .. ..	124	82	66.2
Built wells .. ..	268	92	34.3
Earth wells .. ..	36	14	38.9
Lagoon* .. ..	17	1	5.9
Miscellaneous† .. ..	26	3	11.5
Total .. ..	1,345	768	57.1

\* In the cases of streams and the lagoon, each was regarded as a separate breeding place in the different sub-section; actually there were three streams and a canal.

† Includes seepage from lagoon, cement drains, artificial containers, &c.

(See page 65 for Table III.)

The relative percentage prevalence of identified larvae (*i.e.*, excluding first instar larvae) in ground water collections and streams, and in wells, for the period March-July was as follows:—

(a) Ground water collections and streams—

<i>A. subpictus</i> .. ..	32.60
<i>A. listoni</i> .. ..	20.60
<i>A. hyrcanus</i> .. ..	20.10
<i>A. barbirostris</i> .. ..	15.60
<i>A. jamesi</i> .. ..	5.40
<i>A. fuliginosus</i> .. ..	4.75
Other species .. ..	0.95
	100.00



Table III.—Relative Prevalence of Anopheles Larvae in Various Types of Breeding Places, Chilaw, March-July, 1927.

Type of breeding Place.	No. of Samples taken.	Species of Anopheles—Numbers of Larvae and Rates per 100 Samples.															
		All Species.	A. listoni.	A. subpietus.	A. hyrcanus.	A. barbirostris.	A. jamesi.	A. fuliginosus.	Other Species.	First Instar.							
Pools	14,732	3,285	22.30	409	2.78	506	3.44	648	4.41	341	2.31	399	2.71	44	0.30	320	2.16
Swamps	4,395	747	17.05	428	9.75	135	3.08	112	2.56	21	0.48	1	0.02	1	0.02	27	0.62
Streams	1,770	1,316	74.42	817	46.30	21	1.18	79	4.47	1	0.05	1	0.05	—	—	378	21.30
Puddles	832	217	26.10	164	19.72	7	0.84	31	3.74	—	—	—	—	2	0.24	12	1.44
Earth drains	4,112	893	21.72	476	11.60	107	2.60	56	1.36	23	0.56	4	0.10	5	0.12	60	1.44
Coconut trenches	24,945	3,239	13.00	709	2.84	625	2.50	544	2.18	77	0.38	16	0.01	33	0.13	212	0.85
Borrow pits	2,900	977	33.75	239	8.24	115	3.97	165	5.70	21	0.73	62	2.14	14	0.50	44	1.53
Gala wells	6,441	1,312	20.16	266	4.15	639	9.98	43	0.67	101	1.58	25	0.39	7	0.10	182	2.82
Totals	60,127	11,986	19.94	3,508	5.84	2,155	3.59	1,678	2.80	585	0.97	508	0.85	106	0.17	1,235	2.03
Built wells	1,578	729	46.20	92	5.84	15	0.95	29	1.84	1	0.06	4	0.25	27	1.71	173	10.95
Earth wells	212	266	125.50	45	21.20	4	1.88	9	4.25	—	—	29	13.68	—	—	66	31.19
Totals	1,790	995	55.60	137	7.65	19	1.06	38	2.12	1	0.06	33	1.84	27	1.51	239	13.36
Lagoon	3,535	7	0.20	6	0.17	—	—	—	—	—	—	—	—	—	—	1	0.03
Miscellaneous	499	22	4.40	6	1.20	11	2.20	1	0.20	—	—	—	—	1	0.20	2	0.40



## (b) Wells—

<i>A. listoni</i>	..	..	..	..	66.30
<i>A. subpictus</i>	..	..	..	..	18.10
<i>A. barbirostris</i>	..	..	..	..	5.02
<i>A. fuliginosus</i>	..	..	..	..	4.36
<i>A. hyrcanus</i>	..	..	..	..	2.50
<i>A. jamesi</i>	..	..	..	..	0.14
Other species	..	..	..	..	3.58
					<hr/> 100.00

Larvae of *A. culicifacies* were found only occasionally during the period of examination and in small numbers.

An analysis of the findings in areas determined by their relation to the sea or lagoon is given below:—

Table IV.—Anopheles Survey, Chilaw, March-July, 1927.

Area.	No. of Situations Examined.	Situations with Anophelines.		No. of Samples taken.	Total Larvae found.
		No.	Per Cent.		
Beach* (sub-sections IA-IC and IIA-IID)	83	6	7.2	5,353	105
Town proper (sub-section VI. A-C)	111	29	26.1	2,101	447
Proximity of Lagoon E. (Sub-sections IIIA-C, VIIA, and VIIC, excluding VIA and B in town area above)	266	139	52.4	20,325	2,638
Rural areas not bordering lagoon (sub-sections IVA-B, VA-C, VIIB and D, VIIIA-B)	885	595	67.2	38,172	9,820
Totals	1,345	769	57.2	65,951	13,010

\* The beach area comprises a somewhat narrow and sparsely inhabited strip of land separated from the town by the lagoon. The area referred to as the "town proper" is relatively small and densely populated; it adjoins the lagoon on the west and extends some 600 yards eastwards. The third area—"proximity of lagoon"—is semi-rural in character and includes the rest of the town area bordering the lagoon; it extends inwards for a distance of approximately 300 yards. The rural or semi-rural area remote from the lagoon is extensive and consists mainly of coconut and tobacco gardens; it extends from approximately 300 yards to rather more than 1 mile from the lagoon.

Table V.—Percentage Prevalence of Various Species of Anopheles in Ground Water collections in Various Portions of Chilaw.

(Identified Larvae.)

Species.	Beach Area.	Proximity of Lagoon.	Town Area Proper.	Rural Area away from Lagoon.
<i>A. subpictus</i>	73.00	63.10	18.05	23.35
<i>A. listoni</i>	1.91	4.94	21.26	25.82
<i>A. hyrcanus</i>	5.73	11.92	36.62	22.08
<i>A. barbirostris</i>	11.72	12.76	17.02	16.42
<i>A. jamesi</i>	7.64	6.27	7.05	5.02
<i>A. fuliginosus</i>	—	0.16	—	6.28
Other species	—	0.85	—	1.03
All species	100.00	100.00	100.00	100.00

It will be observed that Anopheline breeding places were most abundant in the semi-rural areas; in the town proper breeding was largely confined to wells. In ground water collections on the beach and in the vicinity of the lagoon, the water is frequently brackish and larvae of *A. subpictus* were predominant; in the town area (where suitable breeding places for this species were scanty) and in the semi-rural area away from the lagoon *A. subpictus* larvae were much less prevalent, but *A. listoni* and *A. hyrcanus* larvae became definitely more abundant. In wells in the town proper *A. listoni* larvae were frequently present.

It would appear, therefore, that the treatment of wells in the town, and of ground water collections, especially borrow pits, pools, coconut trenches, and unbuilt drains in the semi-rural areas should be given preference in the initial stages of the proposed campaign. Further observations during the wet seasons are in progress, and it is hoped that these will provide more definite information regarding the prevalence and breeding places of the important malaria carrying species *A. culicifacies*, which occurs at Chilaw and is known to be abundant in certain neighbouring districts.

4. *Malaria and Anopheline Mosquitoes at Diyatalawa.*—In view of the importance of this hill station (4,200 feet) as a sanatorium and training camp and of a proposal which had been made that malaria preventive measures should advisably be introduced there, it was considered necessary to undertake investigations.

These investigations were performed at Diyatalawa and in the surrounding neighbourhood and were directed more particularly towards determining the extent to which indigenous malaria occurred among the resident population, and the relative prevalence, seasonal periodicity, and breeding places of the various species of Anopheline mosquitoes present. For the latter purpose arrangements were made for examinations to be conducted once a month throughout the year.

(a) *The Incidence and Endemicity of Malaria at Diyatalawa.*—The returns of the hospitals at Haputale and of the dispensary at Bandarawela were examined in this connection. Analyses of the returns of the former over a period of 6 years (1918-1923) showed that the annual average number of cases treated for malaria during this time was 522 (indoor cases 185, outdoor 337) or 11.4 per cent. of all cases treated at the hospital. At Bandarawela the annual average number of cases treated for malaria during the years 1920-1923, inclusive, was 692 or 12.1 per cent. of all cases treated. Although these percentages are low for Ceylon, they nevertheless suggest that considerable numbers of infected persons exist within the areas served by these institutions.



At the same time it must be remembered that these areas are extensive and include places where malaria is known to be endemic; and also that, in view of the inexpensive and rapid means of transport now available and of the highly malarious nature of the adjacent low-country, the probability of many of these infections being imported is great. Furthermore, the accuracy of these figures is questionable as diagnoses are rarely confirmed by blood examination, and there is an undoubted tendency for many minor ailments characterized by pyrexia to be included under the term "malaria."

With a view to obtaining evidence regarding the existence or prevalence of malaria among the resident population, random examinations for splenic enlargement in children between the ages of 2 and 10 years were undertaken in Diyatalawa and the surrounding villages. In all, 247 children at eight villages or towns (including Bandarawela and Haputale) were examined, and slight enlargement of the spleen occurred in two (0.8 per cent.). These two children lived at Bandarawela, but it is not known whether they had previously resided elsewhere. Thirty-four blood films were also taken at random from the children, and in one case (a child from Haputale who had recently visited Badulla) parasites of Benign Tertian malaria were found.

The evidence obtained, therefore, indicated that the amount of indigenous malaria present at or in the neighbourhood of Diyatalawa was extremely small.

There is every reason to believe, however, that the importation of malaria into Diyatalawa is of frequent occurrence. Convalescent cases are often present in the Naval, Military, and Survey camps; and as indicated above there can be no doubt that the disease is often introduced by villagers and coolies who visit the neighbouring low-country for purposes of trade or pilgrimage.

Although numerous inquiries at the various camps in Diyatalawa and in the surrounding villages were made, definite evidence of malaria having been contracted in the neighbourhood was obtained in one case only. There was, however, evidence which indicated clearly that at certain seasons of the year an undetermined fever, locally called "Three days' fever" often occurred in epidemic form.\* In this connection a note by "Anopheles" in the United Service Magazine on "Upper Uva, Ceylon, as a Station for British Troops" is of considerable interest and importance. Regarding the health of two British regiments stationed at Diyatalawa, one of which came from the Siege of Ladysmith and the other from the malarious district of Dum Dum after long service in India, he writes: "In spite of these drawbacks, the medical officer in charge of the former of these regiments writes in most enthusiastic terms of the physique and the healthiness of the men after they had 4 months' experience of the place, i.e., after they had got rid of the diseases they had brought with them or contracted from the Boers. The latter regiment has been here for nearly 9 months, and was in a very sickly condition on arrival. Some 70 men have been either invalided home or sent away for change, but how far their complaints were due to local causes or were legacies from Dum Dum and elsewhere is difficult to say, but India has probably most to answer for. With regard to malaria, which was rife in the regiment on arrival, it is noteworthy that an examination in August of 600 men, which included a draft of 150 men from home, showed that only two men had had an attack of malarial fever for the first time here; one of these was a man of the Draft."

This author further states that although *Anopheles* mosquitoes occurred at Diyatalawa, they were not abundant, and considered that had they been more numerous "many more of the fresh arrivals would surely have been infected with the malaria parasite, with such a large number of malarious cases open to the attacks of the mosquito."

Evidence of malaria having been contracted within the camp or in its immediate vicinity does exist; but such evidence is rare and indicates that sporadic cases only have so far occurred, even although at times circumstances favourable to the spread of the disease appear to have been present. It is of course impossible to say whether the conditions relating to the breeding of *Anopheles* mosquitoes in 1903 were similar to those existing in 1925, but unless very radical changes have taken place during this period it is difficult to believe that any considerable alteration in the prevalence and composition of the *Anopheline* fauna has occurred. In any case the statements made by "Anopheles" above are most significant in that despite the fact that a large number of men were concentrated at Diyatalawa during 1903, and that many non-immune and infected persons were closely associated for a considerable period, 2 only contracted malaria.

(b) *The Anopheline Fauna of Diyatalawa*.—Regular examinations of a large series of potential breeding places were made each month during the period December to November, and the material collected was forwarded to Colombo for identification.

In all, 35,760 examinations were made, and 9,256 *Anopheles* larvae collected and examined microscopically. Search for adult *Anophelines* in huts and houses was also made from time to time, but without marked success.

Examination of the larvae referred to above showed that 11 species of *Anopheline* mosquitoes occurred at Diyatalawa. These species were, however, not equally prevalent and frequently 4 or 5 species only were represented in the material obtained during a particular month.

Of the total (9,256) larvae collected 7,098 were identified, the remainder (2,158—23.3 per cent.) being in the first stage of development and accordingly unidentifiable.

The relative prevalence of the various *Anophelines* present as indicated by the proportionate distribution of identified larvae in every 100 samples spread evenly throughout series of breeding places of similar composition was as follows:—

	Per Cent.			
<i>Anopheles maculatus</i>	..	..	..	56.6
<i>Anopheles jamesi</i>	..	..	..	30.2
<i>Anopheles hyrcanus</i>	..	..	..	8.3
<i>Anopheles listoni</i>	..	..	..	3.8
Other species ..	..	..	..	1.1

\* The possibility of this disease being sand-fly fever is deserving of consideration; specimens of *Phlebotomus* (sp. incert.)—one or more species of which are recognized carriers of the disease in other countries—were occasionally found in houses.



Under "other species" above mentioned are included *A. barbirostris*, *A. subpictus vagus*, *A. tessellatus*, *A. aitkeni*, *A. culicifacies*, *A. fuliginosus*, and *A. gigas*. Only one of each of the three last named species was found throughout the whole period of investigation, and although one of them (*A. culicifacies*) is normally a dangerous malaria-carrying species, its apparent extreme rarity in this area would exclude it from consideration. *A. maculatus* and *A. jamesi* were the predominant species present, but *A. hyrcanus* and *A. listoni* were not uncommon during certain months. Of these four Anophelines, *A. maculatus* and *A. listoni* are reputed to be potentially dangerous species, and the former is recognized as the chief carriers of malaria in the hill districts of the Federated Malay States and Assam. It is essentially a hill species, and its high prevalence at Diyatalawa is, therefore, in no way exceptional.

Examples of each of the four commoner Anophelines were found from time to time in huts and houses within the Military camp. Comparatively small numbers were obtained, although on occasions culicine mosquitoes (*Culex fatigans* and other species of *Culex*, and *Stegomyia albopicta*) were numerous. These examinations were made early in the mornings, chiefly in December and January.

The seasonal variations in prevalence of Anophelines as indicated by larval findings are shown in the following table:—

Table VI.—Seasonal Prevalence of Anopheles—Diyatalawa.

Larval Rates per 100 Samples Examined.

Month.	All Species.	<i>A. maculatus</i> .	<i>A. jamesi</i> .	<i>A. hyrcanus</i> .	<i>A. listoni</i> .	Other Species.	First Stage Larvae.
December	15.7	4.1	3.6	0.6	0.04	0.08	7.3
January	13.1	3.8	2.2	0.5	0.7	0.03	5.9
February	14.8	5.8	1.8	2.2	0.6	0.3	4.1
March	18.6	7.3	3.6	1.0	0.9	0.0	5.8
April	27.8	12.9	5.7	2.3	0.1	0.02	6.8
May	52.1	22.8	10.3	5.0	0.0	0.5	13.5
June	38.6	22.0	8.0	5.1	0.0	0.4	3.1
July	53.5	26.2	14.3	2.9	2.4	0.1	7.6
September	59.6	40.5	7.2	3.6	3.5	1.6	3.2
November	21.8	3.7	13.1	1.0	0.9	0.1	3.0

Larvae were relatively much less numerous during the period November to April, but increased greatly during the months of May to September, when the rainfall was diminishing; *A. maculatus* larvae became especially prevalent during this period.

Analyses of the results of the examinations in relation to the various types of Anopheline breeding places are shown in the table below (VII.):—

Table VII.—Relative Prevalence of Anopheline Larvae in Various Types of Breeding Places, Diyatalawa.

Larval Rates per 100 Samples Examined.

Breeding Places.	Samples taken.	No. of Larvae.	All Species.	<i>A. maculatus</i> .	<i>A. jamesi</i> .	<i>A. hyrcanus</i> .	<i>A. listoni</i> .	Other Species.	First Stage Larvae.
Earth drains	6,940	2,673	38.6	24.3	4.5	1.0	1.0	0.7	7.7
Swamps	3,325	1,140	34.0	14.4	11.3	1.6	1.0	0.1	5.6
Streams	7,450	2,150	28.9	15.9	4.1	0.3	0.3	0.6	7.7
Paddy fields	8,500	1,993	23.5	3.9	7.1	5.6	1.4	0.2	5.3
Pits and pools	4,545	707	15.6	3.1	5.7	1.3	0.3	0.2	5.0
Wells	3,750	474	12.6	4.2	3.5	0.1	0.0	0.4	4.4
Irrigation channels	1,100	102	9.3	5.1	1.6	0.3	0.8	0.0	1.5
Miscellaneous*	150	17	11.3	5.3	0.0	5.3	0.0	0.7	0.0

\* Included in the category are three cement tanks or pits; the samples are too small to allow of reliable results.

The results obtained indicate clearly the preferences exhibited by the more important Anophelines present in their choice of breeding places. Thus, *A. maculatus* larvae were most frequently and abundantly present in earth drains, streams, and spring-fed swamps; *A. jamesi* larvae in swamps, paddy fields, and pools; and *A. hyrcanus* in paddy fields. *A. listoni* as previously shown was not an abundant species at Diyatalawa, and the number of larvae found were insufficient to allow of preferences for particular types of breeding places being indicated with any degree of reliability. It is of interest to note, however, that this species was not found in any of the wells examined; although in other parts of Ceylon, where it occurs at all abundantly, wells usually play an important rôle as breeding places. It is, therefore, not improbable that wells in this area may occasionally harbour the larvae of this species.

(c) *The Possibility of Malaria Increasing at Diyatalawa.*—It has been stated that, in certain circumstances, there is a serious danger of malaria becoming severely endemic at Diyatalawa. The results of the investigations discussed in the preceding pages appear at first sight to strengthen this conclusion, particularly since it has been shown that the predominant indigenous Anopheline mosquito (*A. maculatus*) is known to be a virulent carrier of the disease in neighbouring countries. On the other hand, the medical history of the locality not only appears to afford no evidence which will support this theory, but furnishes data which, if anything, is opposed to it. Careful consideration of certain factors known to influence the transmission of malaria and the extent to which they exist at Diyatalawa is therefore necessary.



The two essential factors for malaria transmission, viz., the presence of infected persons and the presence of mosquitoes known to be carriers have both been shown to be present at this station. In regard to the first, cases of infected malaria exist constantly although apparently seldom in large numbers at any one time; and in association with them are—as indicated by the spleen and blood examinations—numerous persons who would prove susceptible to infection. It is obvious that the low prevalence of human carriers alone would tend to lessen the chances of malaria occurring in epidemic form; but this condition would be liable to change entirely upon the introduction of large bodies of men recruited from diverse localities. This in fact has occurred on at least one occasion—yet seemingly without ill effects. The second factor also exists, and as has been shown previously is particularly potent during the months of May to September.

But the mere presence of human malaria carriers and of malaria carrying mosquitoes is not alone sufficient for the spread of the disease; for in certain countries they co-exist and yet no serious outbreaks of malaria occur. Other factors which affect transmission, however, are altitude and meteorological conditions. The altitude of Diyatalawa varies from approximately 4,200 to 4,700 ft.; but malaria is known to occur in other countries in places at far greater elevations, e.g., Italy 8,400 ft., Rocky Mountains 6,500 ft. One authority places the critical altitude at between 5,000 ft. and 6,000 ft., while another maintains that elevation is a protection from malaria only when mosquitoes and the conditions favouring their existence are absent. Thus, it would appear that, in any event, altitude cannot be regarded as the determining cause of the extremely low prevalence of malaria at this town.

An examination of the meteorological conditions normally pertaining at Diyatalawa, however, offers—in the light of recent work—suggestive and important data in connection with the matter. A considerable amount of research on the rôle of meteorology in malaria has been performed of late years in India and elsewhere, and the evidence so far obtained indicates that the temperature and relative humidity of the atmosphere are of fundamental importance in determining the active presence of the disease. It has been shown experimentally that the development of the malaria parasites within the mosquito ceases when the mean temperature remains below 61 F., and that the most favourable range of temperature for development lies between 68 F. and 86 F.; and further that, provided the temperature is favourable, the lower limit of humidity compatible with the transmission of malaria is approximately represented by a mean monthly relative humidity of 63 per cent. The conditions necessary for transmission are not therefore identical with those favouring the breeding and development of mosquitoes, and accordingly no relationship need exist between the distribution of the *Anopheles* carrier and the distribution of endemic malaria.

The average monthly mean temperature (over a period of 25 years) and relative humidity\* (over a period of 7 years, 1920-1926, inclusive) at Diyatalawa are shown in the following table (VIII.):—

Table VIII.—Temperature and Relative Humidity, Diyatalawa.

Month.	Average Mean Temperature. (25 Years).	Average Mean Humidity. (7 Years).
January .. ..	64.6	77.6
February .. ..	65.6	63.4
March .. ..	67.7	63.1
April .. ..	69.4	69.7
May .. ..	70.6	65.6
June .. ..	70.5	62.0
July .. ..	70.0	60.3
August .. ..	70.2	59.1
September .. ..	61.5	61.0
October .. ..	68.4	70.9
November .. ..	67.0	76.3
December .. ..	65.0	79.4

Examination of this table shows that in an average year (a) the mean monthly temperature is sufficiently high for development of the malaria parasites during every month, but is not altogether favourable during the period November to March, inclusive.

(b) The mean monthly relative humidity is unfavourable for transmission of malaria during the months of June to September, inclusive, and is only a fraction above the lower limit compatible with transmission during February and March.

While, therefore, in an average year the potential infection period (i.e., the period during the year when a mean monthly temperature of over 61 F. is associated with a monthly relative humidity of over 63 per cent.) at Diyatalawa extends—strictly speaking—from October to May, the conditions for transmission throughout this period are not uniformly favourable. For a considerable portion of this period—November to March—the mean monthly temperatures are such that parasite development would tend to be retarded, and the infectivity rate of the susceptible species of *Anopheles* thereby reduced. In February and March also the lowering of the relative humidity would further operate unfavourably in regard to transmission of the disease. In addition to, and in association with, these factors, however, the variation in seasonal prevalence of the potential *Anopheline* carriers has also to be considered. Reference to Table VI. shows that *A. maculatus* and *A. listoni* larvae were most abundant during the period May to September or October, and that from November to March or April they were much less numerous. Both species reached their maximum prevalence during the months of July to September—a time which, in an average year, does not fall within the potential infection period. Moreover, the months (November to March) of lowest prevalence were coincident with those in

\* The figures given for percentage humidity represent the mean humidity as derived from 9.30 A.M. and 3.30 P.M. readings.



which the temperature and humidity factors were not particularly favourable for transmission, a fact which would further reduce the liability to infection of the inhabitants. Thus, it would see that normally the greater part of the potential infection period at Diyatalawa is not likely to prove favourable to the origination of epidemics of malaria; but it cannot be gainsaid that the months of May (and possibly April) and October are liable to be dangerous in this respect. In all of these months the temperature and humidity are favourable, and the potential Anopheline carriers—although not at their maximum prevalence—are at least moderately abundant.

It must, however, be noted that the above remarks concerning the potential period of infection are based upon the meteorological conditions which pertain in an average year at Diyatalawa. In occasional years the mean monthly temperature or relative humidity may be sufficiently above or below the average in particular months to render transmission possible or impossible as the case may be. An examination of the monthly records during the past seven years (1920-1926) shows that this has occurred on several occasions. Thus, in the period (June to September), which is normally unfavourable for transmission, the mean relative humidity increased beyond 63 per cent. in 7 out of 28 months, viz., in June twice, in July once, in August once, and in September three times; and on the other hand in the period February to May, which normally falls within the potential infection period, the humidity has decreased below the limit compatible with transmission on seven occasions, viz., in February three times, in March three times, and in May once. In none of the years in question did the meteorological conditions become definitely unfavourable in April and October, and, as indicated previously, in only one year in May.

In spite of the very favourable history of Diyatalawa in regard to indigenous malaria, therefore, it must be considered that a distinct element of danger exists at certain periods of the year; and that at such periods the danger would be seriously enhanced by any considerable accession in the numbers of infected persons in the neighbourhood. But while sporadic cases of malaria are likely to occur at these times and epidemics might arise in the circumstances specified above, it is not considered probable in view of the variations in temperature and humidity that the camp would become a dangerous endemic centre of the disease. Endemic malaria is intimately associated with constancy of infection, a condition which the evidence available suggests will rarely, if ever, occur at Diyatalawa.

In view of the information given above it will be appreciated that the advisability of introducing anti-mosquito measures at Diyatalawa, and particularly of introducing permanent works which will necessitate the expenditure of large sums of money, is a matter deserving of the most careful consideration. In the light of the evidence available it is questionable whether—from the standpoint of malaria alone—great expenditure on anti-mosquito measures is warranted, unless there is a reasonable expectation of extension of the camp associated with a more or less permanent maintenance there of considerable numbers of men drawn from malarious and non-malarious areas. On the other hand, since conditions at the camp are undoubtedly favourable for transmission of the disease at certain periods of the year, precautionary measures of a less costly nature should be introduced whenever concentration of troops is likely to occur. Such measures are indicated as being particularly necessary should concentration occur during April, May, or October; but as meteorological conditions during June to September are occasionally also favourable for the spread of malaria they should advisedly be undertaken at this period as well.

April 2, 1928.

H. F. CARTER,  
Medical Entomologist.



## 3.—Report of Anti-Malaria Campaigns for the Year 1927.

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1. *An Outline of the Commencement of Malaria Activities in Ceylon.*—With the appointment of a Malariologist to the Civil Medical Establishment of Ceylon (now the Department of Medical and Sanitary Services) in 1921, a new chapter in the studies of the malaria problem of this Island was opened. Such activities were of a continuous and intensive nature. Before describing the organization and work now in progress, it would be helpful and useful as a guide to the better understanding of the problems confronting the workers in this Island, if a brief resume were given of the work done in the past (period 1921-1925).

The work can be conveniently divided into (a) Investigatory, (b) Executive. The work performed under the heading Investigatory can be further divided and subdivided into several minor activities, only the most important of them being mentioned here. Under the nomenclature Executive minor anti-malaria works, works carried out in some areas of the Island are to be understood.

*Investigatory.*—The principal investigations into the subject of malaria between 1921-1925 were concerned with—

- (i.) The determination of the incidence and distribution of malaria by means of a spleen and a parasite survey.
- (ii.) The relative prevalence and seasonal incidence of the different species of malaria plasmodia.
- (iii.) The identification, differential characters, and distribution of the indigenous species of mosquitoes in the adult and larval stages.
- (iv.) The anopheline fauna of the rice fields of Ceylon.
- (v.) The study of statistics relating to the incidence of malaria in the principal towns of Ceylon.

The findings on the above lines of inquiry can be briefly summarized and stated categorically.

(i.) In order to determine the intensity, distribution, &c., of malaria prevalence, examinations of children and adults were made at as many schools as possible and over 500 towns and villages. A total of 56,372 children were examined, giving a spleen index of 13.6 per cent. The endemicity of the disease varies considerably in different parts of the Island depending upon physical, climatic, and economic conditions. For purposes of ready visualization the country is divided into (A) low-country (0-200 metres) and (B) hill country. In order to render the findings of spleen measurements according to some standard of measurement, the endemicity of the disease has been divided into (a) low (spleen rates from 0-10 per cent.), (b) moderate to high (10-40 per cent.), and (c) high or very high (40-60 per cent. and over).

In the low-country we have the following conditions:—

- (1) Endemicity low (0-10 per cent.)—
  - (a) The south-west portion of Ceylon extending from the coast to the foot-hills of the Province of Sabaragamuwa and including the bulk of the Western Province and the western half of the Southern Province.
  - (b) The north and north-west portions of the Jaffna peninsula.
- (2) Endemicity moderate to high (spleen rates from 10-40 per cent.)—
  - (a) The eastern littoral extending from Trincomalee in the north to the neighbourhood of Tirukkovil in the south.
  - (b) The northern limits of the Western and Sabaragamuwa Provinces and the southern portion, as far north as Kurunegala, of the North-Western Province.
- (3) Endemicity high or very high (spleen rates 40-60 and over)—
  - (a) The eastern half of the Southern Province, the low-country of the Province of Uva, the greater part of the Eastern and Northern Provinces, the central and northern portions of the North-Western Province, and the entire North-Central Province. In short, almost two-thirds of the whole Island.

In the hill country we have the intensity demarcated as follows:—

- (1) Endemicity low—
  - (a) Most of the hill country above 500 metres altitude.
- (2) Endemicity moderate—
  - (a) A small localized area—below 500 metres—comprising the northern and sub-montane regions of the Central Province, and along the foot-hills of the Provinces of Sabaragamuwa and Uva.

*Parasite Survey.*—A total of 5,040 blood films (among children) were examined, giving a general parasite rate of 13.5 per cent. The rates ranged from 0.8 per cent. to 28.8 per cent., the lower rate being established in the southern wet zone area and the higher rate being obtained in the North-Central Province.



(ii.) *The Relative Prevalence and Seasonal Incidence of Malaria Plasmodia*.—A total of 11,260 blood films were examined from children and adults. 1,751 were positive to malaria parasites. The examinations were made by the thin film method. Of the 1,751 positive films 57.7 per cent. were Benign Tertian, 32.2 per cent. Quartan, and 10.1 per cent. Sub-tertian. Among mixed infections, the largest number were Benign Tertian and Quartan. Evidence collected goes to show that no marked seasonal alteration occurs in regard to Sub-tertian malaria, but that Benign Tertian predominates throughout and manifests a definitely increased prevalence during the last four months of the year.

(iii.) The identification, differential characters, and distribution of the indigenous species of mosquitoes in the adult and larval stages have been fully dealt with by Mr. H. F. Carter, Medical Entomologist, in his Report, Sessional Paper VII. of 1927.

(iv.) *Anopheline Fauna of the Rice Fields of Ceylon*—

- (a) *A. sinensis* and *A. rossii* were in every case—except in the south-west, where *A. jamesi* and *A. barbirostris* largely took the place of *A. rossii*—the chief species forming from 70 per cent. to 88 per cent. of the larvae collected.
- (b) *A. culicifacies* and *A. fuliginosus* seldom occurred in large numbers. *A. maculatus* was never found in abundance in the rice fields, and even in the hill areas it formed only 3 per cent. of the Anophelines present.
- (c) In irrigation channels Anopheline larvae were always presented, *A. listoni* heading the list found. Fuller and more detailed information on this subject could be found in Sessional Paper VII., 1927, already mentioned—Report on Malaria and Anopheline Mosquitoes in Ceylon, by Henry F. Carter, Malariologist, assisted by Drs. K. J. Rustomjee and E. T. Saravanamuttu.

(v.) *The Study of Statistics Relating to Malaria in the Principal Towns of Ceylon*.—The principal heads under which this phase of the problem was inquired into were—

- (a) The death rates by causes among the total population.
- (b) The death rates from malaria in the principal towns.
- (c) The hospital statistics.

The figures must be accepted for what they are worth realizing the enormous inaccuracies in diagnoses by unqualified practitioners, particularly in "fever" cases. Whatever such defects may be, the mean annual death rate from the "fever group" for the Island formed one-fifth of the crude mean death rate, which was 80.6. The mean annual death rate from the fever group is generally higher in the dry than in the moist zones. The death rates from malaria in the principal towns vary according to their climatic and social environments. The highest mean rates are confined more or less to the towns in the hot, dry zone, e.g., Mannar, Anuradhapura, Hambantota.

Hospital statistics are open to several disturbing factors, and the figures given below must be regarded not unreservedly. The total malaria cases treated at the hospitals and dispensaries were in 1923 34,522 and 1,193,225 respectively. The malaria morbidity rate per 100 population in 1923 was 26.5, the hospital malaria mortality rate per cent. being 0.5 for that same year. The malaria case fatality per cent. for 1923 was 1.6, being as high as 5.8 in 1911-12.

It may be safely stated that there are well defined seasons of greatest intensity of malaria in Ceylon, popularly known as the "fever season." These periods correspond to the months of heavy rains, resulting in a very large number of fever cases attending the hospitals and dispensaries for treatment. In the northern, eastern, and south-eastern hills and foot-hills the increase in the intensity of malaria is definitely greater during the latter months of the year (the north-east monsoon period), while in the south-western and west-central areas of the hilly region the prevalence of malaria rises in conjunction with the fall of heavy rains (May-October). The seasonal incidence very briefly treated here must not be regarded as of clockwork regularity or equal in intensity throughout the zones affected, as such qualities depend upon several factors well known to malariologists the world over.

*Executive*.—During the period mentioned above malaria control measures were adopted at certain selected towns, viz., Anuradhapura and Trincomalee. The principal measures adopted were oiling, draining, ditching, filling, fish distribution (top-minnows), and quinine distribution to the populace and school children. Prior to the commencement of such minor measures, complete Anopheline surveys and measurement of the malaria intensity and distribution were made with great thoroughness. The results of such work have been very gratifying, e.g., the spleen index at Anuradhapura prior to control measures was nearly 50 per cent., while in 1927 the index had dropped as low as 17 per cent. All initial expenses are met by the Central Government until such time as the works are completed and handed over to the local authorities for their management, but under the supervision and guidance of a fully-trained Medical Officer. Full details of the work stated above could be obtained from the Sessional Paper quoted before, viz., VII. of 1927.

2. *Present Organization of Anti-Malaria Work in Ceylon and Present Staff*: (a) *Present Organization*.—With the establishment of two Boards of Malaria Control, a new chapter in the history of malaria work in Ceylon was opened. The Boards are called respectively (1) The Anti-Malaria Advisory Board and (2) The Departmental Committee (of the Medical and Sanitary Services Department) on Malaria. The functions of the first-named Board, which was appointed in 1925, are—

- (1) To receive reports from experts and advise upon these reports.
- (2) To consider the practical application of all suggested measures for the control of malaria as they may affect the different sections of the community.
- (3) To consider the best methods of obtaining thorough co-operation from all sections of the community, and to consider the relative urgency and probable cost of proposed anti-malaria measures and submit estimates to Government. The members of this Board are (1) several Legislative Councillors, representing a



large portion of the country, (2) the Director of Medical and Sanitary Services, together with the Assistant Director of Sanitary Services, the Medical Entomologist (*ex* Malariologist), the Superintendent of Anti-Malaria Campaigns, (3) the heads of several departments that are concerned, to a greater or smaller extent, in the malaria problem, (4) the Colonial Secretary as Chairman, and (5) the Office Assistant to the Director of Medical and Sanitary Services as Secretary.

At a meeting of the Anti-Malaria Advisory Board held in December, 1926, the Director of Medical and Sanitary Services put forward for the approval of the Board a scheme for the establishment of an Anti-Malaria Division. The following quotation from the minutes of that meeting explains the Director's proposal:—

"Arising out of the last subject Dr. Bridger, Director of Medical and Sanitary Services, made a statement as regards the organization of the Anti-Malaria Division. He explained that he proposed, if the Anti-Malaria Advisory Committee approved, to form a Departmental Committee consisting of Dr. S. T. Gunasekera, Assistant Director of Sanitary Services, as Chairman, and Mr. Carter, the Government Entomologist, and the Sanitary Engineer to be lent by the International Health Board as members. He stated that Dr. K. J. Rustomjee, who had recently returned from a course of study in Anti-Malaria work in America, Italy, Palestine, Straits Settlements, Federated Malay States, and India, would be the executive officer of this Committee and would submit anti-malaria work programmes for the Committee's approval. After discussion the Anti-Malaria Advisory Board approved of the scheme put forward by Dr. Bridger."

The Board's recommendation was submitted to Government, and in the meantime the Departmental Committee came into being and commenced to function. Monthly meetings were held, and additional meetings whenever any urgent business made them necessary. The duties of this Committee are—

- (1) To initiate and control malaria campaigns in centres or areas approved by the Anti-Malaria Advisory Board.
- (2) To consider and discuss the results of all investigations made at proposed campaign centres by the Medical Entomologist, the Executive Officer, Anti-Malaria Campaigns, and others; and their practical application.
- (3) To consider programmes, including estimates of costs, for anti-malaria works submitted by the Executive Officer, Anti-Malaria Campaigns.
- (4) To consider any other matters relating to malaria prevention.

In due course Government approved of the scheme submitted by the Director of Medical and Sanitary Services, and the writer was appointed Superintendent, Anti-Malaria Campaigns, with effect from June 1, 1927. There was thus created the necessary machinery for planning, organizing, and carrying out anti-malarial measures in Ceylon.

(b) *Present Staff.*—Dr. K. J. Rustomjee, Superintendent, Anti-Malaria Campaign.

*Medical Officers attached to the Campaign.*—Drs. S. G. Jackson, I. J. Fernando, O. G. Weerasinghe, and G. Jeremiah.

*Sanitary Inspectors.*—The officers seconded for service in the Malaria Campaign are Messrs. Batcha, Wanigasekera, Candiah, Poulier, and Vincent de Silva. Mr. D. S. Samarasinghe was appointed Laboratory Assistant at the Central Office, Colombo.

*Dates of Appointment and Distribution of the above Officers of the Campaign.*—Dr. K. J. Rustomjee as from June 1, 1927.

Dr. S. G. Jackson, stationed in the Central Office at Colombo, was appointed on June 9, 1927.

Dr. I. J. Fernando, Medical Officer, Malaria Campaign, Kurunegala, was posted to that station on January 1, 1927, having been appointed to the Campaign in October, 1926.

Dr. O. G. Weerasinghe, Medical Officer, Malaria Campaign, Anuradhapura, was appointed in October, 1926, and was posted to Anuradhapura in January, 1927.

Dr. G. Jeremiah, Medical Officer, Malaria Campaign, Chilaw, was appointed in October, 1926, and assumed duties at Chilaw on April 6, 1927.

The disposition of the Sanitary Inspectors is as follows:—

Messrs. Batcha and Wanigasekera at Chilaw, Messrs. Poulier and Vincent de Silva at Anuradhapura, and Mr. Candiah at Kurunegala. They assumed duties on February 1, 1927.

Mr. D. S. Samarasinghe, Laboratory Assistant, is attached to the Central Office at Colombo, being appointed on November 21, 1927.

**3. Activities of the Anti-Malaria Division in 1927.**—At a meeting of the Anti-Malaria Advisory Board held in May, 1925, it was resolved to limit malaria control work to the four centres of Anuradhapura, Trincomalee, Kurunegala, and Chilaw for the time being.

As regards Chilaw, a complete preliminary survey of Anopheline breeding places was commenced and finished during 1927.

At Kurunegala a fairly detailed Anopheline survey had been made in 1922-23, but a resurvey was found necessary and was carried out during 1927 by the Medical Entomologist and his staff.

At Anuradhapura, where work had been in progress for several years, anti-malaria control measures were carried on intensively.

As active anti-malaria control measures had been completed in Trincomalee in previous years, work was confined to maintenance of the initial anti-malaria work.

The details at each centre are given hereafter:—

(a) *Epidemiological Work done at Centres of Proposed Anti-Malaria Operations:* (i.) *Chilaw.*—To most people who have lived some considerable time in this Island a description of Chilaw town would appear as nothing new, but in malaria investigation work a brief account from



the malaria view-point of the area in which inquiries are being carried out has generally to precede information of a somewhat technical and scientific nature. With the aid of such a general description the reader can better value and appreciate the findings and the difficulties encountered in the work.

Chilaw town is the second town in importance in the North-Western Province with a total population of 6,642 as estimated during the last Census (1921). The town is unequally divided by a lagoon which runs directly north and south, the greatest width of the lagoon—of that portion within the limits of the Urban District Council—being approximately a quarter of a mile. There is thus a narrow, sandy, thinly-populated strip on the western shore of the lagoon and a thickly-populated, large area (forming the larger part of the town) on its eastern shore. Along the northern boundary of the town limits there lies a large tract of water-courses, which insinuate themselves into the neighbouring cultivated and uncultivated portions of the land. Along the eastern boundary are situated paddy fields of no very great extent, and a large tank. The southern area of the town is uninteresting and calls for no special reference. The centre of the town is studded with different sized lotus ponds showing indistinct and non-functioning connections from one to another. These ponds by means of such defective connections finally open into the lagoon not far from its southern limit. The ponds are utilized for purposes of bathing, washing, watering of gardens, &c. The water surface of the ponds is full of aquatic plants, debris of more than one kind, and there are no good, built banks.

The town east of the lagoon is below sea level and it is not uncommon to find comparatively large areas of water-logged soil within the two square miles the town is comprised of. The predominant race in the town is Low-country Sinhalese, who form nearly 70 per cent. of the total population. The two chief industries followed are fishing and miscellaneous agriculture, *e.g.*, coconut planting, tobacco cultivation, minor garden produce, &c. It must be noted that within the town limits there is no paddy cultivation, but somewhat extensive lands are under tobacco cultivation. The plots of tobacco lands are watered by means of earth wells merely dug in the soil with no proper sanitary constructional details. Such wells are fairly numerous and the area under tobacco is more or less confined to the area north of the bazaar section, *i.e.*, the Alutwatta road section. The coconut estates are not much different from the other estates in the low-country, characterized, of course, by innumerable trenches and a number of borrow pits.

The water supply of the town is exclusively from wells, the wells on the western side of the lagoon being preferred for their unusually good quality and taste. The wells on the east of the lagoon are reputed to be very brackish and the water not potable. Of the total population of 6,642 within the Chilaw town limits, 2,155 were at the last Census between the ages of 0 to 14 years. Of those 2,155, 1,638 were Sinhalese, 231 Tamils, and 286 others. Of that number (2,155), there were 1,138 males and 1,017 females. Of the 1,138 males, 855 were Sinhalese, 118 Tamils, and 165 others. Of the 1,017 females, 783 were Sinhalese, 113 Tamils, and 112 others. The approximate number of houses (estimated in 1927) is 1,200. The rainfall in the area is chiefly drawn from the north-east monsoon, although a small quantity is also obtained during the south-west monsoon. The average annual rainfall is about 60 inches. The town east of the lagoon is so low-lying that after any appreciable rain has fallen the ground holds up water for a very long period. The town may be said to be prosperous and not alarmingly unhealthy, although malaria is one of the most important ailments met with. The mean annual birth rate of Chilaw District was 33.6 per 1,000 (1900-1920) and the mean annual death rate per 1,000 was 22.8 (1911-1920). The mean malaria mortality rate (1911-1920) was 5.1 per 1,000.

There is a well equipped hospital with all the necessary requirements.

In 1922 119 children were examined, out of whom 44 were found with enlarged spleens, a rate of nearly 37 per cent. In 1923 124 were examined and a spleen rate of 33.7 per cent. was obtained. In 1924 42 children were palpated and a spleen rate of 57.1 per cent. was obtained.

In February, 1927, a total of 710 children were examined at Chilaw town schools, 135 being found with enlarged spleens, a spleen rate of 19 per cent. The numbers include children over 12 years of age. If children under 12 years only are reckoned, the 611 examined gave a spleen rate of 20.8 per cent. In August, 1927, 531 of the 611 were re-examined and a rate of 7.7 per cent. was got. In December, 1927, 328 of the above 611 were re-examined again for spleen enlargement, and a spleen rate of 11.2 was registered. In the meantime, no anti-malaria measures of any sort were adopted. The reduction from 20.8 per cent. to 7.7 per cent. is significant and indicates a comparatively high standard of social conditions and good food supplies. A total of 1,077 persons was examined in February (including adults and children not examined at schools), out of whom 145 were found with splenomegaly. If children under 12 years only are reckoned, 1,050 examined gave a rate of 18.0 per cent.

The rate 18.0 per cent. could be taken to represent more or less the amount of endemic malaria during the month of February, 1927, as determined by the examination of children under 12 years of age. On the whole, a rate of 18.0 per cent. cannot be regarded as excessive, although we must bear in mind that the index is—as far as can be ascertained—representative of infections acquired within a town as large as Chilaw.

Taken according to age groups of subjects examined at the schools the following data were obtained at the various indices:—

Table 1.

Ages.	February, 1927.			August, 1927.			December, 1927.		
	Number Examined.	Positive.	S. R. Per Cent.	Number Examined.	Positive.	S. R. Per Cent.	Number Examined.	Positive.	S. R. Per Cent.
3-5 years	24	2	8.3	18	1	5.5	19	—	—
6-9 years	355	73	20.6	330	22	6.6	207	22	10.6
10-12 years	232	52	22.4	183	18	9.8	102	15	14.7
13-15 years	74	8	10.8	59	—	—	55	4	7.2
16 and over	25	—	—	19	—	—	18	—	—
Total	710	135	—	609	41	—	401	41	—



The age groups 6-9, 10-12, and 13-15 show both a more maintained and a higher rate than the other groups for each of these indices. The numbers examined varied owing to absentees and those who had left school permanently. It must be stated here that, while the above data were being collected, no anti-measures of any sort were in progress. The reduction or increase in the spleen values have been due to natural conditions, climatic, social, &c.

The school children—as it is only among them that re-examinations of the same subjects are possible—under 12 years, examined in February, August, and December, were 611, 531, and 328 respectively. The spleen indices for those months were 20.8 per cent., 7.7 per cent., and 11.2 per cent. respectively. Of the number examined primarily (in February) 30 per cent. were absent from school on the day of spleen inspection and nearly 7 per cent. had left school. If a large number had been available in December, I feel certain that a higher rate than 11.2 per cent. would have been got.

A grand total of 1,717 subjects was examined in February and the results obtained are submitted in Table 2.

Table 2. (Spleen Rate among the different Age-groups as determined in February, 1927.)

Age-group.	Number Examined.	Number Positive.	Spleen Rate. Per Cent.
0-2 years	129	9	6.9
3-5 years	178	21	11.8
6-9 years	423	91	21.0
10-12 years	320	69	21.5
13-15 years	131	20	15.2
16 and over	536	70	13.0
Total	1,717	280	—

*The Relative Distribution of Enlarged Spleens.*—Of the 280 enlarged spleens palpated they were grouped as shown under:—

Table 3.

Total number of enlarged spleens	280
Number found measuring—	
Finger one	173 (61.7 per cent.)
Finger two	51 (18.2 per cent.)
Finger three	28 (10.0 per cent.)
Finger four	14 (5.0 per cent.)
Umbilicus	13 (4.6 per cent.)
Pubis	1 (0.3 per cent.)

It is not possible to state how many of the 173 spleens measuring one finger's breadth were of recent origin and how many were due to retrogressive changes dependent on factors such as improved social and economic conditions, quininization, &c. It is, however, interesting to note that one finger's breadth spleens were found more commonly in the areas 3B, 3C, 4A, 4B, 6A, and 6B, which are arbitrary divisions of the town made in order to facilitate the Anopheline survey in progress.

*Incidence of Malaria according to Geographic Location of those Examined in the Town of Chilac.*—While the dissemination of the causative organism of typhoid fever, cholera, &c., depends upon the unconscious co-operation of the source of infection and the fortuitous distribution by means chiefly dependent on human intercourse and relationship, the dissemination of the parasites of malaria depends upon the active pursuit of the human species by members of the female sex of a definite group of mosquitoes. Adaptation has eliminated certain of the hazards of dissemination, but at the same time has introduced certain additional complexities. The degree of proximity of the production areas of a susceptible species to the locality or habitations where a blood meal may be secured is an important factor in maintaining a high intensity of malaria among the members of that locality.

Such information, i.e., the locality or street where the subjects of spleen examinations lived was noted and is presented here in terms of the Entomological sections mapped out for the location of Anopheline breeding places. The correlation of the spleen findings and mosquito survey should show certain important details, but it must be stated that such findings are only relative, as it would be impossible to prove that all conditions necessary for transmission were the same as found at present, when those examined were primarily affected.

To state the number examined for each street or locality and give all malarimetric figures for that individual group would take up a great deal of space. In order to present, therefore, the figures concisely and in relationship to the Entomological divisions of the town Table 4 has been drawn up. Subjects over 12 years of age are excluded.

Table 4.

Area involved.	Streets.	Number Examined.	Positive.	Spleen Rate. Per Cent.
3B, 3C, 4A, and 4B	Alutwatta road, Puttalam road, Jetty street, and Watakeliya	287	60	20.7
6A and 6B	Jetty street, Bridge street, St. Mary's, Bazaar, Pitipana, Ferry, Barber, Fiscal, Sea, 1st Cross, Malay streets, and Lake road	487	64	13.1
5A, 5B, 5C, and 6C	Iechampitiya, Courts, Kurunegala, and Puttalam roads	108	31	28.7
8A, 8B	Kurunegala and Colombo roads	75	19	25.4
7A, 7B, 7C, and 7D	Ferry street, Lake road, Weaver's lane, Church street, Barber's street, and Colombo road	144	18	12.5
Waddiya (The Beach)	—	135	33	24.3



Table 4 would indicate that with the exception of the centre of the town (sections 6A, 6B, and 7A-7D) malaria endemicity is high, considering that Chilaw town is more distinctly urban than rural in character. If, however, a more careful study of the data is made, the area Puttalam road-Iechampitiya-Kurunegala road deserves first mention by virtue of its high rate of endemicity.

*The Distribution of the various Sizes of Enlarged Spleens according to Geographic Location and Age-groups.*—Knowing as we do that small sized spleens in a fixed community in the younger ages spell steady and active transmission of malaria in the past and of sustained transmission in the present, it is important to obtain information of the rate of distribution of the various sized spleens in each locality and of the rate of enlargement in that area.

Table 5 shows the rate per cent. of the total number of enlarged spleens (in each group of enlargement) as found in each area outlined for the Anopheline survey.

Table 5.\*

Area Involved.	Component Streets.	Children up to 12 Years. Sizes of Spleens.					Subjects over 12 Years. Sizes of Spleens.			
		F 1	F 2	F 3	F 4	U	F 1	F 2	F 3	F 4
3A, 4A, 3C, 4B ..	Alutwatta road, &c.	..35.0	..25.0	..27.7	..8.3	..14.2	..32.0	..6.6	..12.5	..22.2
6A and 6B ..	Jetty street, &c.	..34.1	..36.1	..22.2	..—	..57.1	..43.3	..26.6	..25.0	..44.4
5A-5C and 6C ..	Courts road, &c.	..12.5	..13.8	..33.3	..25.0	..14.2	..24.5	..26.6	..25.0	..22.2
8A and 8B ..	Kurunegala road, &c.	..6.6	..11.1	..22.2	..16.6	..14.2	..11.3	..6.6	..25.0	..—
7A-7D ..	Ferry street, &c.	..10.0	..8.3	..5.5	..8.3	..14.2	..7.5	..20.0	..12.5	..22.2
Waddiya (Beach)	—	..57.6	..24.2	..12.1	..3.0	..3.0	..33.2	..50.0	..16.6	..—

*Relationship of Malaria to Duration of Residence in Chilaw Town.*—Of the total number of enlarged spleens found (280), 13 were found in subjects resident less than six months in the town, 1 in a resident over six months but less than one year in the town, 8 in persons residing over one year but less than two years, 13 in those who had lived two years but less than three years in the town, and the remainder of the spleens were found in subjects who were resident over three years.

Table 6. (Showing Relationship of Duration of Residence to Enlarged Spleens found.)

Total number of enlarged spleens ..	..	..	..	280
Resident in the town—				
6 months and under ..	..	..	..	4.6 per cent.
Over 6 months, less than 1 year ..	..	..	..	0.4 per cent.
1 year, under 2 years ..	..	..	..	2.9 per cent.
2 years, less than 3 years ..	..	..	..	4.6 per cent.
Over 3 years ..	..	..	..	87.5 per cent.

Duration of residence, although a very important factor in determining the amount of prevalent malaria and speed of transmission from mosquito to man and its manifestation as fever in the subject, has to be supplemented by a history from each subject examined as to residence in other towns and villages, the duration of each of such periods, if the illness has been acquired there or not, &c. This is both necessary and important when it could be shown from the survey done that certain splenomegalic conditions were found, precluding all doubt of the infections being primarily acquired in Chilaw town, e.g., a three-finger spleen was found in a child of 2 years of age who had lived in Chilaw town for three weeks only before the survey was made, a three-finger spleen was discovered in a man 28 years of age who had lived in Chilaw less than six months, a two-finger spleen in a boy of 7 years who had lived in the town only two months, a spleen of 2 fingers' dimension in a 12-year old subject of only one month's residence in the town, &c. In conjunction with a record of the length of stay in a malarious town, it is necessary to note the degree of splenic enlargement against each definite period of residence, thereby rendering it possible to visualize the gradual acquirement of immunity or resistance to further splenic enlargement as age and length of stay advance. The field worker should have a relatively clear conception of how things are progressing with the population concerned, particularly with regard to the general health, which reacts directly upon the factor of malaria transmission.

*Relationship of the Sizes of Spleens to Duration of Residence.*—A study of the data collected shows that over 95 per cent. of those examined were born in Chilaw town and had continued to live there. In view of the fact that, during the preliminary examination, only 2.4 per cent. of the total number examined lived outside the town, who gave only 1.8 per cent. of the total number of enlarged spleens, it will not be useful to include them in the computation. The period of residence in town will be considered here as under 1 year, 1 year to 3 years, and over 3 years.

Table 7. (Period of Residence and Sizes of Spleens found in February, 1927.)

Size of Spleen.	Under 1 Year.	1-3 Years.	Over 3 Years.	Total.
1 finger ..	.. 4 ..	.. 16 ..	.. 153 (88.4 per cent.) ..	.. 173
2 fingers ..	.. 6 ..	.. 2 ..	.. 43 (84.3 per cent.) ..	.. 51
3 fingers ..	.. 3 ..	.. 1 ..	.. 24 (85.0 per cent.) ..	.. 28
4 fingers ..	.. 1 ..	.. 1 ..	.. 12 (85.7 per cent.) ..	.. 14
Umbilicus ..	.. — ..	.. 1 ..	.. 12 (92.3 per cent.) ..	.. 13
Pubic ..	.. — ..	.. — ..	.. 1 ..	.. 1

From Table 7 it would appear that malaria transmission in Chilaw is not very active, i.e., it might be said that the chances of acquiring malaria in Chilaw town during a short sojourn there are not great.

\* A reference to Table 4 above will show that as certain streets and roads have been inserted in more than one area the same persons are sometimes included in more than one set of figures, with the result that the total percentage of enlarged spleens referred to in Table 5 is more than 100.



*Determination of the Average Spleen and Average Enlarged Spleen.*—In addition to the usual rates employed in estimating the intensity of malaria in a community there are two other splenic indices that are undoubtedly of great value.

These are the average spleen and the average enlarged spleen. According to Ross the average spleen roughly estimated by palpation is unity; enlarged spleens are about 3 times, 6 times, or 9 times the normal size (small, medium, and great enlargement). He then multiplies the number of persons found to possess each class by 1, 3, 6, or 9, as the case may be, adds the products, and divides the total by the number of people examined.

The average enlarged spleen is found in the same manner except that the normal spleens are not reckoned. The figure for the average spleen is an index of the average amount of illness caused by malaria in a given community. The average enlarged spleen indicates only the degree of enlargement when it exists.

Table 8. (Analysis of Average Spleen and Average Enlarged Spleen.)

Group.	Number Examined.	Number with Enlarged Spleen.	Average Spleen Rate per Group.	Increased Splenic Substance in Grammes per 100.	Average Enlarged Spleens (Grammes).
0-10 ..	336 ..	24 ..	7.1 ..	797 ..	178
10-20 ..	886 ..	130 ..	14.6 ..	1,365 ..	143
20-30 ..	465 ..	106 ..	22.7 ..	2,806 ..	173
30-40 ..	61 ..	21 ..	34.4 ..	3,606 ..	164
40-50 ..	12 ..	5 ..	41.6 ..	13,833 ..	382

*Investigations into the Spleen Variability as found in School Children during August and December, 1927.*—The examination in December was the third and last for the year 1927, the two previous indices being obtained in February and August. At the time of the last index, current opinion in the town was to the effect that a serious epidemic of malaria was prevalent and that many school children were therefore absent for varying periods. Spleen examinations performed on children attending schools around Chilaw town revealed a considerably higher rate than heretofore, and absentees in some of the schools numbered over a third of those on the school register. At the initial examination (February, 1927) 710 were examined among the children in Chilaw town. At the last examination only 401 of those re-examined, 100 having left school altogether and 209 being absent—29 per cent. The percentage of absentees in August (second index) was only 5.3 per cent. Obviously, there was some disturbing factor producing a marked reduction of school-day attendances.

Table 9. (Re-examination of School Children to Demonstrate varying Spleen Rate.)

Ages.	February, 1927.				August, 1927.				December, 1927.					
	No. Ex- amined.	Posi- tive.	S. Index.		No. Ex- amined.	Posi- tive.	S. Index.		No. Ex- amined.	Posi- tive.	S. Index.	Left.	Absent.	
			Per Cent.				Per Cent.				Per Cent.			
3-5 ..	24 ..	2 ..	8.3 ..	18 ..	1 ..	5.5 ..	2 ..	4 ..	19 ..	—	—	3 ..	2	
6-9 ..	355 ..	73 ..	20.6 ..	330 ..	22 ..	6.6 ..	11 ..	14 ..	207 ..	22 ..	10.6 ..	22 ..	126	
10-12 ..	232 ..	52 ..	22.4 ..	183 ..	18 ..	9.8 ..	36 ..	13 ..	102 ..	15 ..	14.7 ..	59 ..	71	
13-15 ..	74 ..	8 ..	10.8 ..	59 ..	—	—	12 ..	3 ..	55 ..	4 ..	7.2 ..	12 ..	7	
16 and over ..	25 ..	—	—	19 ..	—	—	2 ..	4 ..	18 ..	—	—	4 ..	3	
Total ..	710	135	—	609	41	—	63	38*	401	41	—	100	209†	

\* 5.3 per cent.

† 29.0 per cent.

The spleen indices for December show that that month is a half-way house to the indicator (spleen rate) of malaria incidence among the group of children examined. The greatest number of absentees found in December belonged to the groups that showed the highest spleen rates last February and in all probability will repeat the same appearance in February, 1928. From this it would appear (not unreasonably) that the children in the age groups 6-9 and 10-12 years particularly are not very well in December, and that malaria is probably the cause of their absence from school. Due to the want of time and personnel, it was not possible to perform any blood examination. In December only 58 per cent. of the original number in the age-group 6-9 could be re-examined and 44 per cent. in the age group 10-12 years.

If children under 12 years are taken collectively, the rate for December was 11.2 per cent. in contradistinction to 7.7 per cent. in August and 20.8 per cent. in February. However, it must not be forgotten that a large number of the children were absent on the day of examination.

Table 10. (Spleen Indices as found in February, August, and December, 1927.)

Period.	Children under 12 Years.			Subjects over 12 Years.		
	Number Examined.	Positive.	S. R.	Number Examined.	Positive.	S. R.
			Per Cent.			Per Cent.
February, 1927 ..	611 ..	127 ..	20.8 ..	99 ..	8 ..	8.0
August, 1927 ..	531 ..	41 ..	7.7 ..	78 ..	—	—
December, 1927 ..	328 ..	37 ..	11.2 ..	73 ..	4 ..	5.4

The month of August, i.e., the period when rainfall is not abundant in Chilaw, is apparently a period of malaria quiescence.



An increase in the spleen rate for December would signify enlargement of the spleen—either from fresh infections or relapses. A comparative table of the ratio of enlargements, diminution, and stationary spleens is given below:—

Table 11. (Ratio of Stationary Spleens.) Rate per Cent.

Month.	Non-palpable.	1 Finger.	2 Fingers.	3 Fingers.	4 Fingers.	Umbilicus.
August ..	84.8	15.1	16.6	—	—	—
December ..	86.0	12.2	14.1	16.8	—	—

Number of Diminished Spleens.

Month.	From F 1 to Non-palpable.	From F 2 to F 1 and 0.	From F 3 to F 2, 1, and 0.	From F 4 to F 3, 2, and 1.	Total.
August ..	72	15	6	3	96
December ..	14	2	3	—	19

Number of Enlargements.

Month.	From 0 to F 1, 2, 3.	From F 1 to F 2 and 3.	From F 2 to F 3 and 4.	From F 3 to F 4 and U.	Total.
August ..	8	—	—	—	8
December ..	33	3	—	—	36

The enlargements in August were only 8 as compared with 36 in December, while the diminutions in August were 96 (72 being from F 1 to normal) as against only 19 (14 being from F 1 to normal) in December.

It is important to know the numbers examined and re-examined at each of the indices. They are, therefore, given in Table 12.

Table 12. (Numbers examined at the different Indices.)

Period.	Age-groups.				
	3-5 Years.	6-9 Years.	10-12 Years.	13-15 Years.	16 and over.
February, 1927 ..	24	355	232	74	25
August, 1927 ..	18	330	183	59	19
December, 1927 ..	19	207	102	55	18

A large number of children were absent on the day of examination held in December, 1927, presumably through fever.

Table 13. (Relative Percentage of the Variations in Splenic Volume as determined by the Examinations in August and December, 1927.)

Age-group.	August.			December.		
	Stationary.	Diminished.	Enlarged.	Stationary.	Diminished.	Enlarged.
3-5 years ..	83.3	11.1	5.5	100	—	—
6-9 years ..	82.4	16.3	1.2	86.4	4.3	9.1
10-12 years ..	79.2	19.6	1.6	79.4	7.8	12.5
13-15 years ..	88.9	3.6	6.8	91.1	8.4	—
16 and over ..	100	—	—	100	—	—

Table 13 demonstrates clearly the marked rise in the percentage of enlargements detected between the ages 6 and 12 years. It is in the same identical age limits that the greatest number of absentees was found in school in December, 1927.

The total number of enlargements found in February, 1927—among the school children only—was 135; 41 were found in August and 41 in December.

Of the 135 palpated in February, 73.3 per cent. were of one-finger size, 16.2 of two-fingers size, 8.1 of three-fingers size, and 2.2 of four-fingers breadth. In August, out of a total of 41 enlargements, 68.2 per cent. were of F 1 size, 24.3 of F 2, and 7.3 of F 3 sizes respectively. In December, out of a total of 41 positive spleens, 65.8 belonged to the F 1 category, 21.9 to the F 2 group, 9.7 to the F 3 class, and 2.4 to the F 4 size. The negative spleens for the same periods were 80 per cent., 67 per cent., and 89 per cent. respectively. It must be pointed out that in December only 56 per cent. of the original number examined in February were available for re-examination.

*Inquiries into the prevalence of Malaria as determined by the Examination of Persons attending the Local Hospital (Chilaw) for Fever Treatment.*—The method of analysis (shown in the case of work done at Kurunegala) indicates that malaria in and around Chilaw town assumes almost a hyperendemic nature when active transmission commences, i.e., from November to end of March (coincident with the north-east monsoon). Out of a total of 487 blood films (from all age-groups) taken, 70 were found positive (P. R. 14.3) in the following numerical prevalence, simple tertian 32, malignant tertian 21, and quartan 17. The simple tertian parasites easily outnumbered the others during the months of November and December.

*Conclusions.*—Conclusions in malaria survey can never be permanent. Work done, however, shows that—

(1) The town of Chilaw possesses a moderate endemicity of malaria which is amenable to the influences of good social conditions as demonstrated by the wide range of fluctuation in enlarged spleen manifestations.

(2) Such endemicity is most pronounced in the age groups 6-9 years and 10-12 years.

(3) There appears to be no marked geographic localization of the intensity of malaria in the town, excepting the bazaar area which is relatively free from malaria.



(4) The largest number of spleens generally found belongs to the one-finger group of enlargements, affecting chiefly the period of 6-9 years of age.

(5) Malaria transmission in Chilaw town cannot be said to be very active.

(6) The Tamils, apparently, suffer more from the disease than either the Sinhalese or "Others."

The commencement of the year 1928 has heralded an active anti-malaria campaign in Chilaw town, which consists of measures against Anopheline larvae and the quininization of school children on a systematic and efficient basis.

(ii.) *Kurunegala*.—Kurunegala is the chief and largest town in the North-Western Province. The population of the town as determined at last Census was 10,187. The town and its immediate environs are under more or less intensive cultivation, particularly paddy and coconut.

The town has had an unenviable reputation for malaria. The rainfall is drawn both from the south-west and north-east monsoons.

The spleen work in Kurunegala town was confined to schools within the town, to areas of collective habitations (generally termed villages) situated within the confines of the Local Board area, and to the town proper. Those whom inquiry revealed as living out of Kurunegala town are entirely excluded from all the computations, figures, &c., although the data for them is available.

Table 14. (Results of Examination conducted in the Town in February, 1927.)

Children under 12 Years Examined at School.			School Children over 12 Years Examined at School.			Total for Kurunegala Town.					
						Children under 12 Years Examined at School and outside School.			School Children over 12 Years Examined at School and Residents over 12 Years Examined outside School.		
Number Ex- amined.	Positive.	S. R. Per Cent.	Number Ex- amined.	Positive.	S. R. Per Cent.	Number Ex- amined.	Positive.	S. R. Per Cent.	Number Ex- amined.	Positive.	S. R. Per Cent.
486	244	50.2	319	79	24.7	904	399	44.1	409	92	22.5

Judging from the spleen rates obtained among school children it might be said that malaria is severely endemic in Kurunegala town as compared with other towns, e.g., Chilaw. Of great importance in the course of determining the incidence of malaria in a town is a recording of the different sizes of the spleens found. Briefly stated, it is clear that the greater the number of small spleens in young children the greater is the transmission of malaria that has just occurred. The small, soft spleen, slightly tender on palpation, spells recent infection, which condition should not be confused with the small, hard spleen not tender on palpation, which is a retrogressive manifestation.

Table 15. (Spleen Analysis.)

Under 12 Years.							Over 12 Years.						
Year.	Number Enlarged.	Spleen Sizes and Totals.					Year.	Number Enlarged.	Spleen Sizes and Totals.				
		F 1.	F 2.	F 3.	F 4.	U.			F 1.	F 2.	F 3.	F 4.	U.
1927	155	84	38	20	4	9	1927	13	7	5	1	—	—
1923	71	22	29	14	4	2							

The above table shows an enormous preponderance of the smallest palpable spleen in 1927, as against the number found in 1923. There is no doubt that when the survey was made in February, 1927, the population was just emerging from a severe season of malaria. Taking into consideration the entire town area, of the 244 enlarged spleens palpated in children under 12 years, 77, 75, 44, 16, and 32 were of 1 finger, 2, 3, 4 fingers and umbilical size respectively.

*Distribution of Malaria in Kurunegala Town, 1927.*—The town has been arbitrarily divided into nine sections for the dual purposes of investigation work and control measures.

Table 16. (Classification of Children and Adults in their respective Sections.)

Section.	Children 0-12 Years.								Adults over 12 Years.							
	Number Examined.	Positive.	S. R. Per Cent.	Spleen Sizes.					Number Examined.	Positive.	S. R. Per Cent.	Spleen Sizes.				
				1	2	3	4	U				1	2	3	4	U
1	168	69	41.0	27	23	5	5	9	87	18	20.6	6	6	2	1	3
2	58	10	17.2	7	1	2	—	—	39	5	12.8	5	—	—	—	—
3	41	14	34.1	9	4	1	—	—	7	1	14.2	—	—	1	—	—
4	253	133	52.5	41	41	24	6	21	142	31	21.8	10	4	9	1	7
5	23	14	60.8	1	6	4	1	2	3	—	—	—	—	—	—	—
6	102	31	30.3	25	4	1	—	1	35	6	17.1	6	—	—	—	—
7	173	95	54.8	39	25	20	5	6	69	24	34.7	10	6	2	4	2
8	76	30	39.4	10	9	6	3	2	21	5	23.8	1	2	—	—	2
9	10	3	30.0	2	—	1	—	—	6	2	33.3	—	2	—	—	—
Total	904	399	41.1	161	113	64	20	41	409	92	22.4	38	20	14	6	14
Out of town	184	63	34.2	30	17	12	2	2	92	24	26.0	16	6	—	1	1
Grand total	1,088	462	42.4	191	130	76	22	43	501	116	23.1	54	26	14	7	15



Only one section (section 5) gave a rate of over 60 per cent. in those under 12 years, but the total number examined was so small (23) that it greatly reduces the value of such a finding. Sections 4 and 7 gave in children under 12 years the high rates of 52.5 per cent. and 54.8 per cent., respectively, and it will be shown in the adult grouping, too, that these two sections are high in the order of spleen rates. The component villages and sections which form sections 4 and 7 are—

*Section 4.*—Theliyagonna, Kandy road, Gettuane, Muttettugala, Pollathupitiya.

*Section 7.*—Habage, Medamegama.

*Contribution from each Section to the Enlargements found.*—Under the best of conditions malaria surveys are problems of random sampling with a varying margin of probable error, so that the smaller the number examined in any group the less reliable the conclusion to be drawn therefrom as to malaria prevalence.

Where F 1 spleens are concerned—in children under 12 years—sections 4 and 7 jointly contributed a half (49.6 per cent.) of the total number. In the case of F 2 spleens they contributed 58.3 per cent. of the total in that group of enlargement. Considering F 3 spleens, they together contributed 64.7 (nearly a third) of the total found. It seems clear, therefore, that there is definite evidence of the unequal distribution of malaria in some parts of the town of Kurunegala.

*Intensity of Malaria in the different Age-groups.*—It is definitely known that the age of the individual involved plays a very important rôle in the epidemiology of malaria. It is common knowledge that even within areas so small that the exposure to infection may be considered uniform, the incidence of the disease will vary greatly among the different age groups.

Table 17. (Spleen Rates among the Classified Age-groups.)

Age-group.	Number Examined.	Number Positive.	Spleen Rate. Per Cent.
0-2 years .. ..	48	21	43.7
3-5 years .. ..	144	67	46.5
6-9 years .. ..	439	201	45.7
10-12 years .. ..	273	110	40.2
13-15 years .. ..	90	23	25.5
16 and over .. ..	319	69	21.6

From the above table it will be seen that the highest rate is obtained in the age-group 3-5 years, very little difference, however, existing between the groups 0-2, 3-5, 6-9, and 10-12 years. The fact that the age-groups up to 12 years of age do not show any great differences in spleen rates demonstrates the presence of some active factor, which, in this case, is the very severe past season of malaria (1926). On analysing further figures, it is found that sections 4 and 7 gave the highest spleen rate for each age-group, and that section 2 gave the lowest spleen rate for most of the age-groups.

*Average Spleen, Average Enlarged Spleen.*—The remarks for the above indices mentioned for Chilaw hold good here, and will, therefore, need no repetition.

Table 18.

Spleen Rate Group.	Number Examined.	Number Positive.	Average Spleen Rate for Group.	Increase of Splenic Substance in Grammes per 100.	Average Enlarged Spleen (Grammes).
0-10 .. ..	—	—	—	—	—
10-20 .. ..	97	15	15.4	1,546	1,000
20-30 .. ..	137	37	27.0	1,890	475
30-40 .. ..	416	142	34.1	5,134	200
40-50 .. ..	395	164	41.5	7,379	227
50-60 .. ..	268	133	49.6	7,373	198

Subjects who contributed to groups 40-50 and 50-60 lived exclusively in sections 4, 5, and 7. There is no doubt, therefore, that the villages that go to form sections 4 and 7 are areas of high endemicity.

*Changes in the Splenic Volume determined by Examinations Performed in June and October, 1927.*—With a view to recording the splenic fluctuation from time to time in a given group of subjects living under the same climatic conditions and exposed more or less to bites of Anophelines, re-examinations of school children—the only group of subject on whom re-examinations could be performed with accuracy—were carried out in June and October, 1927. The total number of children examined in February and June was 508 and 480 respectively. In October it was possible to re-examine 425 of the number examined primarily.

The total number of enlargements was 168 and 143 in February and June, respectively. In October 91 were found enlarged.

Table 19. (Re-examinations Performed at the Kurunegala Schools.)

Age.	February, 1927.			June, 1927.			October, 1927.		
	Number Examined.	Positive.	Spleen Rates.	Number Examined.	Positive.	Spleen Rates.	Number Examined.	Positive.	Spleen Rates.
			Per Cent.			Per Cent.			Per Cent.
3-5 years .. ..	15	3	20	15	3	20	12	4	33.3
6-9 years .. ..	242	98	40.5	229	71	31.0	196	34	17.3
10-12 years .. ..	161	54	33.5	152	46	30.2	136	41	30.1
13-15 years .. ..	61	11	18.0	56	17	30.3	54	10	18.5
16 and over .. ..	29	2	6.9	28	6	21.4	27	2	7.4
Total .. ..	508	168	—	480	143	—	425	91	—



From a study of Table 19 it would appear that the time of the last examination synchronized with a comparatively quiescent period in the prevalence of malaria.

Table 20. (Spleen Indices as found in February, June, and October, 1927.)

Period.	Children under 12 Years.			Subjects over 12 Years.		
	Number Examined.	Positive.	S. R. Per Cent.	Number Examined.	Positive.	S. R. Per Cent.
February ..	418	155	37.0	90	13	14.4
June ..	396	120	30.3	84	23	27.3
October ..	344	79	22.9	81	12	14.8

Discrepancies in numbers examined are very small so that the spleen rates obtained in October could be safely taken to indicate no active propagation of malaria.

Table 21. (Indicating the Number of Spleens in Various Stages as observed during February and October, 1927.)

Age groups.	Number Examined in February.	Number Examined in October.	Spleen Sizes.		
			Stationary.	Diminished.	Enlarged.
3-5 years ..	15	12	10	—	2
6-9 years ..	242	196	123	36	37
10-12 years ..	161	136	77	35	24
13-15 years ..	61	54	34	11	9
16 and over ..	29	27	22	3	2
Total ..	508	425	266	85	74

The percentage stationary (all ages) in June was 62.3 per cent., diminished 23.1 per cent., and enlarged 14.3 per cent.

The same children examined in October gave a stationary per cent. of 62.8 per cent., diminished 20 per cent., and enlarged 17.4 per cent. Although there were 83 less children examined in October, there does not appear to be any marked fluctuation in the spleen picture of the town. In June there was a total of 69 enlargements, and 74 in October.

Table 22. (Table showing the Number and Ratio of Enlargements for all Ages.)

Period.	From 0 to F 1 and 2.	From F 1 to F 2 and 3.	From F 2 to F 3 and 4.	From F 3 to F 4 and U.	From F 4 to Umbilicus.	Total.
June, 1927..	48 69.5%	13 18.8%	6 8.7%	1 1.4%	1 1.4%	69
October, 1927	52 70.2%	18 24.3%	2 2.7%	1 1.3%	1 1.3%	74

Table 22b. (Table showing the Number and Ratio of Diminutions (all Ages).)

Period.	From F 1 to Negative.	From F 2 to F 1 and 0.	From F 3 to F 2, 1, 0.	From F 4 to F 3, 2, 1, 0.	From U to F 4, 3, 2.	Total.
June, 1927..	60 54.0%	27 24.3%	15 13.5%	2 1.8%	7 6.3%	111
October, 1927	45 52.9%	26 30.6%	9 10.6%	5 5.9%	—	85

From Table 22b it is seen that the greater total reduction of spleens occurs before the onset of the south-west monsoon rains, and that figures for October indicate a more general settling down of conditions relating to spleen enlargements. The rates of diminution are more than maintained in October, and also are large in all the important and easily reducible spleen size groups.

Table 23. (Table showing the Ratio of Stationary Spleens in the Various Sizes.)

	June.	October.
Stationary at 0 (non-palpable)	78.2	93.6
Stationary at one-finger breadth	20.2	1.8
Stationary at two-fingers breadth	23.6	3.0
Stationary at three-fingers breadth	25.0	0.7
Stationary at four-fingers breadth	50.0	—
Stationary at Umbilicus	11.1	0.7

Table 23 reveals very strikingly the absence of any upheaval in the factors of malaria transmission during the period of last examination. Between February and June the disturbances were sufficiently great to produce wide variations in the percentage stationary in each spleen group. In October conditions were more settled as indicated by the fact that among the stationary spleens 93.6 per cent. remained non-palpable as determined in June.



*Inquiries into the Prevalence of Malaria as determined by the Examination of Patients attending the Local Hospital for Fever Treatment.*

Table 24. (Percentage of Fever Attendances at the Hospital for each Month and for Whole Period of Work.)

Month.	Total Examined.	Percentage from Town.	Percentage from out of Town.	Percentage under 12 Years within Town.	Percentage over 12 Years within Town.
May ..	83	38	62	28	72
June ..	235	34	66	16	84
July ..	208	36	64	13	87
August ..	145	52	48	13	87
September ..	161	31	69	13	87
October ..	285	36	64	16	84
November ..	367	29	71	19	81
December ..	313	35	65	14	86
Total ..	1,797	35	65	16	84

We know that meteorological factors, particularly rainfall, have an important bearing on the incidence and transmission of malaria. Relapses and fresh infections are more or less proportional to the intensity and amount of rainfall. The seasons of rainfall are essentially the south-west and north-east monsoons. Their periods are familiar to all. From the above table it will be seen that the influence exerted by the south-west monsoon in producing an alteration of malaria incidence is not so potent as the effects exerted by the north-east monsoon. The total number examined in May is very small owing to the fact that the examinations were not instituted until the second week of the month. As malarimetry concerns mostly the young children—up to 10 or 12 years—the percentage treated during the months of July–September is very significant as it bears out the spleen findings performed in October, when the lowest spleen index (22.9) for the three indices was obtained. The advent of the north-east rainfall co-incidentally increases the number of attendances in all groups shown. The figures given are purely comparative and cannot be regarded as very strictly accurate, as there are several factors operating upon an individual attending the hospital for fever treatment.

*Blood Findings.*—This work was co-ordinated by taking blood samples from patients examined. All the blood examinations were made at the Central Office, Colombo. The results are as follows:—

Table 25. (Blood Samples taken from Patients Attending the Hospital for Fever Treatment.)

Month.	In Town.						Out of Town.					
	Under 12 Years.			Over 12 Years.			Under 12 Years.			Over 12 Years.		
	Number taken.	Positive.	P. R. Per Cent.	Number taken.	Positive.	P. R. Per Cent.	Number taken.	Positive.	P. R. Per Cent.	Number taken.	Positive.	P. R. Per Cent.
May ..	9	1	11.1	23	1	4.3	13	1	7.7	38	4	10.5
June ..	13	—	—	67	6	8.9	28	6	21.4	127	13	10.2
July ..	10	1	10.0	66	6	9.1	13	—	—	119	4	3.3
August ..	9	2	22.2	67	1	1.5	5	1	20.0	63	2	3.2
September ..	7	2	28.6	44	8	18.2	10	—	—	100	8	8.0
October ..	17	8	47.0	86	24	28.0	33	12	36.3	149	24	16.1
November ..	21	10	47.6	86	16	18.6	39	6	15.4	221	50	22.6
December ..	16	2	12.5	95	10	10.5	20	2	10.0	182	24	13.2
Total ..	102	26	25.5	534	72	13.4	161	28	17.3	999	129	12.9

From Table 25 it will be seen that the parasite rate in children has been generally higher than the rate in adults throughout the work done. A total of 1,796 blood films were examined, of which 102 were obtained from young children living in the town, which gave a parasite rate of 25.2 per cent. The months of June, July, and August gave rates of a lower value in conformity with spleen findings as established at the examination in October.

*The Seasonal Prevalence of Malaria Parasites.*

Table 26. (Species of Parasites as found in all Age-groups in and out of Town.)

Month.	In Town.				Out of Town.			
	Number Positive.	S. T.	M. T.	Qt.	Number Positive.	S. T.	M. T.	Qt.
May ..	2	—	1	1	5	2	2	1
June ..	6	3	—	3	19	9	7	3
July ..	7	5	1	1	4	4	—	—
August ..	3	—	1	2	3	—	—	3
September ..	10	3	3	4	8	2	3	3
October ..	16	13	3	—	18	10	5	3
November ..	13	10	1	2	28	23	3	2
December ..	7	6	1	—	13	9	4	—
Total ..	64	40	11	13	98	59	24	15



Table 26 is an important one in that it shows unmistakably the remarkable manner in which simple tertian (*P. Vivax*) parasites predominate in the fever season. Quartan parasites maintain a steady rate throughout the period unlike malignant tertian, which tend to increase during the period of active transmission. The table lends itself to a fuller discussion, which, however, cannot be done in a report of this nature.

*Conclusions.*—(1) Malaria is severely endemic in Kurunegala.

(2) Malaria is unequally distributed in the town of Kurunegala, sections 4 and 7 being the worst affected.

Anti-malaria work was instituted in Kurunegala town in January, 1928, and it is proposed to deal with the problem from all possible points of view.

(b) *Anti-Malaria Campaigns*: (1) *Anuradhapura*.—The work of this campaign was started in June, 1923, and has now reached the fifth year of its activities. Good progress was made during the year under review in carrying on anti-mosquito work, which was the only preventive method adopted by the campaign in 1927.

The chief measures employed to prevent breeding of Anopheline mosquitoes were filling and draining, oiling and paris green spraying, and fish introduction.

Greater attention was paid during the year to filling, sloping, and draining with a view to eliminating the breeding places of Anophelines as much as possible, as oiling and paris green spraying, apart from the constant recurring nature of the supervision, labour, and expenses involved in their application, depend so much for their success on the faithful devotion to duty of the coolies concerned. This becomes all the more important at Anuradhapura as the surface soil in the greater part of the town is composed of a thick, whitish clay which holds up the water on the surface, and after even a moderate shower of rain a countless number of minute pools are left behind in which the water is held up sufficiently long to allow them to become ideal breeding places for Anopheline mosquitoes.

There were other considerations too which influenced the adoption of this policy of paying more attention to filling and draining than to oiling and paris green spraying. These considerations were, to a great extent, based on some of the practical difficulties met with in the course of oiling and paris green spraying, which tend to impair their efficiency as larvicides.

Some of the considerations above referred to may be mentioned here:—

(a) The oil film is disturbed by people who get into the water for various purposes, by cattle that wade into the water to drink, by tortoises and frogs that are found in large numbers in pools, and by the wind (in those places exposed to the wind) during heavy blowing.

(b) Oiling and paris green spraying are called for during the rainy season, but such weather conditions are unfavourable for obtaining good results by these methods, as the rains soon destroy the oil film and also cause the particles of paris green to sink to the bottom.

(c) The large number of cattle that graze in open spaces in the town leave behind large numbers of hoof prints in the neighbourhood of pools and other collections of water, and into these water oozes, so that they afford suitable breeding places for Anophelines.

*Labour Force.*—At the beginning of the year the labour force was distributed as follows:—

(a) An oiling gang of 5 coolies with 1 kangany.

(b) A gang of 22 coolies with 1 kangany for general maintenance work and for clearing pools, &c., of weeds. These two gangs were supervised by 1 overseer.

(c) A gang of 20 coolies with 2 kanganies for maintaining Halpanu-ela. This gang was supervised by a junior overseer and an overseer.

(d) A paris green gang of 2 coolies supervised by an Entomological Assistant.

It was seen that the maintenance gang could satisfactorily maintain the various works as well as spare a few days in a month for new works. Similarly the Halpanu-ela gang was also able to spare some time for filling pools and borrow pits and for cutting drains in the reservations near Halpanu-ela. Accordingly, for a few months during the middle part of the year, they were employed in doing such works whenever time could be spared. However, the fact that the different gangs were doing work outside of what they were primarily intended to do, creates a false impression as to the costs of different items of work, e.g., the cost of labour of the Halpanu-ela gang would be put down as the cost of maintaining the ela even though the coolies were engaged in other work for several days in the month, which thereby creates an exaggerated impression as to the cost of maintaining the ela.

Therefore, it was considered necessary to revise the strength of the various gangs and also to create a new gang to undertake new works. This was done during the closing months of the year and the revised strength of the gangs is as follows:—

Name of Gang.	Number of Coolies.	Overseers.	Kanganies.
Oiling .. ..	5 ..	— ..	1 ..
Maintenance ..	14 ..	— ..	1 ..
Paris green ..	5 ..	— ..	— ..
Halpanu-ela ..	14 ..	1 ..	— ..
New works ..	35 ..	1 ..	— ..

Average strength.

In addition to paid labour the campaign had the assistance of prison labour for filling borrow pits and clearing jungle. The strength of the Convict Brigade varied from time to time, and the total aggregate attendance for the year was 13,351.

*Halpanu-ela.*—The recutting of this ancient channel was completed in 1926, and it was maintained in a very satisfactory condition during 1927.

Further, much progress was made during the year in improving the banks by turfing, filling, and opening up side drains wherever they were found necessary. The reservations belonging to the channel were kept free of scrub jungle. Seepage water was creating a large number of small swamps in the reservations of Tracts 1 and 2, which was controlled very satisfactorily by



cutting suitable drains to catch the water. In the course of this work some of the drains which were considered unnecessary were filled up. Now, the banks and the reservations all along the channel are maintained in a dry condition and free of scrub jungle.

The maintenance gang (employed in connection with the maintenance of this channel), which had a strength of 30 coolies and 2 kanganies under an overseer at the beginning of the year, was reduced towards the end of the year to 14 coolies under the overseer. Kanganies were considered unnecessary.

The total length of the channel that had to be maintained was 16,520 feet. The total number of side drains which had to be maintained was 120 of a total length of 8,210 feet.

*Filling.*—A large number of pools and borrow pits were filled during the year. Filling was done whenever possible for two reasons. Firstly, to reduce the constant recurring maintenance and oiling charges, and, secondly, definitely to stop the breeding of Anophelines in such places by permanent measures. It should be mentioned here that more activity in this connection was shown during the second half of the year after the formation of a separate gang of coolies for that purpose.

*Draining.*—During the year 54 new drains were cut in various parts of the town. The total combined length of these drains was 13,118 feet. Another drain, 304 feet long, was opened up with prison labour in the Puttalam road area.

*Oiling.*—Oiling was done in the area included within  $1\frac{1}{4}$  mile radius of the Brazen Palace ruins.

This area was divided into six sections and a section per day was oiled, so that during the six working days of the week the oiling gang was able to cover the whole area. Accordingly, each breeding place received an application of oil once a week.

The following is a statement of the type of breeding places oiled and the number of applications for the year:—

Type of Breeding Place.				Number of Applications of Oil for the Year.	
Pools	..	..	..	..	2,507
Borrow pits	..	..	..	..	1,193
Stone quarries	..	..	..	..	134
Earth drains	..	..	..	..	2,963
Built drains	..	..	..	..	1,634
Swamps	..	..	..	..	1,781
Abandoned earth wells	..	..	..	..	581
Abandoned built wells	..	..	..	..	385
Disused irrigation channels	..	..	..	..	891
Ponds	..	..	..	..	1,701

*Paris Green Spraying.*—At the beginning of the year there was no systematic paris green spraying being done, but before the year was far advanced arrangements for obtaining the supply of the mixture regularly from Colombo were made and spraying on a small scale (with two sprayers) was organized. It was seen that it would be more convenient to adulterate the paris green with coir dust on the spot, and accordingly a mixer was obtained towards the middle of the year and mixing was started on the spot.

However, even this number of sprayers is insufficient to cover the large area under paddy cultivation, and this being the only preventive treatment that can be employed in paddy fields, more sprayers could be put in use, especially during the puddling seasons.

*Fish Introduction.*—All the wells in town had larvivorous fish introduced into them during the second half of the year. Each well received between 10 and 20 fish, and all the fish required were obtained from the local nursery.

*Jungle Clearing.*—As breeding places were noticed to be hidden away in patches of jungle, and as the edges of some drains were overgrown with vegetation, it was found necessary to clear the scrub jungle from such places. The total area thus cleared was 322,476 square feet. It may be mentioned here that, although a large number of breeding places were stopped by filling during the year, other breeding places were exposed as a result of clearing the scrub jungle. Keeping down the vegetation on both banks of the Halpanu-ela involved the clearing of 381,600 square feet. In addition the prisoners cleared the scrub jungle on both banks of Malwatu-oya between Dickson road and Mihintale road.

*Anuradhapura Hospital Malaria Figures.*—Anuradhapura hospital serves a large district, and malaria cases from outlying villages too seek treatment at the hospital. Further, the town dwellers go out to the villages outside the protected area for a few days or weeks during the paddy sowing and reaping seasons and there expose themselves to infection. Again, a large number of the patients may or may not be suffering from relapses. Therefore, the hospital statistics are not a true index as to prevalence of malaria in Anuradhapura.

Anuradhapura Hospital Malaria Figures.

Year.	Total Number of Cases for the Year.	Year.	Total Number of Cases for the Year.
1920 ..	.. 10,336	1924 ..	.. 11,508
1921 ..	.. 14,141	1925 ..	.. 8,499
1922 ..	.. 13,051	1926 ..	.. 11,418
1923 ..	.. 17,189	1927 ..	.. 9,188

*General Remarks.*—A large part of the activities of this campaign during 1927 can be put down as maintenance works. Such works as oiling, paris green spraying, general maintenance, and maintenance of Halpanu-ela have all passed their initial stages and have now become parts of daily routine work. The only new works undertaken can be summarized as filling, draining, and clearing scrub jungle. It may be noted that paris green spraying, which was more or less in an experimental stage in 1926, was organized on a proper working basis in the middle of 1927.



The number of borrow pits, &c., which had to be oiled varied with the season of the year, some of them running dry during the dry season. On an average between 150 to 200 breeding places in the town were treated by oiling, and the cost of labour alone for the year was Rs. 1,418.19. Paris green spraying was solely confined to paddy fields during the year, but it is intended to extend it during 1928 to include some of the swamps and such other places.

Of the total cost of labour about 50 per cent. goes to meet the expenses of oiling, paris green spraying, and maintenance works, the balance being the cost of labour of new works. December figures show that Rs. 582.57 were spent on new works and Rs. 595.65 on maintenance and other works, such as oiling and paris green spraying.

*Spleen Survey performed at Anuradhapura in October, 1927.*—The spleen survey performed in October revealed a very satisfactory reduction in the spleen rates since anti-malaria measures were instituted in 1923.

Table 27. (Comparative Figures of Spleen Surveys Performed on School Children.)

Period.	Number Examined.	Positive.	Spleen Rate. Per Cent.
1922 .. ..	328	137	41.8
1927 .. ..	451	82	18.1

Apart from the significance of the above figures, the unanimous opinion of residents long in the town, teachers, and others is that there has been a material reduction of fever in the town and that mosquitoes are now comparatively few. The reduction in spleen rates is all the more striking since no quinine measures, other than those established in 1924 and performed for six months, were adopted.

At the examination carried out in October, 1927, a total of 412 school children (resident in town) was palpated, out of whom 72 (S. R. 17.4 per cent.) were found positive to enlargement of the organ.

Table 28. (Classification of School Children Examined into Age-groups and Residence.)

Age-group.	In Town.			In and Out of Town.		
	Number Examined.	Positive.	S. R. Per Cent.	Number Examined.	Positive.	S. R. Per Cent.
3-5 years .. ..	18	5	27.7	18	5	27.7
6-9 years .. ..	203	40	19.7	222	46	20.7
10-12 years .. ..	112	17	15.1	123	19	15.4
13-15 years .. ..	54	9	16.6	59	11	18.6
16 and over .. ..	25	1	4.0	29	1	3.4

From the above table it would appear that the school-going population of Anuradhapura town and its immediate environs was not disturbed nor was the attendance at school disorganized by malaria fever. It must, however, be pointed out the examination was performed at a period of comparative malaria quiescence.

Of the school-children resident in town, and under 12 years age, a total of 333 examined gave a spleen rate of 18.6 per cent., while in 79 over 12 years of age a rate of 12.6 per cent. was obtained.

(2) *Trincomalee: Maintenance of Anti-Malaria Works.*—The work in the town is in charge of Mr. S. da Silva, Sanitary Inspector, who is supervised by Dr. O. G. Weerasinghe from Anuradhapura.

*Nature of Work done: Drains.*—There are in all 288 drains in Divisions Nos. 2, 3, 4, 9, and 11 within the limits of the Local Board, whilst there are 3 drains of the Fish Nursery outside the Local Board limits included in the above total, which are also maintained. It must be mentioned that the sides and basins of these drains are being cleared of dried leaves blown by the wind, dung, and more especially grass and small undergrowth, which latter grow very rapidly and consequently need attention during the whole year. The removal of silt and the regrading of some of the drains to allow storm water to flow is also a very important part of the maintenance of drains.

The chief causes of the falling in of the sides of drains could be attributed to—

- (1) Erosion due to storm water.
- (2) Erosion due to tide.
- (3) Cattle hoofs.
- (4) Wheel tracks.
- (5) People treading on them.

*Tanks.*—There are 6 tanks, namely, Kandakulam, Horse Pond, Sivan tank, Tamarakulam, Sinnathodia kerry, and Muttucumarusamy kerry. Of these, 5 are regularly cleaned, debris removed, and edges trimmed and oiled. As Muttucumarusamy kerry is used for temple purposes, "Top Minnows" were introduced.

*Marshy Areas.*—There are four areas, which are as follows:—

- (1) Land known as Admiralty Flats.
- (2) Yard Cove.
- (3) Sivan area.
- (4) Uppuveli.

Admiralty Flats are low lying and after heavy rains the whole area is under water, whilst Yard Cove area is more of a salt marsh, low lying, and subject to heavy and constant tidal flushing. Uppuveli area is also low lying and liable to tidal flushing. This area is sparsely populated as it is more or less jungle land. All the areas mentioned above are regularly attended to by oiling.



*Investigation Work.*—The balance of the wells in Divisions 5 to 11 were examined during the first quarter of the year, as the other Divisions numbering 1 to 4 were examined the previous year. A fresh examination was carried out during the latter part of this year in Divisions 1, 2, 3, 4, 5, 6, 8, 9, 11, and Maniaveli. The total number of breeding places examined was 1,204, out of which 1,041 were wells, 6 tanks, 4 swamps, and 153 pools and water collections. Of the wells examined, 290 proved positive for Anopheline larvae and did not contain any "Millions" at the time of examination.

*Fish Introduction.*—4,162 "Top Minnows" were distributed into 653 wells, whilst 388 of the total number of wells examined had fish in them at the time of examination and proved negative to Anopheline breeding.

*Oiling.*—The oiling of mosquito breeding places was carried out systematically by an oiling brigade consisting of 4 coolies and 1 head cooly. The machine for spraying now in use is a "Four Oaks Knapsack Sprayer."

The areas cleaned and oiled regularly are—

- (a) Admiralty Flats.
- (b) Maniaveli swamps and low lying lands, including quarry pits, borrow pits, pools, and water collections.
- (c) Marshy area in Yard Cove.
- (d) Swamps in Division No. 9.
- (e) Uppuveli area in Division No. 11.
- (f) Railway station site and along the railway line, also pools, tanks, collections, channels, drains, and disused wells in Divisions Nos. 1, 2, 3, 4, 9, and 11.

The quantity of oil used from January to December of the year was as follows:—

					Gallons.
Kerosine oil	..	..	..	..	109
Liquid fuel	..	..	..	..	456

costing Rs. 398.94.

*Jungle Clearing.*—About 5 acres of jungle were cleared in Sivan area, in the Residency, land belonging to the Local Board, and patches of jungle in lands where anti-malaria work was done previously. Jungle to a breadth of 4 feet was also cleared round the Public Works Department pits in Maniaveli.

*Quinine Distribution.*—During the month of February the distribution of 10,474 five grains and 8,026 three grains quinine tablets was made at all the schools in the town.

4. *General: Propaganda.*—Lantern lectures were given at all centres of work and demonstrations of mosquitoes, their habits, mode of application of larvicides, &c., were given to the schools in Chilaw and Kurunegala.

*Other Work.*—Assistance was rendered to the Medical Entomologist during the spleen survey of the proposed Dumbura Valley site of the future University. A report of anti-malaria work at Kataragama (July-August) was forwarded to the Director of Medical and Sanitary Services on October 22, 1927. It may also be stated that a Memorandum on Malaria Control in Ceylon was prepared by the present writer before he was actually appointed by Government as Superintendent, Anti-Malaria Campaign. A copy of it is annexed to this Report.

March 3, 1928.

K. J. RUSTOMJEE,  
Superintendent, Anti-Malaria Campaign.

## MALARIA CONTROL IN CEYLON.

Memorandum prepared by the Department of Medical and Sanitary Services, June, 1927.

### CONSTITUTION AND GOVERNMENT.

THE Government of Ceylon is vested in the Governor. He is assisted by an Executive and a Legislative Council.

(2) *Provincial Administration.*—Ceylon is divided into nine Provinces, each in the hands of a Government Agent who is assisted by one or more Assistant Government Agents.

(3) The officer next subordinate to the Government Agent or Assistant Government Agent is the Chief Native Headman, who is differently styled in different districts. There are about 110 Chief Headmen in the Island.

(4) Next to the Chief Headmen ranks the superior headman, called in the maritime Sinhalese districts Vidane Arachchi, in the Kandyan Sinhalese districts the Korala, and in the Tamil districts the Udayar. There are about 613 such men.

(5) Lastly comes the Village Headman who is in charge of one or more villages. There are about 4,000 Village Headmen.

(6) *Municipalities and Local Boards.*—Each of the three principal towns (Colombo, Kandy, and Galle) has been created a Municipality, of which the affairs are administered by a body corporate consisting of a Chairman (who, in the case of Colombo, is a member of the Civil Service and nominated by the Governor, and in the cases of Kandy and Galle, the Government Agent) and a number of elected members and of nominees of the Governor. Every ratepayer who



possesses a house of the annual value of Rs. 180, or every tenant who pays a monthly rental of Rs. 15, or is a graduate of a university is qualified to vote for the election of a Councillor. In fourteen of the smaller towns the administration has been entrusted to Local Boards of Health and Improvement, composed of the Government Agent or Assistant Government Agent or a person nominated by the Government Agent as Chairman, two other Official Members, and three Unofficial Members. The maintenance of roads other than main thoroughfares is the duty of the Provincial and District Road Committees, while the administration of village affairs and the working of rules connected with irrigation are vested in Gansabhawas or Village Councils.

(7) *Local Government.*—Ordinance No. 11 of 1920 provides for the establishment of District Councils throughout the Island to take charge of the sanitation, communications, and development of their district. District Councils are to elect their own Chairman, and are debarred from electing the Government Agent or his Assistant. Rural District Councils are to consist of four to eight members nominated by the Governor, but Urban and General District Councils are to be composed of from six to twelve members, of whom two-thirds are to be elected by the inhabitants. These local bodies are to be supervised by a Local Government Board. This Board was established in June, 1921, and Urban District Councils have been formed for Negombo, Ratnapura, Chilaw, Jaffna, Kalutara, Matale, Matara, and Panadure. These Councils will not be created in any area unless the people show a desire for them and preliminary notices are first issued to ascertain whether such desire exists.

#### PHYSICAL, CLIMATIC, AND ECONOMIC CONDITIONS.

##### A.—Physical.

- (1) Ceylon is a pear-shaped Island lying close to the southern extremity of the Indian peninsula.
- (2) It is situated between  $5^{\circ} 55'$  and  $9^{\circ} 50'$  North Latitude, and  $79^{\circ} 42'$  and  $81^{\circ} 53'$  East Longitude.
- (3) Its area is approximately 25,332 square miles (16,212,480 acres), its greatest length from north to south being 270 miles, and its greatest breadth from east to west being 140 miles.
- (4) Ceylon is a well watered country with numerous rivers and streams.
- (5) The hill-country covers, roughly, one-fifth of the total area and includes several high peaks, the highest being 8,292 feet.
- (6) The northern, eastern, and south-eastern plains of the Island are subject to prolonged periods of drought, and the water supply is restricted to large tanks resembling lakes.

##### B.—Climatic.

- (1) The climate is essentially tropical without any marked seasonal changes.
- (2) Broadly speaking, three main climatic zones or belts exist—a hot moist zone, a hot dry zone, and a cool moist zone.
- (3) The first two zones embrace the whole of the low-country and the foothills around the central hills, the last the great part of the hill-country.
- (4) The south-west and north-east monsoon periods are usually regarded in Ceylon as lasting from April to September and October to March respectively.
- (5) The average annual rainfall extends from less than 50 in. in the dry zone to over 200 in. in the sub-montane regions. The annual average at Colombo is about 85 in.
- (6) The shade temperature in the hill-country ranges between  $55^{\circ}$  F. and  $80^{\circ}$  F. While in the low-country it averages between  $80^{\circ}$  F. and  $95^{\circ}$  F. rarely rising above  $100^{\circ}$  F.
- (7) The annual average percentage saturation is of the order of 70 to 80. In the low-country the humidity is highest in the south-west.

##### C.—Economic Conditions.

- (1) Ceylon is mainly an agricultural country, the chief products being coconut, tea, rubber, and paddy.
- (2) Approximately 43 per cent. of the total area is cultivable, but only 19 per cent. is under cultivation.
- (3) Approximately 800,000 acres are under paddy cultivation, but the industry is not organized on commercial lines and intensive cultivation is practised in only a few districts.
- (4) Paddy is generally grown under irrigation, the water being obtained from streams, tanks, springs, &c., but in certain districts the paddy cultivation is entirely dependent on the rainfall.
- (5) The uncultivated lands in the low-country of Ceylon are clothed in luxuriant vegetation and jungle growth and in the hill-country occur as large, rolling grassy plains termed "patnas."
- (6) Development in the dry zone is greatly retarded by adverse economic and social conditions, malaria, parangi, and other diseases, difficult communications, insufficient rainfall, and absence of an assured water supply.

##### POPULATION.

- (1) At the Census of 1921, the total population was 4,504,549.
- (2) The Sinhalese total 3,016,659, Tamils 1,121,018, Moors 285,876, Burghers and Eurasians 29,532, Europeans 8,937, and Others 42,527.
- (3) In 1921 the urban population was 580,953, the ratio of the urban to the rural population being 1: 6.7.
- (4) The population in the hot, dry zone is relatively sparse as compared with the greater density in the moist south-west area and the hill-country.



## THE FACTORS AT WORK.

- (1) The earliest attempt to obtain information on the subject of malaria was made by the late Dr. A. J. Chalmers in 1905.
- (2) In 1908 instructions were issued by Sir Allen Perry, then Principal Civil Medical Officer, for the carrying out of a Spleen Census of the Island.
- (3) This census was limited to school children and to young children and young persons (up to 15 years of age) attending the dispensaries for treatment.
- (4) Similar examinations were made in subsequent years, the last being made in 1918 when the examinations were limited to school children.
- (5) In the years 1911 and 1913, investigations into malaria prevalence in certain towns and anti-malaria works were performed. The workers at that time included Lieut.-Col. S. P. James, Dr. P. H. Bahr, Dr. S. T. Gunasekera, and others.
- (6) The appointment of Mr. H. F. Carter as Government Malariologist was effected in 1921, and apart from anti-malaria work of a minor nature in certain towns and areas, the period 1921-1926 was confined to malaria investigation work of a purely original nature.
- (7) The Government Departments most concerned in the control of malaria are the Department of Medical and Sanitary Services, the Public Works Department, the Railway Department, and Irrigation Department.
8. The Boards appointed for promoting efficient organization and co-operation in anti-malaria work are (1) the Anti-malaria Advisory Board and (2) the Departmental Committee (of the Medical and Sanitary Services Department) on malaria.

## THE MEDICAL AND SANITARY SERVICES OF CEYLON.

- (1) The Department of Medical and Sanitary Services is under the control of the Director of Medical and Sanitary Services.
- (2) There are also attached to the Department 1 Deputy Director of Medical and Sanitary Services, 1 Assistant Director of Medical Services, and 1 Assistant Director of Sanitary Services.
- (3) *The Medical Services.*—(a) As the Island is divided into nine Provinces, there are 9 Provincial Surgeons—corresponding to the Senior Medical Officers in the Malay States—who are in immediate charge of the administration and proper management of hospitals, dispensaries, &c., in their respective Provinces.
- (b) In 1926 there were 98 Government hospitals providing about 8,089 beds, and each in charge of fully qualified Medical Officers who are graded as Grade I. and Grade II. Medical Officers. There were in 1926 65 Medical Officers in Grade I. and 212 in Grade II.
- (c) In 1926 78 estate hospitals and 645 estate dispensaries were maintained by proprietors of estates.
- (d) There were 543 Government dispensaries in different parts of the Island in 1926, and 2,864,733 patients were treated at them and at the out-patient department of hospitals. The total number of apothecaries in 1926 was 404.
- (4) *The Sanitary Services.*—(a) The Sanitary Services are in charge of the Assistant Director of Sanitary Services, but under the full control of the Director of Medical and Sanitary Services.
- (b) In 1926 there were 2 Senior Medical Officers of Health and 19 Medical Officers of Health, who are in charge of the more important towns and districts of the Island. They are full-time officers and possess the necessary qualifications for public health service.
- (c) By means of an arrangement with the International Health Board of the Rockefeller Foundation of New York, an annual Fellowship for the purposes of studying different public health problems and methods in America and elsewhere is granted to officers interested in public health work. The cost of this scholarship is borne alternately by the Ceylon Government and the International Health Board.
- (d) With the aid of such scholarships studies in malaria in America, Italy, Palestine, and the Federated Malay States have been made.
- (e) The Sanitary Services possess a full-time Sanitary Engineer, a Sanitary Superintendent, 4 Supervising Sanitary Inspectors, and 229 Sanitary Inspectors.
- (f) An Engineering Division of the Sanitary Services is coming into existence shortly with a Sanitary Engineer lent by the International Health Board for a period of two years as Head of the Division. This staff will consist of 3 Assistant Engineers and the necessary draughtsmen and clerical assistance.
- (g) The Sanitary Services have detailed men to be in charge of certain sections of the railway line whose duties are to carry out any minor measures on station premises, *e.g.*, clearing scrub from the vicinity of railway bungalows, &c., maintaining the drains, &c., in good condition, and also to supervise such measures as oiling of pools, &c.
- (5) The main branches and campaigns of the Medical and Sanitary Services are—
  - (i.) The Bacteriological Institute.
  - (ii.) The Pasteur Institute.
  - (iii.) The Department of the Medical Entomologist (previously designated the Government Malariologist).
  - (iv.) The Anchylostomiasis Campaign—in conjunction with the International Health Board of New York, U. S. A.
  - (v.) The Parangi Campaign.
  - (vi.) The Division of Anti-malaria Campaigns.



# INVESTIGATIONS INTO MALARIA AND ANTI-MALARIA ACTIVITIES PERFORMED DURING THE PERIOD 1921-1926.

## A.—Investigations.

- (1) Investigation into malaria prevalence, &c., was carried out exclusively by the Malariologist and his staff.
- (2) The determination of the incidence and distribution of malaria in the Island by means of a spleen and parasite survey.
- (3) The relative prevalence of the different species of malaria parasites.
- (4) The seasonal incidence of the malaria parasites.
- (5) An inquiry into the effect of age upon the spleen and parasite rates, together with the determination of splenic values in Ceylon.
- (6) The identification, differential characters, and distribution of the indigenous species in the adult and larval stages.
- (7) The relationship of the indigenous species to malaria.
- (8) The Anopheline fauna of the rice fields of Ceylon.
- (9) The examination of anopheline breeding places and their relation to species production.
- (10) An inquiry into local natural enemies of Anophelines and their economic importance.
- (11) An inquiry into the value of imported (*Gambusia*) larvivorous fish.
- (12) The study of statistics relating to the incidence of malaria in the principal towns of Ceylon.

## B.—Prevention Work.

- (1) Anti-malaria campaigns of a minor nature have been conducted in certain towns and areas, e.g., Mahara Jail, Trincomalee, and Anuradhapura.
- (2) The measures have been restricted to filling, oiling, paris green distribution, minor drainage, and the use of larvivorous fish.
- (3) The establishment of fish nurseries for the safe propagation and later distribution of *Gambusia*.
- (4) Quinine administration to the populace has been tried twice in towns where other anti-malaria measures were in progress.
- (5) In one such town, for a period of six months, a total of 34,823 quinine tabloids (gr. 3 and 5) were distributed.

## THE CURE.

- (1) The cure of malaria rests chiefly in the hands of the Medical Officers in charge of hospitals and in apothecaries who are in charge of dispensaries and minor visiting stations.
- (2) The Ayurvedic physician is also a keen supporter of quinine medication.
- (3) Quinine is distributed free to the poor at all Government hospitals and dispensaries.
- (4) During the fever season, headmen, school teachers, &c., obtain quinine for distribution in their respective areas and schools.
- (5) All methods of quinine administration are practised in the hospitals.
- (6) Quinine to the value of Rs. 248,068 was issued free for preventive and curative purposes during the year 1926. The cost of quinine distributed in 1925 was Rs. 223,194.

## EDUCATIONAL METHODS.

- (1) The distribution of pamphlets in English, Sinhalese, and Tamil on any occasion where large gatherings are expected.
- (2) The demonstration by lantern slides of the problem as affecting Ceylon. This has been done in schools, colleges, towns, villages, and at exhibitions.
- (3) The use of a moving picture film depicting the entire history of malaria propagation and the value of anti-malaria measures.
- (4) The distribution (free of cost) to school teachers of pamphlets and books on Hygiene written in simple language and illustrated.
- (5) The distribution to Medical Officers of Health and Medical Officers of the Medical Services of a copy of "The Anopheline Mosquitoes of Ceylon" by Mr. H. F. Carter, Government Malariologist.

## ANTI-MALARIA PRECAUTIONS AS ADOPTED BY VARIOUS GOVERNMENT DEPARTMENTS.

### A.—The Surveyor-General's Department.

- (1) Instructions in circular form are issued regarding favourable camp sites for men in the field.
- (2) Pamphlets on malaria prevention and general sanitation are distributed to all field officers.
- (3) Field workers are provided with mosquito nets.
- (4) The supervising officers are provided with medicine chests and obtain a good supply of quinine tablets from the Civil Medical Stores.
- (5) Field workers are provided with filters.

### B.—The Postal Department.

Distribution of pamphlets in Government circular form and approved by the medical authorities to all Postmasters in the districts.

### C.—The Railway Department.

- (1) In 1925 District Inspectors were appointed to maintain in good sanitary condition the various stations, coolie lines, drains, compounds, &c.
- (2) A special Anti-malaria Inspector was appointed in 1921, whose duties entailed the cleaning and oiling of pools, filling in of low-lying lands in the close proximity of stations, draining of pits, closures of unsuitable drains, and the removal and burial of water-holding receptacles.



(3) Instructions are issued by the General Manager of Railways to all Station Masters to keep and maintain in good state all railway premises (including bungalows), station yards, lines, &c.

(4) A stock of quinine powder and Epsom salts is issued to all Station Masters and Foremen Platelayers in malarial districts. The Station Master is held responsible for administering the doses to the subordinate staff of all departments at his station, and officers of departments other than the Traffic Department must see that their men conform to this order. The Station Master is required to keep a record of quinine issued and quinine in hand, &c.

(5) Foremen Platelayers are held responsible in a like manner for all intermediate cooly lines in their districts.

(6) The higher officers and also Drivers and Guards can obtain their quinine from the Station Master at their station for self-treatment.

(7) Station Masters and Foremen Platelayers are enjoined to have a sufficient stock of quinine and to apply for a fresh supply in good time.

(8) Members of the Traffic, Locomotive, or Way and Works resident at stations are requested to obtain quinine and Epsom salts from the Station Master.

(9) Simple instructions, printed in Sinhalese and Tamil and giving directions for the prevention of malarial fever, have been prepared and distributed for the guidance of the subordinate staff, and a copy of each (both Sinhalese and Tamil instructions) must be exhibited and maintained in every set of lines irrespective of departments.

(10) Members of the department not paying attention to the instructions issued are liable to punishment.

(11) Houses of Station Masters, &c., in certain areas are made mosquito proof. Such buildings are frequently examined to see that they are in good repair.

(12) At stations situated in malarial districts, officers are posted for a period of one year only, but this period is reduced to six months in the case of stations situated in intensely malarious districts.

(13) Leave of absence of an officer stationed in a malarious district is permitted with the privilege of free passes at the discretion of the Head of his department, at intervals of not less than a fortnight, provided his duties do not suffer thereby.

(14) The Railway Department has done some filling in of borrow pits, *e.g.*, near Pesalai, Talaimannar, Trincomalee. This pits are under the close supervision and treatment of the officer in charge of the section until such time as more permanent measures are instituted.

#### D.—The Public Works Department.

(1) The activities instituted by this department against malaria are directed chiefly towards the adequate drainage of existing borrow pits and the abolition, in future, of the digging of borrow pits not permitting of a natural drainage.

(2) To ensure such being done, circulars have been issued by the Director of Public Works to all officers in the field.

(3) The circular states that—

(a) Borrow pits should, as far as possible, be avoided, and in no circumstances are they to be made unless efficient drainage is provided.

(b) Quarries are not to be opened without considering satisfactory means of drainage.

(c) Existing borrow pits and quarries must be drained at once. Where this is not possible, stagnant water should be oiled.

(d) The co-operation with health and sanitary officers in these matters is keenly invited.

(4) The apothecaries of the Medical Services visit the rural cooly lines at stated intervals.

#### E.—The Department of Agriculture.

Where malaria is prevalent, the following steps have been taken to combat it:—

(1) During the rainy season quinine is administered regularly to members of the staff and coolies who reside in areas termed "Experimental Stations" at the rate of 20 grains per week for adults in two doses with 1 ounce of Epsom salts. Children are given smaller doses in castor oil.

(2) Draining and filling of small pools.

(3) Cutting down of all undergrowth around lines and bungalows.

(4) The removal and burial of all water-holding receptacles.

(5) The above type of work at the more important experimental stations is in the charge of an officer of the Agricultural Department.

(6) All inspecting officers are required to pay attention to the general sanitation of lines, &c., at the various experimental stations.

#### F.—The Police Department.

(1) Precautions taken by the authorities of this department to keep their men fit depends primarily upon the intensity of malaria in the district in which the police station is.

(2) In the definitely malarious stations, the entire personnel is supplied with mosquito nets and systematic quininisation is carried out.

(3) Where malaria is not a serious menace mosquito nets only are provided.

(4) Quinine is stocked at every station in large towns and in district stations where malaria is prevalent.

(5) Pamphlets on malaria are stocked at stations and used at instruction classes.



## G.—Department of Education.

- (1) Distribution of circulars on the subject to school teachers.
- (2) Distribution of pamphlets on malaria to all schools.
- (3) Text books, *e.g.*, "A Manual of Hygiene for Ceylon Teachers" and "Light and Cleanliness" have special chapters dealing with malaria and its prevention. These books are widely used in the vernacular schools.
- (4) Government has made arrangements to supply free of charge to children in Government schools a sufficient quantity of quinine tablets from the nearest dispensary. The teacher is instructed to apply to the Government dispensary nearest his school and state the number of children attending his school who require quinine, and follow out the instructions given in the circulars and pamphlets.

## H.—Department of Irrigation.

- (1) The draining of borrow pits, clearing of belts of jungle in the vicinity of cooly lines and residences in jungle districts.
- (2) Circulars giving instructions to officers in the methods of personal precautionary measures, *e.g.*, quinine administration, wearing of mosquito boots at night, &c.

## BOARDS FOR MALARIAL CONTROL.

The two Boards appointed in this connection are the Anti-Malaria Advisory Board and the Departmental Committee of the Department of Medical and Sanitary Services.

The duties of the Anti-malaria Advisory Board are—

- (1) To receive reports from experts and advise upon these reports.
- (2) To consider the practical application of all suggested measures for the control of malaria as they may effect the different sections of the community.
- (3) To consider the best means of obtaining through co-operation from all sections of the community, and to consider the relative urgency and probable cost of proposed anti-malarial measures and submit estimates to Government.

The members of the Anti-malaria Advisory Board are—

- (a) The Colonial Secretary (Chairman).
- (b) The Director of Medical and Sanitary Services (Vice-Chairman).
- (c) The President, Local Government Board.
- (d) The Medical Entomologist (formerly Malarialogist).
- (e) The Assistant Director of Sanitary Services.
- (f) The Director of the Bacteriological Institute.
- (g) The Executive Officer-in-Charge of Anti-malaria Campaigns.
- (h) Several Legislative Councillors, representing a large portion of the country.
- (i) The Director of Education.
- (j) The Director of Public Works.
- (k) The Representative of the Low-country Products Association.
- (l) The Representative of the Planters' Association.
- (m) The Office Assistant to the Director of Medical and Sanitary Services as Secretary.

The duties of the Departmental Committee on Malaria are—

- (1) To initiate and control malaria campaigns in centres or areas approved by the Anti-malaria Advisory Board.
- (2) To consider and discuss the results of all investigations made at proposed campaign centres by the Medical Entomologist, the Executive Officer, Anti-malaria Campaigns, and others; and their practical application.
- (3) To consider programmes, including estimates of costs for anti-malaria works submitted by the Executive Officer, Anti-malaria Campaigns.
- (4) To consider any other matters relating to malaria prevention.

Its members are—

- (a) The Assistant Director of Sanitary Services (Chairman).
- (b) The Medical Entomologist.
- (c) The Sanitary Engineer.

Its Executive Officer is the Superintendent, Anti-malaria Campaign.

## VITAL STATISTICS.

## Hospital and Dispensary Returns of Malaria Cases.

Year.	Hospital Cases.	Dispensary Cases.	Malaria Case Fatality Rate Per Cent. (in Hospitals).
1910-1911	7,288	508,302	3.4
1911-1912	11,877	857,492	5.8
1912-1913	17,249	770,738	2.9
1914	14,208	758,156	3.1
1915	8,764	476,318	3.3
1916	12,618	670,301	2.3
1917	6,960	341,768	1.5
1918	8,154	359,700	1.6
1919	13,816	602,356	1.8
1920	16,538	488,832	1.5
1921	27,453	888,699	1.6
1922	29,377	956,810	1.6
1923	34,522	1,193,225	1.6
1924	26,865	925,476	1.8
1925	22,600	785,903	1.7
1926	29,334	1,061,457	2.15



## Splenic Surveys, Ceylon.

Year.	Children examined.	Spleen Rate.
1908 .. .. .	92,258	34.0
1911 .. .. .	109,526	20.6
1912 .. .. .	60,906	19.0
1914 .. .. .	54,874	43.9
1915 .. .. .	41,451	33.8
1916 .. .. .	47,100	35.6
1921 .. .. .	56,372	13.6

## Blood Examinations.

Children examined	.. .. .	5,040
Positive .. .. .	.. .. .	684
Rate .. .. .	.. .. .	13.5 per cent.

## The Proportional Prevalence of Malaria Parasites.

Films examined	.. .. .	11,260
Films positive	.. .. .	1,751
Benign tertian	.. .. .	57.7 per cent.
Quartan .. .. .	.. .. .	33.7
Malignant	.. .. .	10.1

## Malaria Morbidity at Mahara Jail, 1919-1926.

Year.	The monthly average of admission to the Jail Hospital as percentages of the average daily strength.
1919 .. .. .	6.5
1920 .. .. .	11.2
1921 .. .. .	13.3
1922 .. .. .	37.4
1923 .. .. .	29.4
1924 .. .. .	7.5
1925 .. .. .	4.6
1926 .. .. .	5.6

The commencement of investigations into malaria at the jail prior to the establishment of anti-malaria measures.



## 4.—Summary of Annual Report, 1927.

## HEALTH UNIT, KALUTARA.

The health unit of Kalutara was established on July 1, 1926, and is therefore in its second year of existence. In an area of 25 square miles and with a population of 33,000, the work was inaugurated by way of experiment with a view to introducing into small towns and rural areas of the Island intensive public health measures, paying attention in particular to the hygiene of the individual.

The environment determines to such a considerable extent the health and well-being of the individual that its control and adaptation to sanitary requirements have constituted an important phase of our work.

The Urban District Council and the Assistant Government Agent of Kalutara have entrusted to the health unit the general sanitation of the urban and rural sections of our area, respectively, and the voluntary agencies, such as the Social Service League, have closely co-operated in the maternal and infant welfare work.

The activities in which the health unit has been engaged during the current year are—

- (1) Sanitation.
- (2) Communicable disease control.
- (3) Maternal, infant, and pre-school hygiene work.
- (4) Health education.
- (5) Collection and analysis of vital statistics.

## SANITATION.

The sanitation of the health unit area has been improved upon during the current year, but in the absence of a public-owned pipe-borne water supply and an organized system of drainage the conditions prevailing cannot be said to be entirely satisfactory. The dry earth system of conservancy is the one in vogue in the urban area and the pit system in the rural area. A dry earth latrine costing as it does nearly a Rs. 100 constitutes an expenditure which many poor people residing in the urban area are unable to afford.

## Water Supply.

The only practical method of obtaining a fairly safe water supply has been by the construction of protected wells. The Assistant Government Agent was able to provide the funds for the construction of a public well at Koholana, where the universal custom had been to drink the water of a polluted stream. The Chairman of the Urban District Council also has obtained the necessary funds to repair and protect a well within the town limits for the use of the general public.

## Wells.

	1926. July-December.	1927.
Number of wells inspected .. ..	940	1,269
Number of inspections .. ..	—	1,488
Number defective .. ..	698	907
Number improved .. ..	9	46
Number newly built .. ..	—	7

## Disposal of Excreta.

The safe disposal of excreta is of considerable importance particularly in view of the relatively large amount of gastro-intestinal disorders prevailing in our area. Intensive latrine construction has therefore been one of our main undertakings.

## Latrines.

	1926. June-December.	1927.
Number of inspections .. ..	1,313	2,534
Number improved .. ..	32	140
Number newly constructed .. ..	—	101

## Disposal of Refuse.

The collection and disposal of town refuse is supervised and directed by the health unit, and the method of disposal adopted is that of dumping, which has been found to be quite satisfactory. We have by this means been able to convert at least a portion of the marshy weed-overgrown Compannawela, right in the heart of the town, into a less offensive and even beautiful spot.

## Drainage.

The drainage of the urban area in particular is in a deplorably bad condition and results in more complaints reaching us than from any other single cause. We have from time to time taken up this question with the local authorities, but our efforts can only be of an advisory nature in these matters. Mr. Dyer, the Sanitary Engineer of the Department of Medical and Sanitary Services, and Mr. Fernando, District Engineer of Kalutara, have undertaken to advise the Urban District Council on a scheme of drainage for the southern half of the town.

## Buildings.

All new buildings or alterations to buildings have to be approved by the health unit before their construction can be undertaken, and before a building can be occupied a certificate of conformity has to be obtained.



*Building Applications.*

Number of building applications allowed .. .. .	178
Number refused .. .. .	132
Total .. .. .	310

*Certificates of Conformity for Buildings.*

Number of buildings constructed .. .. .	26
Number of certificates of conformity granted .. .. .	20
Number of buildings repaired .. .. .	10

*Laundries.*

None of the laundries, even in the urban area, are licensed, and the result is that clothes are washed under conditions which are unsatisfactory. They often constitute a nuisance and even a menace to the health of our area. The average laundryman is very poor and unable to comply with the necessary requirements. We have, therefore, recommended to the Urban District Council that a model laundry be erected in Kalutara North to be rented out at a nominal cost. A site has already been recommended, and it is hoped that the work will be completed during the ensuing year.

*Food Sanitation.*

Our food sanitation work includes the supervision of all eating-houses, a limited examination of food-handlers, supervision of dairies, bakeries, and public markets, inspection of cattle and goats for slaughter, and periodical examination of milk from milk vendors.

*Eating-houses.*

Number of eating-houses existing .. .. .	25
Number defective .. .. .	19
Number improved .. .. .	19
Number of notices served .. .. .	22
Number of inspections .. .. .	581

*Dairies.*

The dairies in our area are without exception unsatisfactory, and it has been found impossible to get existing dairies to conform to all the necessary requirements. Mr. M. F. P. Gunaratne is constructing a model dairy in Kalutara North, and it will be completed early next year.

*Bakeries.*

The construction of a model bakery in Palatota in the rural area has been undertaken by Mrs. Amerasakera. The work has already been begun, but it is temporarily suspended owing to certain alterations which we consider desirable.

Number of bakeries existing .. .. .	28
Number defective .. .. .	24
Number improved .. .. .	19
Number of notices served .. .. .	18
Number of inspections .. .. .	516

## COMMUNICABLE DISEASES CONTROL.

The three main diseases with which we have had to deal are hookworm, typhoid fever, and dysentery, all diseases of the intestinal tract and all endemic in our area. Morbidity reporting with regard to the notifiable diseases has been achieved with some measure of success owing to the co-operation of the medical practitioners, the vedaralas, and the general public.

Hookworm is by far the most prevalent and most debilitating of all diseases in our area. The measures adopted for the control of this disease are—

- (1) Education of the public regarding aetiology, pathology, and prophylaxis of this disease—27 lantern lectures with an average attendance of 185 were delivered in the various parts of our area.
- (2) Hookworm survey—5,235 faeces tins were distributed, 3,921 collected, and 3,477 were examined. The percentage of infected was 75.
- (3) Intensive treatment—3,259 patients were treated. The drugs used being chenapodium and carbon tetrachloride.
- (4) Latrine construction.

*Hookworm Treatment.*

Number treated <i>en masse</i> .. .. .	2,730
Number treated at the health unit office and health centres .. .. .	229
Number referred to the civil hospital .. .. .	300

*Hookworm Examination after Treatment.*

Locality.	Before Treatment.			After Treatment.		
	Number Examined.	Number Positive.	Per Cent. Positive.	Number Examined.	Number Positive.	Per Cent. Positive.
<i>Urban Area.</i>						
Kalutara North .. .. .	275	192	69.7	—	—	—
Kalutara South .. .. .	237	163	68.8	—	—	—
Katukurunda .. .. .	179	123	68.6	—	—	—
<i>Rural Area.</i>						
Rural Area A .. .. .	748	569	76.0	172	79	45.9
Rural Area B .. .. .	977	706	72.4	105	47	44.7
Estates .. .. .	1,061	842	79.3	115	47	40.8
Total .. .. .	3,477	2,595	74.7	392	173	44.1



*Typhoid Fever.*

Sixty-four cases of typhoid fever were reported with 14 deaths during the current year, as against 14 cases and 6 deaths during the latter half of 1926.

The fatality rate for 1926 was 43 per cent.

The fatality rate for 1927 was 22 per cent.

It would not be unfair to presume that this reduction in the fatality rate for 1927 and its nearer approach to the standard 10 per cent. is due to a better reporting and more successful tracing of typhoid cases.

Cases of typhoid fever are reported from various sources—

	1926.	1927.
Doctors .. .. .	5	27
Vedaras .. .. .	4	6
Police Vidanes .. .. .	2	12
Public .. .. .	2	6
Detected .. .. .	1	13

A large percentage of the cases in 1927 was reported by medical practitioners and their co-operation in this respect was very valuable.

Typhoid fever being endemic in many parts of the Island it is not possible to prevent cases getting infected elsewhere and coming into our area. In nearly 25 per cent. of the cases of 1927 the source of infection was from without.

*Typhoid Fever-seasonal Distribution.*

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1927.												
Cases ..	1	5	8	11	2	12	3	7	6	3	5	1
Deaths ..	—	2	1	1	—	2	1	2	—	3	1	1
1926.												
Cases ..	—	—	—	—	—	—	2	1	1	3	6	1
Deaths ..	—	—	—	—	—	—	—	2	—	—	2	2

	Dysentery.	Chickenpox.	Measles (Cases).
1926, June-December	34	4	4
1927	55	63	8

*Vaccination against Smallpox.*

Locality.	Number Vaccinated.	Number Successful.	Number Unsuccessful.	Number Unknown.
Urban ..	350	326	2	22
Rural ..	758	743	6	9
Estates ..	82	81	1	—
Total ..	1,190	1,150	9	31

The Kinion method of vaccination was introduced into our area and seemed to be quite suitable to local conditions and even preferable to the old method of scarification.

## HYGIENE.

The work on maternity, infant and child hygiene has made considerable progress. The nurses, midwives, and the members of the Social Service League work in close co-operation with the Medical Officer of Health, and the success achieved is entirely due to the combined efforts of all.

A new centre for this work was opened at Kalamulla, in a building given by Mr. and Mrs. C. A. P. W. Jayasuriya, on September 10, 1927. Very satisfactory progress has been made at this centre, largely due to the assistance and co-operation of Mrs. Jayasuriya.

All arrangements for another centre at Lowmont estate have been completed with the assistance of Mr. Denham Till, the Superintendent of the estate.

The new centre at Koholana erected by Mudaliyar D. B. K. Goonetilleke on a site provided by Mr. Win. E. de Silva was opened by Lady Stanley on December 17, 1927.

The Kalutara South centre has been transferred to the Health Unit Office, with the consent of Dr. F. R. E. Bartholomeusz, District Medical Officer, Kalutara, who is in charge of this centre.

It will be observed that during the current year two new centres, both within the rural area, have been started and that two of the existing centres have been reorganized and rehoused under conditions more suited to our work.

The number of milk centres has been increased from one to four, and the cost of the milk which is approximately Rs. 125 per mensem is entirely borne by the Social Service League.

The attendance at the centres shows a decline during the first half of the year, but shows a steady increase during the second half of the year, and this latter is coincident with the appointment of a permanent Medical Officer of Health in June.

Showing the Number of Clinics held, Mothers, Infants, and Pre-school Children Registered, and Average Attendance at the various Health Centres during 1926-1927.

Centres.	Number of Clinics held.	Number of Mothers Registered.	Number of Infants Registered.	Number of Pre-school Children Registered.	Average Attendance.
	1926-1927.	1926-1927.	1926-1927.	1926-1927.	1926-1927.
Koholana ..	21-48	30-144	30-104	35-50	28-46
Kalutara South ..	11-50	28-80	22-91	7-36	8-10
Kalamulla ..	18-50	46-204	36-156	25-57	14-30
Kalutara North ..	18-50	56-154	27-97	21-76	12-20
Total ..	68-198	160-582	115-448	88-219	62-106



Two photographs showing the Kalamulla and Kalutara North Health centres are given at the end of this Report.

#### *Home Visits on Infants.*

Infants.				Number of Visits.
Number of infants registered	..	..	..	448
Number of home visits by nurses	..	..	..	1,809

#### *Home Visits on Pre-school Children.*

Pre-school Children.				Number of Visits.
Number of pre-school children registered	..	..	..	219
Number of home visits paid by nurses	..	..	..	1,343

The delivery of expectant mothers is undertaken by the midwives under the supervision of the nurses. Only cases examined by the Medical Officer of Health and nurses and found to be normal are entrusted to the midwives, the others being referred to the private medical practitioners or the Medical Officer in charge of the Civil Hospital.

#### *Deliveries.*

(Registered Mothers.)

By whom delivered.				Number 1927.
Health unit	..	..	..	276
Hospital	..	..	..	26
Medical practitioners	..	..	..	4
Private midwives	..	..	..	85
Total deliveries				391

#### *School Hygiene.*

Intensive school hygiene was started by way of experiment at Holy Cross College and St. John's School. The proportion of defects at these two schools was as follows:—

	Holy Cross College.				St. John's School.			
	Number Defects.	Per Cent. Defects.			Number Defects.	Per Cent. Defects.		
Vision	53	20.7	..	..	25	27.2	..	..
Hearing	8	3.1	..	..	1	1.1	..	..
Teeth	84	32.8	..	..	26	28.3	..	..
Tonsils	86	33.6	..	..	20	21.8	..	..

The mere detection of defects is of little use unless their subsequent correction can be achieved. With this object in view the children with defective vision were first taken up, as they constituted a considerable proportion of the total defective, and as their correction would involve the least amount of surgical interference. The most urgent cases were selected and after making suitable arrangements for their examination with the Superintendent of the Eye Hospital, and for their transport, two batches of children were sent by bus to Colombo, in charge of a teacher and one of our nurses.

After all this trouble had been taken few or none of the parents took the trouble to act on the advice that had been given by the Eye Surgeon.

School.	Number sent to Colombo.	Number Corrected.
Holy Cross College ..	10	2
St. John's School ..	11	—
Total ..	21	2

Owing to the non-co-operation of the parents and the inability of the principals to enforce the correction of these defects it was felt that these examinations were of no use, and our work was suspended until such time as some scheme could be devised for the correction of these defects.

#### HEALTH EDUCATION.

A series of 17 lectures on health matters was delivered to teachers of the English schools in Kalutara. The Girl Guides under Mrs. Dyson attended the last six of these lectures.

Another series of ten lectures on more elementary health subjects was delivered to the Village Headmen. At the close of the lectures an examination was held and 11 out of the 23 who sat for the examination were awarded certificates, which were presented to the successful candidates by His Excellency the Officer Administering the Government on the occasion of the anniversary of the health unit.

Dr. D. M. de Silva delivered a course of lectures to the vernacular teachers of the district and the teachers in our area as well attended them.

Five lectures on pure milk and several lectures on hookworm illustrated with lantern slides were delivered from time to time.

A course of lectures for vederalas has also been organized and will be put into effect at the beginning of the coming year.

A Little Mothers' League has been organized at Koholana.

In addition to the lectures, pamphlets, posters, leaflets, &c., were from time to time issued from the Health Unit Office with a view to educating the public.



## VITAL STATISTICS.

The improvement in morbidity reporting has been referred to in connection with typhoid fever.

The period within which the registration of a birth is required by law is 42 days and time is often allowed up to three months. This is a long time compared with the 10 days of certain more advanced countries. The result of this delay in registering a birth is that a number of babies and mothers are missed by us during the period of early infancy, when the risk to the mother and the baby is at a maximum.

In the case of stillbirths within the rural area the headmen do not receive a fee for reporting them to the Registrar. This is unfortunate as the tendency is either to report a stillbirth as a birth or not to report it at all.

		1926.		1927.
Birth rate per 1,000 population	.. ..	40.2	.. ..	39
Death rate per 1,000 population	.. ..	26.8	.. ..	26
Infant mortality per 1,000 births	.. ..	143	.. ..	116
Maternal mortality rate per 1,000 live births	.. ..	—	.. ..	15.5

(See page 98 for Organization Chart of Health Unit.)

Statement of Expenditure—January to December, 1927—Health Unit,  
Kalutara Badda.

Description.	Salaries. Rs. c.	Allowances, Rent, Diet, &c. Rs. c.	Total. Rs. c.	Grand Total. Rs. c.
<b>Personal emoluments—</b>				
<b>Permanent Staff—</b>				
1 Medical Officer of Health in charge	6,475 0	597 18	7,072 18	
2 Sanitary Inspectors	3,273 31	480 0	3,753 31	
1 Sanitary Inspector—3 months only	173 32	40 0	213 32	
3 Public health nurses—1 till April only	1,996 99	1,990 64	3,987 63	
3 Midwives—1 from July	801 40	274 65	1,076 5	
1 Clerk	492 0	30 0	522 0	
1 Peon	273 0	30 0	303 0	
1 Cooly	282 0	—	282 80	
1 Cooly for 2 months	47 20	—	47 20	
<b>Temporary Staff—</b>				
Medical Officer for 6 months	1,350 0	67 50	1,417 50	
Total personal emoluments				18,674 99
<b>Other charges—</b>				
Travelling expenses, approximate	—	—	2,238 13	
Rent of buildings	—	—	750 0	
Transport of stores	—	—	42 95	
Equipment and contingencies	—	—	170 93	
Stationery	—	—	46 78	
Incidental expenses	—	—	90 73	
Total other charges				3,339 52
			Grand total	22,014 51

Source of funds—Government : Rs. 22,014.51.

<b>Personal emoluments—</b>				
3 Sanitary Inspectors	2,659 0	720 0	3,379 87	
1 Midwife	600 0	—	600 0	
2 Overseers	696 0	—	696 0	
1 Market-keeper	384 0	—	384 0	
Coolies, scavenging and conservancy	11,536 93	—	11,536 93	
Total personal emoluments				16,596 80
<b>Other charges—</b>				
Water cart	—	—	453 22	
Contract—scavenging and conservancy	—	—	5,550 0	
Travelling allowances	—	—	960 0	
Incidental expenses	—	—	4 50	
Total other charges				6,967 72
			Grand total	23,564 52

Source of funds—Urban District Council : Rs. 23,564.52.

Grand total for 1927 : Rs. 45,579.03.

*Budget.*

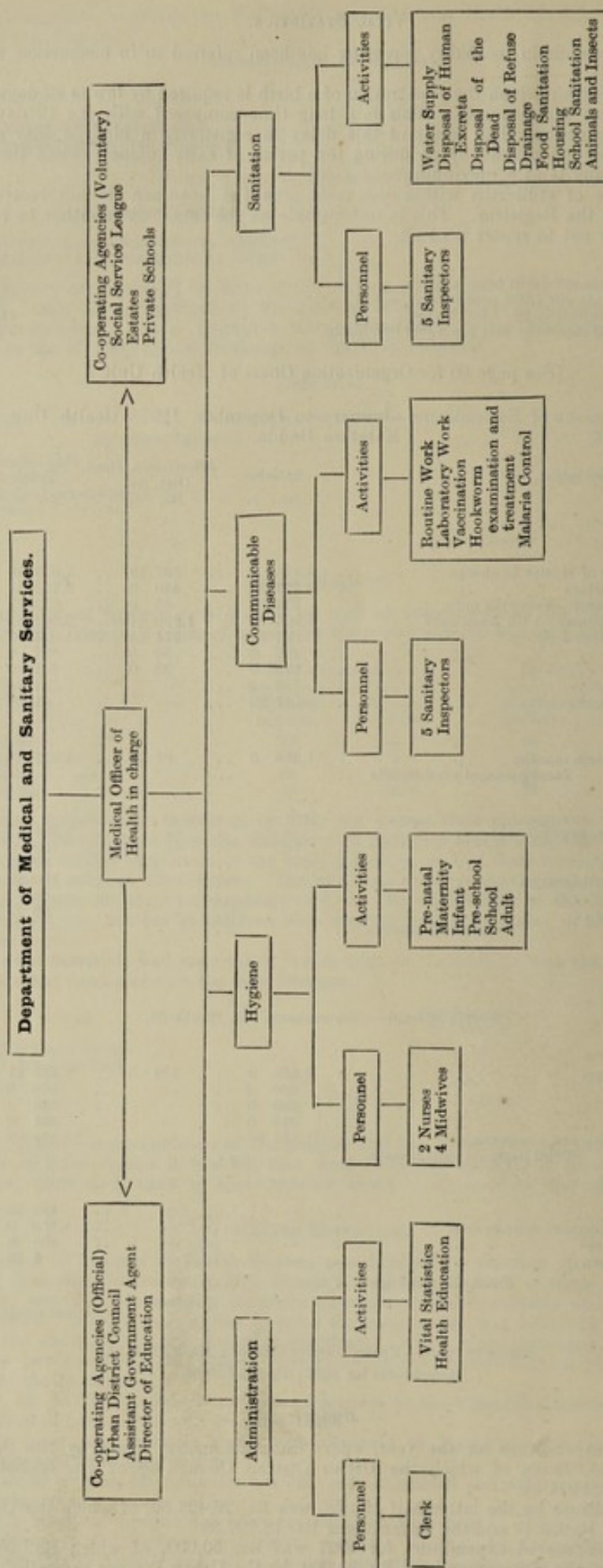
The total expenditure for the year, apart from the money spent by the Social Service League, is Rs. 45,579.03, of which the Urban District Council spent Rs. 23,564.52 and the Government Rs. 22,014.51.

The expenditure for the latter half of 1926 was Rs. 29,422.56, of which the Urban District Council spent Rs. 10,625.17 and the Government Rs. 18,797.39.

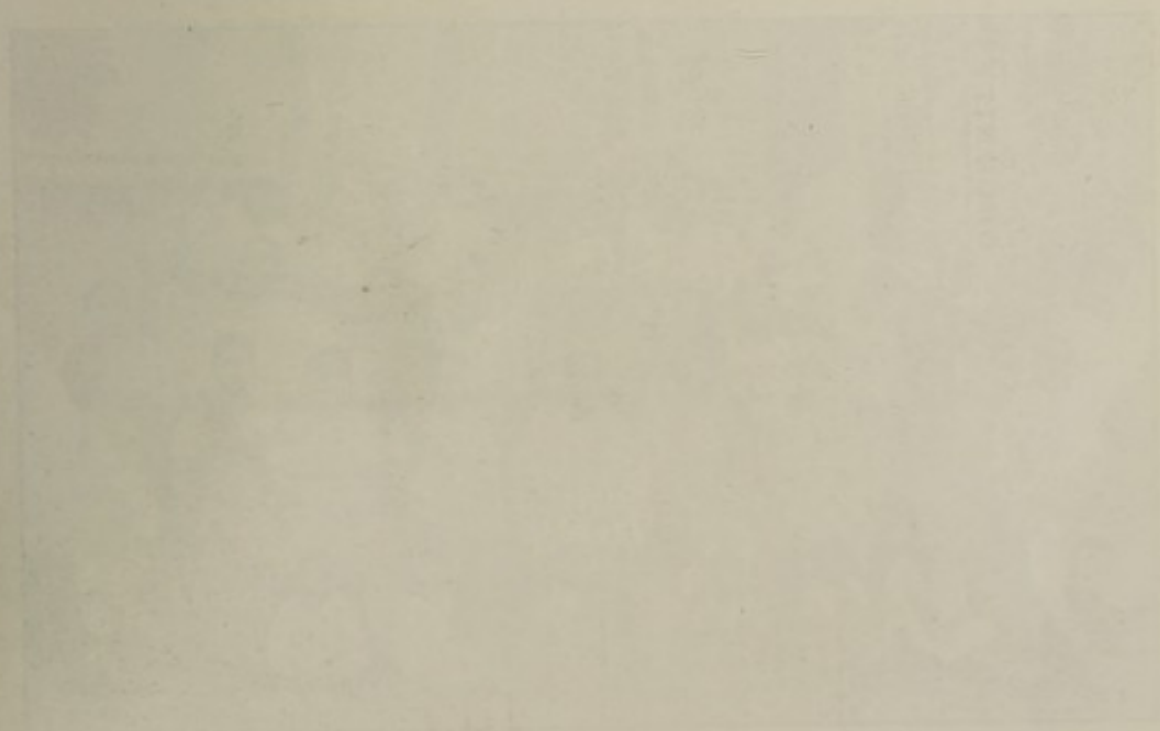
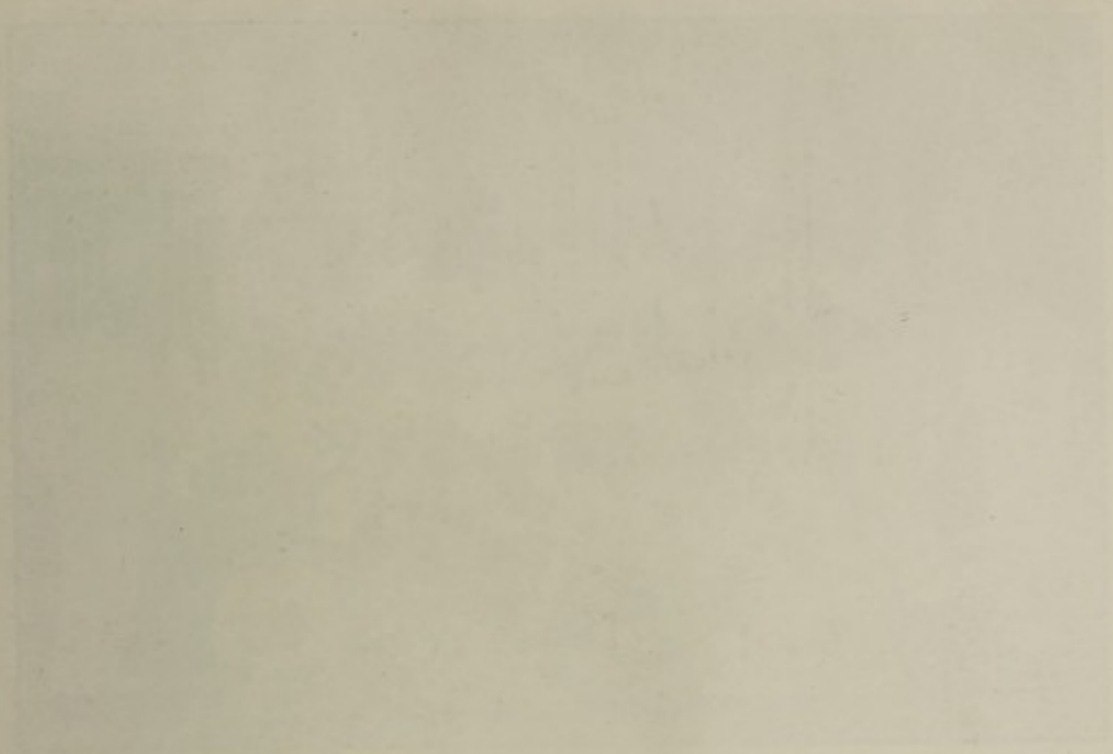
The total estimated expenditure for 1927 was Rs. 50,000, of which Rs. 26,000 was to have been spent by the Government and Rs. 24,000, by the Urban District Council.



# **ORGANIZATION CHART OF HEALTH UNIT.**











Kalamulla Health Centre opened 1927.



Kalutara North Health Centre—Seated are the Social workers at this centre. On the extreme left is Mr. M. F. P. Gooneratne, the donor of the present centre as well as the proposed new centre in this area.



It will be noted that the expenses estimated for the Urban District Council are very approximately the same as those incurred. In the case of the Government expenses there is a difference of about Rs. 4,000 between the estimated and the incurred. The difference is due to the following:—

	Rs.
1. Sanitary Inspector discontinued from March, salary and allowances approximately .. .. .	1,300
2. One cooly discontinued from March .. .. .	250
3. Medical Officer of Health remuneration and allowances estimated but not paid .. .. .	1,800
4. Midwives travelling allowances but not paid .. .. .	350
5. Rent for Clyde estate bungalow discontinued from July .. .. .	150
6. Equipment balance .. .. .	350
Total .. .. .	4,200

*Programme of Work planned for the Year under review.*

1. *Vital Statistics*.—To improve the certification of causes of death.
2. *Health Education*—
  - (a) To introduce systematic work in health education in schools.
  - (b) Course of lectures to headmen.
  - (c) Plan series of talks, lantern shows, and moving picture shows for the whole area.
3. *Maternity and Infant Hygiene*—
  - (a) To make service available to all parts of the area.
  - (b) For nurses to visit early and carry through at least the first year of life every new born infant. The vital statistics of the area have shown that 46 per cent. of the deaths occur before the child reaches the 5th year of life.
  - (c) To get in touch with all expectant mothers and to give them necessary assistance.
  - (d) To organize Little Mothers' classes.
  - (e) To develop school nursing.
  - (f) To organize a Baby Day towards the end of the year.
4. *Communicable Diseases*—
  - (a) To get better notification of all infectious diseases.
  - (b) To vaccinate every child against smallpox.
  - (c) To push on inoculation against typhoid fever.
  - (d) To give hookworm treatment.
5. *Sanitation*—
  - (a) To interest the public in a pipe-borne water supply for the town, and in improving the existing wells by covering them up and providing pumps.
  - (b) To act up to the slogan "for every home a latrine."
  - (c) To exercise better supervision over scavenging and conservancy and to provide efficient service.
  - (d) To improve all food-handling establishments.
  - (e) To provide a clean milk supply.
  - (f) To get cattle and pigs in compounds properly housed and to wage warfare against the rat, the fly, and the mosquito.

It will be observed from the foregoing that all the items of the above programme have been attempted and effected with an encouraging measure of success.

Morbidity and mortality reporting is conducted with a regularity and precision that is dependable. All the measures indicated for the education of the public have been undertaken and amplified and added to. The maternity, infant, and child welfare work has been well consolidated. The control of communicable diseases has been undertaken with an intensity that is possible only in a limited area such as ours.

The general sanitation has been improved by the safe disposal of refuse, by intensive latrine construction, and by a systematic supervision of scavenging and conservancy.

After a year and half's existence the Health Unit in Kalutara has justified its existence and the time has arrived when the work could be expanded and a more varied programme of work undertaken.

WALTER G. WICKREMESINGHE,  
Medical Officer of Health, Health Unit, Kalutara.

April 17, 1928.



### 5.—Report of the Sanitary Engineer for the Year 1927.

*Introduction.*—I arrived in the Colony on July 30 for the purpose of organizing a Division of Sanitary Engineering in the Department of Medical and Sanitary Services. In this work I have been assisted by the advice and co-operation of the Director of Medical and Sanitary Services and Dr. W. P. Jacocks, representative in Ceylon of the International Health Division of the Rockefeller Foundation.

Shortly after arrival, I made a tour, with Dr. Jacocks, to the most important points in the Island and thus made a slight acquaintance with the different climatic and topographical phases which would have to be dealt with. Much of the time since then has been taken up in securing personnel and equipment and becoming acquainted with the country and the people.

*Personnel.*—On arrival in the Colony, I found 1 Assistant Sanitary Engineer, Mr. W. G. McCarthy, and 2 clerks attached to the Sanitation Division's Office. These officers and an office were placed at my disposal by the Director of Medical and Sanitary Services. To secure the balance of the staff, the Director of Medical and Sanitary Services inserted advertisements in the various papers calling for applications for the post of one District Engineer, who was to be the Deputy Sanitary Engineer, 1 Assistant Sanitary Engineer, and 2 draughtsmen.

No suitable men applied for the post of Deputy Sanitary Engineer because the maximum grade only corresponded to that of a District Engineer of the Public Works Department. A good man in that Department would at least reach the grade of a Provincial Engineer. The attention of Government was called to this fact, and Government finally raised the maximum grade of the Deputy Engineer to that of a Provincial Engineer, with the understanding that the man chosen for this post would become the Sanitary Engineer on the departure of the present Sanitary Engineer.

After carefully studying the applications for the post of Deputy Sanitary Engineer, and personally interviewing the men who qualified, I recommended Mr. H. N. Worth, who was appointed by Government in due course.

Mr. J. W. de Alwis was appointed by Government to the post of Assistant Sanitary Engineer.

Mr. Worth and Mr. de Alwis are to report for duty on February 1, 1928.

Mr. C. D. Fernando and Mr. K. D. Goonetilleke were appointed by Government as Senior and Junior Draughtsmen respectively. They reported for duty on November 1, 1927.

*Malaria.*—A Malaria Advisory Board consisting of eighteen members, with the Colonial Secretary as Chairman, has been appointed by Government. This Board decides in what places malaria control work is to be carried out. The Board has decided that malaria control measures shall be started in Trincomalee, Anuradhapura, Chilaw, and Kurunegala. All these towns are very malarious.

The malaria control work is done under the direction of the Departmental Committee on Malaria, a committee in the Department of Medical and Sanitary Services and composed of the Assistant Director of Sanitary Services as Chairman, the Medical Entomologist, the Sanitary Engineer, and a Secretary. There is a Superintendent of Anti-Malaria Campaigns, who is in direct charge of the work.

The quarter ending September 30 was spent by the Committee in outlining the duties of the Superintendent of the Anti-Malaria Campaign and in discussing programmes of work.

During the quarter ending December 31, estimates for tools, materials, and labour were approved, methods of work were systematized, and other details were arranged. It was rather disappointing that control work was not started before the end of the year. The main reasons for not starting the work earlier were the high wage demanded by the coolies to start work during the holidays and the necessity of providing lines for the imported labour. However, work is to be started in Kurunegala on January 4, with the labour taken over from the local authorities.

*Engineering side of Malaria.*—An Assistant Sanitary Engineer has been surveying and running levels in Kurunegala since October 19. Some small surveys and 21 miles of levels have been finished.

Investigation and report were made on the malaria drainage of Trincomalee, and a conference is to be held in January with the Government and Railway Officials of that place with regard to the correction of the drainage.

An effort is also being made to incorporate the malaria drainage with the general drainage scheme of Chilaw.

The Committee has taken up with the General Manager of Railways the question of malaria prevention on the Tangalla Railway Extension.

It is not believed that much actual malaria control will be accomplished this season, but the Committee will have definite plans, supplies, and the nucleus of an organization with which they can make an early start next season. They should then be able to do efficient work and extend the scope of their activities, season after season.

*General Drainage.*—Reports were made or conferences held with regard to general drainage along the railway lines at Weligama, the general scheme of Kalutara South and Kurunegala. These are separate problems from the malaria drainage.

*Water Supplies.*—Investigations, reports, and recommendations were made for the improvement of the Ragama water supply. This supply is important as it provides water for the Anti-Tuberculosis Hospital and the Mahara Jail.

Most of the time has been spent on the proposed Tangalla water supply which is to provide water for Tangalla and Beliatta. This supply has special significance as it will be the first, small, low-country water supply that will have a purification system. In company with the Engineers of the Public Works Department, we took many different samples at different times, investigated the source, and gathered a great deal of other data.

Work is now being done on the details of the purification system.



Hambantota water supply will be postponed until the salinity point of the river is determined.

A suggested set of Water Plant Regulations has been sent to Government for approval. It is felt that a great deal of trouble and expense will be avoided if some sort of regulations are in force before many water supplies are installed. This question is still in abeyance.

This division now receives copies of all water analyses.

*Sewerage.*—Plans are now being drawn for a septic tank at Kurunegala.

*Miscellaneous.*—The many small questions that are received and do not require investigation are not reported here.

New problems called for much travelling to gather the preliminary data; the Sanitary Engineer travelled over 5,000 miles in five months.

Besides the work done on new projects, a great deal of time was spent on investigations and reports of existing projects, on personnel, equipment, and the listing of articles and books for study by the new Engineers.

December 31, 1927.

B. R. DYER,  
Sanitary Engineer.



## TABLES AND RETURNS.

The following tables and returns are annexed:—

## Table I.—

Return of Statistics of Population for the Year.

## Table II. (a)-(f).—

Meteorological Returns.

## Table III.—

Return of Diseases (Out-patients).

## Table IV. (a)-(d).—

## Charts.—

(a) Chart showing the General Systemic and Preventable Diseases treated at the Government Hospitals during the Year 1927.

(b) Chart showing Deaths from General Systemic and Preventable Diseases treated at the Government Hospitals during the Year 1927.

(c) Chart showing Cases of Infectious Diseases treated at the Government Hospitals during the Year 1927.

(d) Chart showing Deaths from Infectious Diseases treated at the Government Hospitals during the Year 1927.

Hospital Returns (as given in the Ceylon Blue Book for 1927):—

- (1) Details regarding Hospitals (Patients, Attendants, &c.) in each Province.
- (2a) Return of Diseases—Cases treated, according to Districts.
- (2b) Return of Diseases—Cases treated, according to Diseases.
- (3) Special Diseases.
- (4) Water Supply, &c., at Hospitals.

TABLE I.

RETURN OF STATISTICS OF POPULATION FOR THE YEAR 1927.

	Europeans.	Ceylonese, including Other Races than Euro- peans and Indian Immigrants.	Indian Immigrants.	Total.
Number of inhabitants on December 31, 1926	10,834	4,475,311	638,847	5,124,992
Number of births during the year 1927	168	181,223	24,079	205,470
Number of deaths during the year 1927	75	93,454	19,478	113,007
Number of immigrants during the year 1927	4,614	139,154	159,399	303,167
Number of emigrants during the year 1927	4,094	116,355	111,379	231,828
Number of inhabitants on December 31, 1927	11,447	4,585,490	691,855	5,288,792
Increase of population	613	110,179	53,008	163,800

TABLE II. (a).

Colombo.

Meteorological Return for the Year 1927.

	Temperature.						Rainfall.			Winds.		
	Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.		Average Force.
	°F.	°F.	°F.	°F.	°F.	°F.		9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.	A.M.	P.M.	Miles.
January	149.9	69.5	86.5	72.3	14.2	79.4	5.66	73	80	NE	Var	130
February	150.5	69.9	87.6	72.9	14.7	80.2	3.67	72	80	NE	Var	105
March	147.8	72.1	87.7	74.2	13.5	81.0	5.91	74	83	Var	W	89
April	144.2	72.6	88.9	75.4	13.5	82.2	11.00	71	81	SW	WSW	96
May	141.8	75.1	86.9	77.3	9.6	82.1	22.65	78	82	SW	SW	133
June	140.0	74.4	85.6	77.0	8.6	81.3	8.64	79	84	SW	SW	155
July	140.8	74.0	85.4	76.8	8.6	81.1	2.87	78	82	WSW	SW	141
August	142.7	74.5	86.9	77.2	9.7	82.0	0.52	74	80	SW	SW	147
September	141.8	73.2	86.8	75.3	11.5	81.0	9.18	75	80	WSW	WSW	140
October	146.1	71.9	86.9	74.6	12.3	80.8	10.12	71	82	WSW	WSW	108
November	147.1	70.8	86.4	73.8	12.6	80.1	7.43	72	80	NNE	WNW	95
December	146.1	69.2	88.0	72.7	15.3	80.4	3.63	68	76	NE	N	127
	144.9	72.3	87.0	75.0	12.0	81.0	91.28	74	81			122



TABLE II. (b).

## Jaffna.

Meteorological Return for the Year 1927.

		Temperature.						Rainfall.			Winds.			
		Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.		Aver- age Force.	
									9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.	A.M.	P.M.		Miles.
		°F.	°F.	°F.	°F.	°F.	°F.							
January	..	149.7	69.6	83.9	72.7	11.0	78.4	7.17	74	78	ENE	ENE	89	
February	..	154.4	72.3	86.0	75.0	11.0	80.5	3.32	73	76	Var	Var	90	
March	..	155.6	74.8	88.8	77.8	11.0	83.3	1.50	74	81	SE	Var	127	
April	..	155.6	77.9	89.1	80.1	9.0	84.6	5.64	76	75	S	Var	223	
May	..	151.2	79.6	86.5	80.9	5.6	83.7	3.28	81	82	SW	SSW	290	
June	..	148.6	78.4	85.6	80.4	5.2	83.0	0.47	79	79	SW	SW	398	
July	..	148.7	77.9	85.9	79.9	6.0	82.9	0.25	75	77	SW	SSW	369	
August	..	152.2	78.0	86.2	79.2	7.0	82.7	0.00	79	78	SSW	SSW	355	
September	..	152.4	77.4	85.7	78.9	6.8	82.3	1.56	78	79	SW	SW	333	
October	..	154.7	75.7	86.1	77.6	8.5	81.8	5.74	78	78	Var	Var	210	
November	..	116.4	72.1	84.0	75.2	8.8	79.6	5.26	76	79	Var	Var	113	
December	..	147.8	70.1	82.9	73.2	9.7	78.0	3.04	78	78	NE	NNE	86	
		148.9	75.3	85.9	77.6	8.3	81.7	37.23	76	78			224	

TABLE II. (c).

## Galle.

Meteorological Return for the Year 1927.

	Temperature.						Rainfall.			Winds.		
	Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.		Average Force.
	°F.	°F.	°F.	°F.	°F.	°F.		9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.	A.M.	P.M.	Miles.
January ..	—	71.1	84.6	74.2	10.4	79.4	3.10	80	84	E	Var	109
February ..	—	71.1	85.2	74.7	10.5	80.0	7.55	78	82	Var	Var	116
March ..	—	73.2	85.6	76.0	9.6	80.8	10.73	80	84	Var	Var	120
April ..	—	73.9	86.2	77.7	8.5	82.0	5.53	76	83	WNW	W	141
May ..	—	75.2	84.3	77.7	6.6	81.0	20.09	81	84	WNW	WNW	238
June ..	—	75.1	83.1	77.3	5.8	80.2	9.00	85	87	WNW	WNW	286
July ..	—	73.9	81.8	76.0	5.8	78.9	6.93	87	88	WNW	WNW	272
August ..	—	74.7	82.8	77.6	5.2	80.2	4.90	85	87	WNW	WNW	282
September ..	—	73.9	82.8	76.9	5.9	79.8	10.05	84	86	W	WNW	265
October ..	—	73.7	84.0	76.0	8.0	80.0	5.44	79	85	WNW	WNW	215
November ..	—	72.6	84.4	74.9	9.5	79.6	9.78	79	82	NW	WNW	169
December ..	—	71.8	83.9	74.5	9.4	79.2	5.17	82	85	Var	W	116
		73.4	84.1	76.1	8.0	80.1	98.27	81	85			194



TABLE II. (d).

## Nuwara Eliya.

Meteorological Return for the Year 1927.

	Temperature.						Rainfall.			Winds.	
	Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.	Aver- age Force.
		°F.	°F.	°F.	°F.	°F.		9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.		
January ..	—	46.1	68.6	49.6	19.0	59.1	13.04	71	80	—	—
February ..	—	44.8	69.2	48.3	20.9	58.8	3.17	61	74	—	—
March ..	—	47.5	70.3	50.9	19.4	60.6	6.04	66	77	—	—
April ..	—	43.1	71.8	47.1	24.7	59.4	4.08	62	76	—	—
May ..	—	52.8	69.1	55.3	13.8	62.2	13.90	82	86	—	—
June ..	—	54.0	65.3	56.5	8.8	60.9	14.64	86	87	—	—
July ..	—	53.7	63.5	55.8	7.7	59.6	14.43	89	88	—	—
August ..	—	50.0	67.8	53.6	14.2	60.7	3.54	80	82	—	—
September ..	—	49.9	66.5	52.6	13.9	59.6	14.73	83	84	—	—
October ..	—	45.4	70.5	49.5	21.0	60.0	4.20	69	78	—	—
November ..	—	49.1	68.9	52.4	16.5	60.6	8.79	76	78	—	—
December ..	—	45.8	68.2	50.4	17.8	59.3	4.64	70	76	—	—
		48.5	68.3	51.8	16.5	60.1	105.20	75	81		

TABLE II. (e).

## Kandy.

Meteorological Return for the Year 1927.

	Temperature.						Rainfall.			Winds.	
	Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.	Aver- age Force.
		°F.	°F.	°F.	°F.	°F.		9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.		
January ..	—	65.0	82.9	68.7	14.2	75.8	12.57	71	74	—	—
February ..	—	64.7	86.1	68.5	17.6	77.3	3.10	66	72	—	—
March ..	—	67.0	85.7	69.7	16.0	77.7	5.76	72	76	—	—
April ..	—	65.8	88.6	70.1	18.5	79.4	5.91	68	75	—	—
May ..	—	69.0	84.7	71.8	12.9	78.2	11.43	78	80	—	—
June ..	—	69.2	81.9	71.1	10.8	76.5	6.62	81	84	—	—
July ..	—	68.9	81.6	71.3	10.3	76.4	6.54	80	80	—	—
August ..	—	66.7	85.0	70.2	14.8	77.6	1.22	70	75	—	—
September ..	—	66.8	84.5	69.2	15.3	76.8	7.94	72	76	—	—
October ..	—	64.0	85.5	68.0	17.5	76.8	8.77	70	78	—	—
November ..	—	65.4	83.0	68.2	14.8	75.6	6.36	75	79	—	—
December ..	—	64.5	82.9	68.6	14.3	75.8	6.41	72	76	—	—
		66.4	84.4	69.6	14.8	77.0	82.63	73	77		



TABLE II. (f).

## Batticaloa.

Meteorological Return for the Year 1927.

	Temperature.						Rainfall.			Winds.		
	Solar Maxi- mum.	Mini- mum on Grass.	Shade Maxi- mum.	Shade Mini- mum.	Mean Range of Tem- pera- ture.	Mean Tem- pera- ture.	Amount in Inches.	Degree of Humid- ity.		General Direction.		Average Force.
	°F.	°F.	°F.	°F.	°F.	°F.		9.30 A.M. and 3.30 P.M. Per Cent.	Max. and Min. Per Cent.	A.M.	P.M.	Miles.
January ..	138.9	72.2	82.2	74.3	7.9	78.2	9.97	77	82	NE	NE	191
February ..	141.7	71.8	85.0	74.9	10.1	80.0	4.32	74	79	Var	NE	168
March ..	140.8	72.7	86.1	74.7	11.4	80.4	17.64	78	81	WNW	ENE	143
April ..	154.0	74.4	90.2	76.6	13.6	83.4	4.02	72	78	Var	E	131
May ..	144.2	74.2	91.1	76.8	14.3	84.0	1.89	68	75	Var	Var	124
June ..	145.9	72.7	93.7	76.9	16.8	85.3	0.31	60	66	Var	Var	115
July ..	147.3	72.5	94.6	77.2	17.4	85.9	0.00	56	61	W	Var	125
August ..	145.8	72.5	92.3	75.9	16.4	84.1	2.08	60	66	Var	E	128
September ..	147.0	73.2	90.5	76.3	14.2	83.4	5.87	66	71	Var	Var	133
October ..	147.3	72.1	88.8	74.9	13.9	81.8	1.38	68	74	W	E	123
November ..	140.0	71.6	84.4	73.8	10.6	79.1	20.02	76	82	Var	Var	125
December ..	136.4	72.3	82.1	74.1	8.0	78.1	21.82	80	85	Var	NNE	168
	144.1	72.7	88.4	75.5	12.9	82.0	89.32	70	75			140

TABLE III.

## RETURN OF DISEASES (OUT-PATIENTS).

I.—GENERAL DISEASES.				Number of Persons treated.	
				1926.	1927.
A.—Epidemic—					
Enteric ..	..	781	..	737	
Malaria ..	..	967,428	..	789,829	
Malarial cachexia ..	..	93,279	..	75,765	
Filarial diseases ..	..	74	..	164	
Chickenpox ..	..	86	..	202	
Measles ..	..	38	..	32	
Whooping cough ..	..	7	..	7	
Diphtheria ..	..	1	..	2	
Influenza ..	..	44,179	..	55,589	
Cholera ..	..	1	..	7	
Dysentery ..	..	26,210	..	25,256	
Dengue ..	..	529	..	2,549	
Leprosy ..	..	13	..	6	
Parangi ..	..	39,797	..	36,131	
Mumps ..	..	23	..	3	
B.—Tubercular—					
Lungs ..	..	1,263	..	2,664	
Other organs ..	..	165	..	309	
C.—Venereal—					
Syphilis ..	..	5,105	..	6,190	
Gonorrhoea ..	..	12,151	..	10,954	
D.—Malignant growths—					
Cancer ..	..	1	..	—	
Non-malignant growths ..	..	113	..	45	
E.—Other General Diseases—					
Rheumatism ..	..	155,068	..	168,395	
Diabetes ..	..	1,095	..	485	
Alcoholism ..	..	8	..	6	
Debility ..	..	32,154	..	30,664	
All other general diseases ..	..	81,907	..	87,333	
II.—LOCAL DISEASES.					
(1) Diseases of the nervous system ..	..	13,598	..	15,125	
(2) Diseases of the eyes and their annexa ..	..	54,484	..	53,214	
(3) Diseases of the ear ..	..	25,695	..	27,895	
(4) Diseases of the nose ..	..	1,899	..	1,589	
(5) Diseases of the circulatory system ..	..	1,843	..	2,055	
Anaemia ..	..	3,873	..	3,572	
(6) Diseases of the respiratory system ..	..	162,245	..	180,257	
(7) Diseases of the digestive system—					
Diseases of teeth, mouth, and gums ..	..	—	..	9,591	
Acute diarrhoea ..	..	82	..	50	
Diarrhoea ..	..	37,207	..	38,131	
Anchylostomiasis ..	..	152,195	..	170,818	
Worms ..	..	199,220	..	230,531	
Sprue ..	..	53	..	68	
Liver ..	..	3,599	..	2,977	
Diseases of the throat ..	..	621	..	976	
Other diseases of the digestive system ..	..	227,831	..	242,092	
(8) Diseases of the lymphatic system ..	..	1,406	..	1,217	
Diseases of the spleen ..	..	7,999	..	4,448	
(9) Diseases of the urinary system ..	..	8,575	..	9,268	
(10) Diseases of the generative system ..	..	17,062	..	17,902	
(11) Diseases of the organs of locomotion ..	..	1,147	..	1,227	
(12) Diseases of the connective tissue ..	..	18,492	..	20,254	
Diseases of the skin ..	..	183,470	..	157,538	
Ulcers ..	..	203,618	..	164,862	
III.—AFFECTIONS PRODUCED BY POISONS ..					
				202	.. 5,114
IV.—INJURIES.					
General ..	..	14,826	..	15,703	
Local ..	..	71,861	..	80,113	



TABLE IV(A)

## CHART

SHOWING

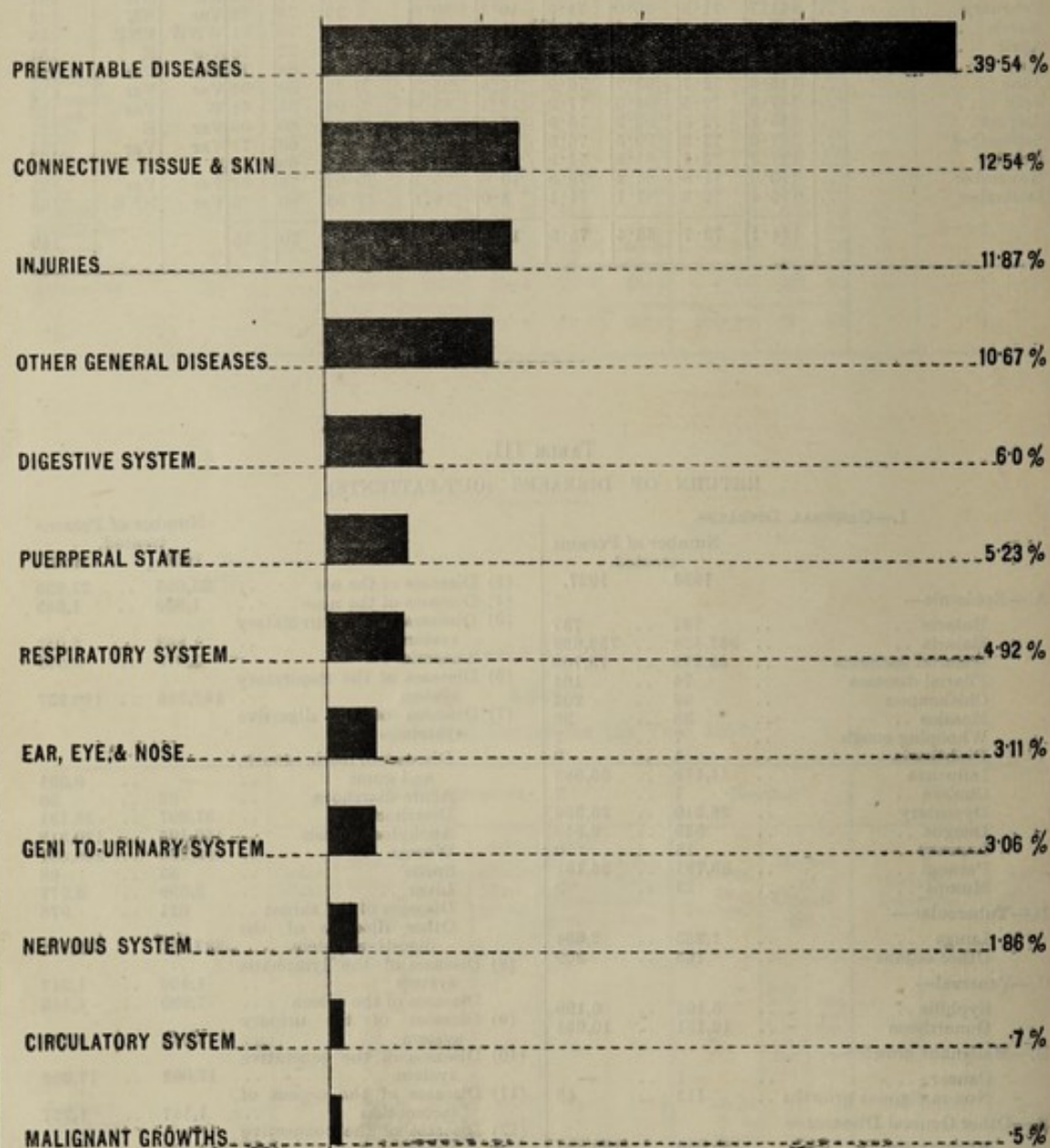
THE GENERAL SYSTEMIC AND PREVENTABLE DISEASES

TREATED AT

THE GOVERNMENT HOSPITALS

DURING THE YEAR 1927.

TOTAL CASES—200,770.



Survey Dept. Ceylon.



TABLE IV (B)

## CHART

SHOWING

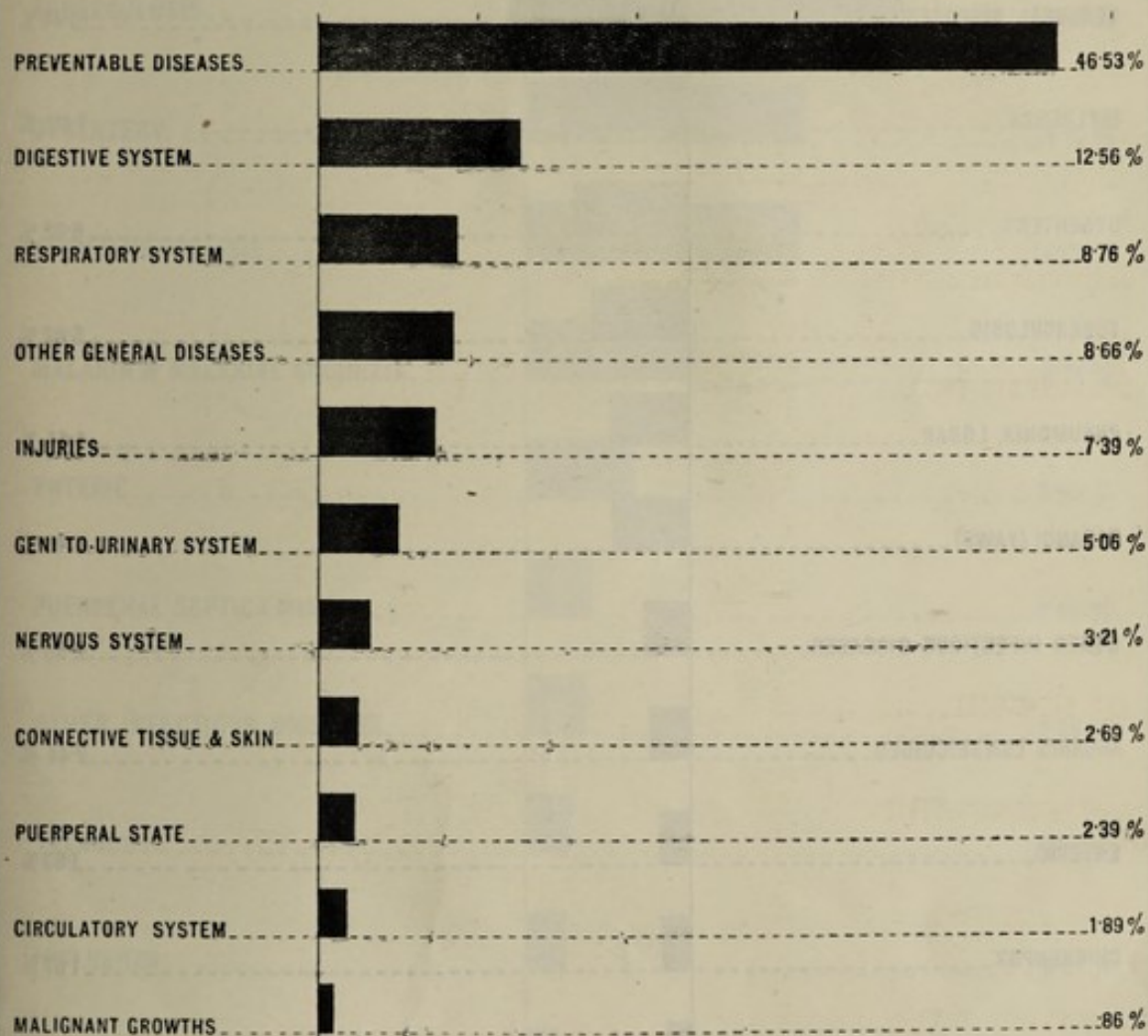
DEATHS FROM GENERAL SYSTEMIC AND PREVENTABLE DISEASES

TREATED AT

THE GOVERNMENT HOSPITALS

DURING THE YEAR 1927.

TOTAL DEATHS = 12,158.



Survey Dept. Canton.



**TABLE IV (C)****CHART**

SHOWING

**CASES OF INFECTIOUS DISEASES**

TREATED AT

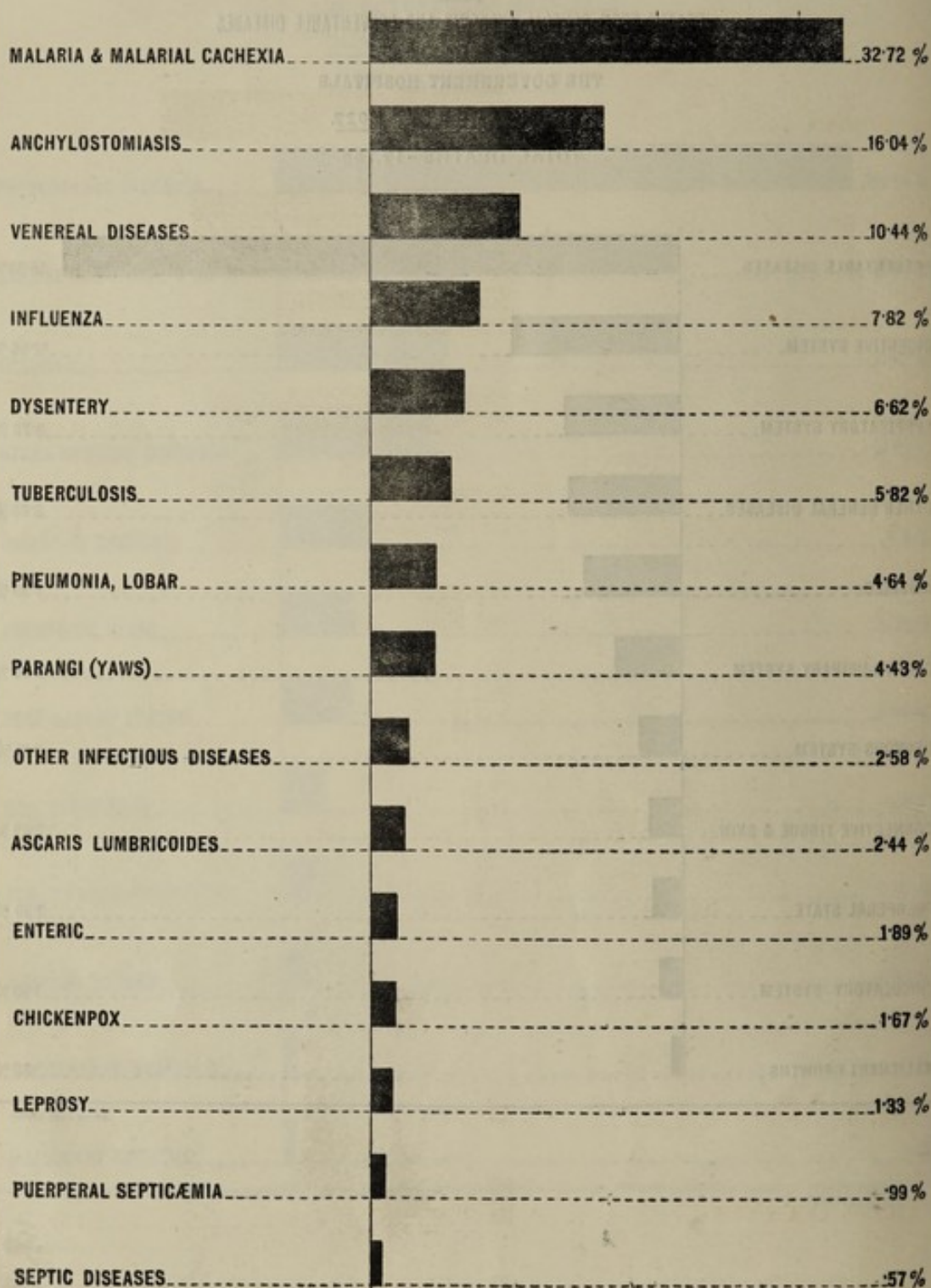
**THE GOVERNMENT HOSPITALS****DURING THE YEAR 1927.****TOTAL CASES - 78,574.**

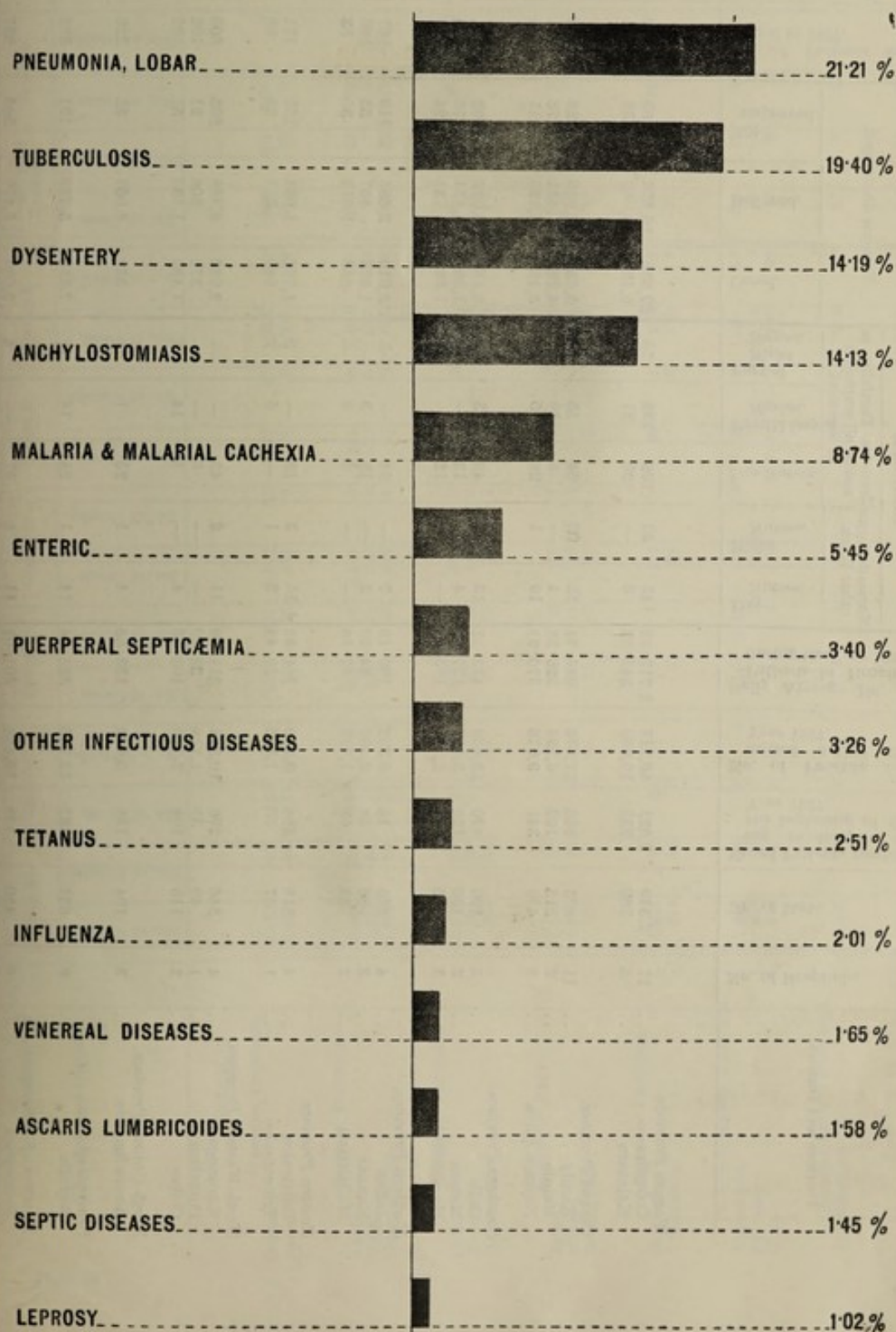


TABLE IV (D)**CHART**

SHOWING

**DEATHS FROM INFECTIOUS DISEASES**

TREATED AT

**THE GOVERNMENT HOSPITALS****DURING THE YEAR 1927.****TOTAL DEATHS - 5,582.**



## I.—Hospital Returns.

Province and District.	No. of Hospitals.	No. of Beds.	No. of Patients remaining in Hospital at the beginning of the Year 1927.	No. of Patients Admitted during the Year 1927.	Daily Average No. of Patients in Hospital during the Year 1927.	Attendants.					Patients discharged.			No. of Patients who died in 1927.	Average stay of Patients, who			Specify the Longest Period for which any one Inmate has stayed.	
						Nurses doing no other Work.				Partially or not at all employed as Servants.		Cured.	Relieved.		Not improved.	Died in 1927.	Were discharged in 1927.		Were remaining in 1927.
						Day Nurses.	Night Nurses.	Not Nurses.	Partial Day Nurses.	Partial Night Nurses.									
<i>Western Province.</i>																			
Colombo	17	2,849	2,521	46,217	2,713.33	143	30	109	198	75	29,536	16,876	4,269	3,704	24.09	28.93	44.08	1,150	
Kalutara	5	360	333	10,940	343.53	8	—	20	21	1	6,130	3,049	232	595	11.84	12.78	13.07	437	
<i>Central Province.</i>																			
Kandy	11	803	886	21,576	945.74	52	16	94	15	4	5,653	12,936	328	1,658	13.56	16.64	16.71	365	
Matale	2	215	192	6,194	228.58	4	—	5	16	5	4,283	1,435	78	391	13.06	12.52	11.07	145	
Nuwara Eliya	8	450	346	9,078	370.91	15	1	26	5	10	5,138	3,235	211	495	13.32	15.23	17.28	232	
<i>Southern Province.</i>																			
Galle	5	390	420	13,458	433.71	13	4	49	3	1	6,151	6,082	592	581	15.23	14.59	21.41	472	
Matara	2	130	125	3,117	127.06	4	—	13	—	1	1,588	1,434	75	183	27.93	13.59	26.59	658	
Hambantota	3	75	121	2,282	103.24	—	—	12	—	1	1,324	731	94	143	10.64	14.41	9.9	134	
<i>Northern Province.</i>																			
Jaffna	4	225	14	5,302	160.15	7	—	24	—	—	2,016	3,685	119	167	8.12	10.47	9.89	160	
Mannar	3	86	48	2,497	64.20	2	—	18	3	—	1,828	457	53	160	8.82	10.28	15.07	145	
Mullaitivu	2	88	62	1,772	57.46	—	—	6	8	—	668	1,013	30	53	9.98	11.01	11.51	96	
<i>Eastern Province.</i>																			
Batticaloa	4	318	264	3,240	261.55	15	3	18	—	3	1,762	1,094	152	171	410.79	218.69	102.29	2,196	
Trincomalee	1	57	52	1,360	39.44	2	1	—	5	2	940	313	36	88	6.58	14.67	24.40	99	
<i>North-Western Province.</i>																			
Kurunegala	4	346	296	10,304	311.59	11	2	43	—	—	2,982	6,488	205	606	11.35	11.41	8.61	135	
Puttalam	1	49	35	1,114	32.99	—	—	6	—	—	372	606	21	102	8.98	11.50	18.95	95	
Chilaw	2	115	108	2,916	105.56	4	—	3	14	2	1,480	1,160	51	192	9.88	11.38	10.73	158	
<i>North-Central Province.</i>																			
Anuradhapura	3	164	138	5,609	133.55	4	1	23	1	1	326	5,007	32	228	7.08	10.83	8.99	89	
<i>Province of Uva.</i>																			
Badulla	9	631	483	13,745	525.24	14	1	28	16	17	7,359	5,728	191	883	12.52	18.14	15.40	259	
<i>Province of Sabaragamuwa.</i>																			
Ratnapura	6	480	488	15,484	501.01	11	2	51	—	4	9,084	5,426	263	857	13.32	13.42	11.84	184	
Kegalla	6	516	381	15,274	474.92	15	2	30	8	24	4,573	9,595	338	723	10.77	11.85	11.06	195	



II.—Cases treated.  
(a) According to Districts.

Province and District.	I.—General Diseases.										II.—Local Diseases.												
	Group A.		Group B.		Group C.		Group D.		Group E.		Group F.		1.—Nervous System.		2.—Eye.		3.—Ear.		4.—Nose.		5.—Circulatory System.		
	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	
CEYLON.																							
WESTERN PROVINCE.																							
Colombo	9,823	525	140	43	921	307	1,957	33	312	49	1,858	151	956	101	2,044	7	61	—	58	3	563	71	
Kalutara	1,956	122	11	—	99	25	441	9	34	2	1,006	56	141	26	64	1	16	—	5	—	75	18	
CENTRAL PROVINCE.																							
Kandy	3,439	263	166	10	275	69	1,329	9	151	10	3,498	181	774	66	740	3	67	—	9	—	177	43	
Matale	1,778	81	1	1	101	21	340	6	23	5	553	28	62	7	33	—	11	—	1	—	25	—	
Nuwara Eliya	1,693	69	17	4	82	18	422	5	44	6	1,624	54	195	23	235	—	46	—	33	—	97	11	
SOUTHERN PROVINCE.																							
Galle	2,109	82	11	—	237	41	304	3	120	4	2,013	73	181	19	961	1	84	—	29	—	84	10	
Matara	591	30	1	—	37	14	146	2	35	—	295	21	59	7	9	—	11	—	2	—	25	2	
Hambantota	830	36	3	—	41	10	75	1	5	—	143	13	29	4	6	—	9	—	—	—	4	1	
NORTHERN PROVINCE.																							
Jaffna	1,515	38	1	—	27	2	139	1	8	—	512	21	84	7	91	—	18	—	2	—	18	3	
Mannar	1,395	29	3	—	30	11	95	1	4	—	108	10	18	4	11	—	5	—	—	—	11	2	
Mullaitivu	756	7	5	—	12	2	40	—	1	—	162	2	28	1	9	—	6	—	1	—	4	—	
EASTERN PROVINCE.																							
Batticaloa	1,021	45	33	—	80	6	172	5	23	1	170	8	45	1	112	6	11	—	—	—	14	—	
Trincomalee	574	18	2	—	2	1	60	—	7	2	118	8	11	4	6	—	5	—	1	—	6	2	
NORTH-WESTERN PROVINCE.																							
Kurunegala	2,986	99	4	4	160	33	368	2	50	8	897	67	134	13	45	—	15	—	3	—	21	3	
Puttalam	438	34	6	2	7	5	34	—	1	—	78	7	12	1	5	—	—	—	—	—	6	4	
Chilaw	646	36	4	—	20	4	124	—	7	—	266	38	53	9	6	—	11	—	—	—	14	—	
NORTH-CENTRAL PROVINCE.																							
Anuradhapura	2,499	70	2	—	49	8	150	—	18	1	434	10	48	8	23	—	22	—	3	—	25	2	
PROVINCE OF UVA.																							
Badulla	4,393	167	6	5	217	49	497	7	62	2	1,155	97	241	27	525	1	86	—	10	—	105	26	
PROVINCE OF SABARAGAMUWA.																							
Ratnapura	3,869	167	20	4	263	63	621	9	49	5	2,683	79	212	30	493	3	83	—	7	—	106	14	
Kegalla	2,825	121	12	6	142	39	871	5	37	2	2,036	71	206	18	185	4	39	—	9	—	75	16	



II.—Cases treated—*contd.*  
(a) According to Districts—*contd.*

Province and District.	II.—Local Diseases— <i>contd.</i>																Total.						
	6.—Respiratory System.		7.—Digestive System.		8.—Lymphatic System.		9.—Urinary System.		10.—Generative System.		11.—Organs of Locomotion.		12.—Connective Tissue.		13.—Skin.		III.—Poisons.		IV.—Injuries.		No. of Cases.	No. of Deaths.	
	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.	No. of Cases.	No. of Deaths.					
CEYLON.																							
WESTERN PROVINCE.																							
Colombo	4,534	929	4,763	587	195	6	1,762	107	5,781	149	136	1	3,002	116	252	1	95	10	8,652	509	47,865	3,705	
Kalutara	658	95	1,844	143	15	—	237	21	641	26	41	—	1,566	11	—	—	52	5	1,371	35	10,273	595	
CENTRAL PROVINCE.																							
Kandy	1,493	280	3,324	436	48	8	663	120	1,026	59	65	—	2,316	52	708	14	30	3	2,109	69	22,408	1,666	
Matale	376	75	1,033	110	1	—	124	17	138	10	2	—	1,215	16	—	—	4	—	565	14	6,386	391	
Nuwara Eliya	866	104	1,366	98	27	—	298	48	232	16	55	—	1,009	4	56	1	14	1	992	32	9,403	495	
SOUTHERN PROVINCE.																							
Galle	633	93	2,051	115	37	—	793	35	630	44	25	1	1,656	16	461	2	30	4	1,429	39	13,878	582	
Matara	266	30	587	34	6	—	142	7	158	10	8	—	490	6	—	—	3	—	371	20	3,242	183	
Hambantota	217	45	160	7	11	—	62	5	47	2	1	—	429	7	—	—	2	—	329	11	2,403	142	
NORTHERN PROVINCE.																							
Jaffna	394	24	862	31	9	—	200	17	233	10	8	—	426	—	95	2	8	—	794	11	5,444	167	
Mannar	238	57	248	33	4	—	30	8	59	1	5	—	140	2	28	—	4	—	109	2	2,545	160	
Mullaivittu	135	21	248	4	5	—	42	6	29	3	4	—	125	4	87	—	2	—	133	3	1,834	53	
EASTERN PROVINCE.																							
Batticaloa	210	15	526	11	11	—	109	2	33	—	5	—	421	15	209	2	2	—	297	12	3,504	129	
Trincomalee	121	23	167	23	3	—	26	2	19	2	6	—	155	—	—	—	1	—	122	1	1,412	86	
NORTH-WESTERN PROVINCE.																							
Kurunegala	676	144	1,307	104	11	1	294	38	412	29	10	—	1,785	21	—	—	30	4	1,264	36	10,472	606	
Puttalam	85	24	56	12	2	—	20	2	36	4	9	—	137	4	—	—	3	—	114	2	1,149	102	
Chilaw	232	36	420	41	16	—	43	3	254	12	4	—	272	1	140	1	5	1	487	10	3,024	192	
NORTH-CENTRAL PROVINCE.																							
Anuradhapura	471	72	590	31	13	—	132	8	177	11	11	—	512	3	121	2	7	1	440	1	5,747	228	
PROVINCE OF UVA.																							
Badulla	1,105	171	1,975	183	52	2	312	66	265	29	38	—	2,091	24	36	—	174	5	1,002	22	14,347	883	
PROVINCE OF SABARAGAMUWA.																							
Ratnapura	1,154	150	2,228	215	18	—	371	45	393	28	45	—	2,169	15	168	1	33	2	987	26	15,972	857	
Kegalla	1,101	143	2,720	145	41	1	422	56	692	35	50	—	1,954	16	595	—	46	5	1,584	40	15,642	723	



II.—Cases treated—*contd.*

## (b) According to Diseases.

Diseases.	*Remaining in Hospital at end of 1926.	Admissions in 1927.	Deaths in 1927.	†Total Cases treated in 1927.	‡Remaining in Hospital at end of 1927.
<b>I.—General Diseases—</b>					
<b>A.—Epidemic—</b>					
Enteric ..	59	1,429	304	1,488	68
Cerebro-Spinal Fever ..	—	6	2	6	—
Malaria ..	472	22,491	363	22,963	820
Blackwater Fever ..	—	2	1	2	—
Acute Polio-Myelitis ..	2	29	3	31	—
Yellow Fever ..	—	—	—	—	—
Malarial Cachexia ..	94	2,655	125	2,749	64
Filarial Diseases ..	—	26	—	26	3
Smallpox ..	4	12	2	16	—
Chickenpox ..	66	1,243	3	1,309	55
Measles ..	6	174	4	180	1
Whooping Cough ..	10	122	5	132	5
Diphtheria ..	—	36	9	36	6
Influenza ..	96	6,051	112	6,147	236
Acute Rheumatic Fever ..	—	26	—	26	3
Cholera ..	—	—	—	—	—
Dysentery ..	159	5,043	792	5,202	176
Dengue ..	24	371	2	395	4
Leprosy ..	690	357	57	1,047	609
Parangi ..	27	717	4	744	25
Parangi treated with Salvarsan ..	109	2,629	7	2,738	94
Erysipelas ..	3	121	20	124	1
Mumps ..	4	84	2	88	1
Varicella ..	—	—	—	—	—
Rabies ..	—	24	20	24	—
Tetanus ..	6	328	140	334	15
Plague ..	—	81	54	81	1
Other Epidemic Diseases ..	17	433	43	450	31
<b>B.—Septic—</b>					
Pyæmia ..	—	52	16	52	3
Septicæmia ..	2	152	56	154	3
Other Septic Diseases ..	—	240	9	240	16
<b>C.—Tubercular—</b>					
Pulmonary ..	493	3,754	1,027	4,247	557
Other Tubercular Diseases ..	21	305	56	326	18
<b>D.—Venereal—</b>					
Syphilis ..	133	3,199	60	3,332	140
Gonorrhoea ..	103	2,951	13	3,054	89
Rheumatism (Gonorrhoeal) ..	32	532	4	564	18
Other Venereal Diseases ..	42	1,212	15	1,254	53
<b>E.—Malignant Growths—</b>					
Sarcoma ..	6	101	12	107	6
Carcinoma ..	16	355	77	371	13
Non-malignant Growths ..	26	505	15	531	23

\* *I.e.*, the year previous to that for which the Return is made.

† "Total Cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's Return.



II.—Cases treated—*contd.*(b) According to Diseases—*contd.*

Diseases.	*Remaining in Hospital at end of 1926.	Admissions in 1927.	Deaths in 1927.	†Total Cases treated in 1927.	‡Remaining in Hospital at end of 1927.
I.—General Diseases— <i>contd.</i>					
F.—Other General Diseases—					
Chronic Rheumatism ..	111	4,254	20	4,365	102
Diabetes Mellitus ..	16	254	21	270	16
Diabetes Insipidus ..	—	10	1	10	1
Alcoholism ..	—	25	3	25	—
Rickets ..	12	199	68	211	11
Scurvy ..	—	—	—	—	—
General Diseases not defined above	430	14,887	922	15,317	517
II.—Local Diseases—					
1.—Diseases of the Nervous System and Organs of Special Sense—					
Meningitis ..	3	113	52	116	3
Septic Meningitis ..	—	15	6	15	—
Other Diseases of the Spinal Cord ..	9	94	15	103	7
Cerebral Haemorrhage, including Hemiplegia and Paraplegia ..	46	527	100	573	34
Cerebral Thrombosis ..	1	31	10	32	1
Paralysis ..	8	221	20	229	15
Idiocy ..	—	2	—	2	—
Cretinism ..	—	—	—	—	—
Mania (Chronic) ..	25	338	5	363	10
Melancholia ..	4	45	2	49	1
Dementia (Primary) ..	1	8	—	9	—
General Paralysis of the Insane ..	1	1	1	2	—
Delusional Insanity ..	9	142	1	151	5
Epilepsy ..	19	315	24	334	13
Other forms of Mental Alienation ..	1	37	1	38	—
Convulsions ..	4	210	72	214	3
Neuritis ..	10	249	2	259	7
Neuralgia ..	5	288	—	293	7
Other Diseases of the Nervous System	24	934	79	958	44
2.—Diseases of the Eyes and their Annexa—					
Conjunctiva ..	46	2,099	4	2,145	64
Cornea ..	38	1,036	10	1,074	62
Lens ..	61	729	—	790	46
Iris ..	5	141	1	146	10
Optic Nerve and Retina ..	3	41	—	44	4
Other Diseases of the Eyes and Annexa	69	1,225	7	1,294	75
3.—Diseases of the Ear—					
External Ear ..	3	62	—	65	1
Middle Ear ..	10	362	—	372	7
Internal Ear ..	—	53	—	53	—
Other Diseases of the Ear	1	106	1	107	4
4.—Diseases of the Nose..					
	5	163	2	168	3
5.—Diseases of the Circulatory System—					
Pericarditis ..	3	82	15	85	4
Myocarditis ..	1	28	15	29	—
Valvular Diseases of the Heart ..	24	528	116	552	20
Other Organic Diseases of the Heart	2	70	30	72	2
Aneurysm ..	—	45	3	45	1
Arterio-Sclerosis ..	1	43	3	44	1
Diseases of the Lymphatic System, including Bubo ..	1	20	3	21	2
Elephantiasis Arabum ..	3	105	—	108	8
Diseases of the Spleen ..	—	3	—	3	—
Other Diseases of the Circulatory System, including Haemorrhoids ..	47	504	45	551	21

\* I.e., the year previous to that for which the Return is made.

† "Total Cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's Return.



II.—Cases treated—*contd.*(b) According to Diseases—*contd.*

Diseases;	*Remaining in Hospital at end of 1926.	Admissions in 1927.	Deaths in 1927.	†Total Cases treated in 1927.	‡Remaining in Hospital at end of 1927.
II.—Local Diseases— <i>contd.</i>					
6.—Diseases of the Respiratory System—					
Laryngitis ..	1 ..	110 ..	1 ..	111 ..	6
Other Diseases of the Larynx ..	— ..	8 ..	— ..	8 ..	1
Bronchitis ..	117 ..	4,498 ..	175 ..	4,615 ..	130
Asthma ..	48 ..	1,522 ..	39 ..	1,570 ..	40
Pneumonia, Lobular ..	50 ..	2,474 ..	716 ..	2,524 ..	90
Pneumonia, Lobar ..	92 ..	3,552 ..	1,184 ..	3,644 ..	117
Pleurisy ..	8 ..	368 ..	46 ..	376 ..	8
Empyema ..	3 ..	53 ..	16 ..	56 ..	1
Other Diseases of the Respiratory System ..	16 ..	592 ..	72 ..	608 ..	17
7.—Diseases of the Digestive System—					
Diseases of the Teeth, Mouth, and Gums ..	4 ..	345 ..	31 ..	349 ..	8
Tonsillitis and Quinsy ..	16 ..	448 ..	4 ..	464 ..	14
Gastric Ulcer ..	1 ..	50 ..	8 ..	51 ..	1
Duodenal Ulcer ..	— ..	9 ..	1 ..	9 ..	—
Gastritis ..	6 ..	383 ..	10 ..	389 ..	2
Gastro-Enteritis ..	1 ..	67 ..	8 ..	68 ..	3
Enteritis ..	35 ..	1,442 ..	432 ..	1,477 ..	60
Diarrhoea ..	102 ..	3,117 ..	575 ..	3,219 ..	108
Anchylostomiasis ..	513 ..	12,087 ..	789 ..	12,600 ..	442
Ascaris Lumbricoides ..	45 ..	1,876 ..	88 ..	1,921 ..	44
Tape Worm ..	1 ..	9 ..	— ..	10 ..	—
Other Intestinal Parasites ..	2 ..	61 ..	1 ..	63 ..	2
Appendicitis ..	7 ..	289 ..	7 ..	296 ..	16
Hernia ..	10 ..	306 ..	7 ..	316 ..	22
Hernia, Strangulated ..	12 ..	142 ..	17 ..	154 ..	14
Intestinal Obstruction ..	— ..	133 ..	53 ..	133 ..	4
Psilosis, Sprue ..	— ..	14 ..	5 ..	14 ..	1
Other Diseases of the Intestines ..	6 ..	439 ..	22 ..	445 ..	9
Cirrhosis of Liver ..	17 ..	298 ..	102 ..	315 ..	13
Abscess of Liver ..	6 ..	155 ..	31 ..	161 ..	12
Peritonitis ..	7 ..	205 ..	86 ..	212 ..	10
Other Diseases of the Liver ..	9 ..	380 ..	22 ..	389 ..	4
Other Diseases of the Digestive System ..	95 ..	3,963 ..	110 ..	4,058 ..	122
8.—Diseases of the Lymphatic System—					
Induration and Enlargement of Spleen ..	— ..	28 ..	2 ..	28 ..	—
Inflammation of Lymph Vessels ..	2 ..	93 ..	7 ..	95 ..	5
Inflammation of Glands (Bubo), not Gonorrhoeal ..	5 ..	119 ..	4 ..	124 ..	4
Suppuration of Glands (Bubo), not Gonorrhoeal ..	4 ..	61 ..	— ..	65 ..	5
Hypertrophy of Lymphatic Glands ..	— ..	32 ..	— ..	32 ..	1
Other Diseases of the Lymphatic System ..	5 ..	176 ..	5 ..	181 ..	11
9.—Non-venereal Diseases of the Genito- Urinary System and Annexa—					
Nephritis Acute ..	56 ..	1,306 ..	327 ..	1,362 ..	77
Nephritis Chronic ..	42 ..	796 ..	192 ..	838 ..	28
Other Diseases of the Kidney and Annexa ..	10 ..	296 ..	27 ..	306 ..	6
Diseases of the Bladder, including Cystitis ..	10 ..	471 ..	19 ..	481 ..	6
Diseases of the Male Genital Organs ..	20 ..	1,511 ..	14 ..	1,531 ..	34
Diseases of the Uterus ..	10 ..	772 ..	19 ..	782 ..	18
Uterine Tumours ..	— ..	46 ..	— ..	46 ..	—
Cysts and other Tumours of the Ovary ..	6 ..	108 ..	— ..	114 ..	7
Salpingitis ..	— ..	71 ..	11 ..	71 ..	8
Other Diseases of the Female Genital Organs ..	14 ..	597 ..	6 ..	611 ..	24

\* *I.e.*, the year previous to that for which the Return is made.

† "Total Cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's Return.



II.—Cases treated—*contd.*(b) According to Diseases—*contd.*

Diseases.	*Remaining in Hospital at end of 1926.	Admissions in 1927.	Deaths in 1927.	†Total Cases treated in 1927.	‡Remaining in Hospital at end of 1927.
II.—Local Diseases— <i>contd.</i>					
10.—Puerperal State (Generative System)—					
Ectopic Gestation ..	—	15	5	15	1
Other Accidents of Pregnancy ..	4	150	10	154	5
Puerperal Haemorrhage ..	—	1	—	1	—
Other Accidents of Childbirth ..	3	167	37	170	7
Puerperal Septicaemia ..	27	748	190	775	29
Eclampsia ..	5	186	48	191	1
Placenta Praevia ..	—	75	22	75	1
Post Partum Haemorrhage ..	—	25	5	25	—
Rupture of Perineum ..	—	29	—	29	1
Abortion ..	4	464	8	468	13
Miscarriage ..	—	140	11	140	1
Pregnancy ..	157	4,376	40	4,533	252
Partus ..	150	4,407	104	4,557	109
Inflammation of Breast (Mastitis)..	8	131	—	139	7
11.—Diseases of the Bones and Organs of Locomotion—					
Diseases of Bones ..	15	224	1	239	10
Diseases of Joints ..	9	283	5	292	11
12 and 13.—Diseases of the Skin and Connective Tissue—					
Gangrene ..	7	206	86	213	6
Carbuncle ..	4	85	9	89	4
Furuncle ..	5	140	9	145	1
Ulcers ..	585	12,675	56	13,260	477
Abscess ..	148	3,661	53	3,809	118
Eczema ..	65	1,488	6	1,553	66
Pemphigus ..	2	79	1	81	—
Other Diseases of the Integument..	220	5,803	107	6,023	216
III.—Affections produced by External Causes, Poisons, &c.—					
Snake Bite ..	1	41	1	42	1
Corrosive Acids ..	4	41	12	45	—
Metallic Poisons ..	—	16	2	16	—
Vegetable Alkaloids..	—	69	11	69	1
Ptomaine Poisoning..	—	1	—	1	—
Other Acute Poisoning ..	5	214	15	219	7
IV.—Injuries—					
A.—General—					
Burns and scalds ..	46	1,002	152	1,048	51
Multiple ..	13	294	25	307	13
Exhaustion ..	—	—	—	—	—
Shock ..	—	84	35	84	—
B.—Local Injuries—					
Wounds, Incised ..	66	2,270	26	2,336	76
Wounds, Contused ..	81	3,316	5	3,397	96
Wounds, Lacerated ..	118	2,546	21	2,664	98
Abrasions ..	25	1,005	1	1,030	28
Gunshot ..	7	220	20	227	18
Fractures, Simple ..	62	1,342	26	1,404	78
Fractures, Compound ..	30	524	44	554	36
Fractures of Spine ..	1	30	6	31	1
Fractures of Skull ..	9	237	80	246	13
Sprains and Dislocations ..	5	592	1	597	8
Concussion of Brain ..	4	109	16	113	1
Compression of Brain ..	1	8	4	9	—
Injuries to Chest ..	—	20	3	20	1
Contusion ..	44	2,732	1	2,776	74
Injuries of the Abdomen ..	5	13	4	18	—
Injuries of the Pelvis..	1	3	—	4	—
Injuries to the Organs of Generation ..	4	109	3	113	1
Other Injuries not defined above ..	480	6,374	426	6,854	317

\* I.e., the year previous to that for which the Return is made.

† "Total Cases treated" will, of course, include those remaining in Hospital at the end of the previous year.

‡ The figures in this column to be carried on to the next year's Return.



## III.—Special Diseases.

Table of Cases of Yellow Fever or other Endemic Fever, Plague, Typhus, Smallpox, Scarlatina, Cholera, Enteric (or Typhoid) Fever, Erysipelas, or Pyaemia occurring amongst Patients, and also amongst Officers.

Hospital and Name of Disease.	Occurring amongst Patients.			Occurring amongst Officers.			
	Number of Cases.	In case of Patients attacked while in Hospital, state how long the person had been in Hospital before his attack, and for what Disease he was admitted.	Number of Deaths.	Resident Officers.		Non-Resident Officers.	
				Cases.	Deaths.	Cases.	Deaths.
WESTERN PROVINCE.							
Lady Havelock and Ridgeway Hospitals, Colombo :—							
Influenza ..	128	—	—	15	—	—	—
Dengue ..	20	—	—	5	—	—	—
Diphtheria ..	3	—	—	—	—	—	—
Dysentery ..	100	—	29	—	—	—	—
Enteric (or Typhoid) Fever	62	—	13	1	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Pyæmia ..	6	—	4	—	—	—	—
Police Hospital, Borella :—							
Malarial Fever ..	135	—	—	—	—	—	—
Enteric (or Typhoid) Fever	6	—	—	—	—	—	—
Erysipelas ..	1	—	—	—	—	—	—
Kalutara Hospital :—							
Enteric (or Typhoid) Fever	56	—	6	—	—	—	—
Infectious Diseases Hospital, Angoda :—							
Plague ..	34	—	28	—	—	—	—
Smallpox ..	10	—	2	—	—	—	—
Enteric (or Typhoid) Fever	135	—	30	—	—	—	—
Typhus ..	6	—	—	—	—	—	—
Scarlatina ..	2	—	—	—	—	—	—
Negombo Hospital :—							
Enteric (or Typhoid) Fever	17	—	2	—	—	—	—
Erysipelas ..	3	—	1	—	—	—	—
Pyæmia ..	1	—	1	—	—	—	—
Watupitiwala Hospital :—							
Enteric (or Typhoid) Fever	27	—	6	—	—	—	—
Erysipelas ..	1	—	—	—	—	—	—
Pyæmia ..	2	—	—	—	—	—	—
CENTRAL PROVINCE.							
Agrapatana Hospital :—							
Enteric (or Typhoid) Fever	6	—	1	—	—	—	—
Erysipelas ..	1	—	—	—	—	—	—
Bogawantalawa Hospital :—							
Enteric (or Typhoid) Fever	—	—	—	1	—	—	—
Dikoya Hospital :—							
Pyæmia ..	1	—	1	—	—	—	—



III.—Special Diseases—*contd.*

Hospital and Name of Disease.	Occurring amongst Patients.			Occurring amongst Officers.			
	Number of Cases.	In case of Patients attacked while in Hospital, state how long the person had been in Hospital before his attack, and for what Disease he was admitted.	Number of Deaths.	Resident Officers.		Non-Resident Officers.	
				Cases.	Deaths.	Cases.	Deaths.
CENTRAL PROVINCE— <i>contd.</i>							
Kandy Civil and Infectious Diseases Hospitals :—							
Plague ..	18	—	10	—	—	—	—
Enteric (or Typhoid) Fever	61	—	13	2	—	—	—
Erysipelas ..	13	—	—	—	—	—	—
Smallpox ..	1	—	—	—	—	—	—
Madulkele Hospital :—							
Enteric (or Typhoid) Fever	2	—	1	—	—	—	—
Erysipelas ..	1	—	—	—	—	—	—
Pyæmia ..	1	—	—	—	—	—	—
Maskeliya Hospital :—							
Erysipelas ..	1	—	1	—	—	—	—
Matale Hospital :—							
Enteric (or Typhoid) Fever	7	—	3	—	—	—	—
Erysipelas ..	1	—	1	—	—	—	—
Maturata Hospital :—							
Enteric (or Typhoid) Fever	2	—	—	—	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Mulhakele Hospital :—							
Malaria and Malarial Cachexia ..	41	—	—	—	—	—	—
Nawalapitiya Hospital :—							
Malarial Fever ..	95	—	1	—	—	—	—
Enteric (or Typhoid) Fever	20	—	3	—	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Ramboda Hospital :—							
Enteric (or Typhoid) Fever	16	—	4	—	—	—	—
SOUTHERN PROVINCE.							
Deniyaya Hospital :—							
Enteric (or Typhoid) Fever	7	—	4	—	—	—	—
Erysipelas ..	1	—	1	—	—	—	—
Elpitiya Hospital :—							
Enteric (or Typhoid) Fever	29	—	5	—	—	—	—
Erysipelas ..	3	—	—	—	—	—	—
Pyæmia ..	1	—	—	—	—	—	—
Bathfield Hospital Unawatuna :—							
Enteric ..	1	—	—	—	—	—	—



III.—Special Diseases—*contd.*

Hospital and Name of Disease.	Occurring amongst Patients.			Occurring amongst Officers.			
	Number of Cases.	In case of Patients attacked <i>while in Hospital</i> , state how long the person had been in Hospital before his attack, and for what Disease he was admitted.	Number of Deaths.	Resident Officers.		Non-Resident Officers.	
				Cases.	Deaths.	Cases.	Deaths.
NORTHERN PROVINCE.							
Killinochi Hospital :— Erysipelas ..	1	—	—	—	—	—	—
Mannar Hospital :— Enteric (or Typhoid) Fever ..	2	—	1	—	—	—	—
Erysipelas ..	2	—	1	—	—	—	—
Mullaattivu Hospital :— Smallpox ..	1	—	—	—	—	—	—
Enteric (or Typhoid) Fever ..	2	—	—	—	—	—	—
Pyæmia ..	1	—	—	—	—	—	—
Point Pedro Hospital :— Plague ..	1	—	—	—	—	—	—
Talaimannar Hospital :— Chickenpox ..	1	—	—	—	—	—	—
EASTERN PROVINCE.							
Batticaloa Hospital :— Enteric (or Typhoid) Fever ..	5	—	1	—	—	—	—
Mahaoya Hospital :— Enteric (or Typhoid) Fever ..	1	—	1	—	—	—	—
NORTH-WESTERN PROVINCE.							
Kurunegala Hospital :— Plague ..	1	—	1	—	—	—	—
Enteric (or Typhoid) Fever ..	2	—	1	—	—	—	—
Pyæmia ..	2	—	—	—	—	—	—
Puttalam Hospital :— Enteric (or Typhoid) Fever ..	2	—	1	—	—	—	—
Erysipelas ..	1	—	—	—	—	—	—
Pyæmia ..	1	—	1	—	—	—	—
Ridigama Hospital :— Endemic Malaria ..	551	—	8	—	—	—	—
NORTH-CENTRAL PROVINCE.							
Anuradhapura Hospital :— Enteric (or Typhoid) Fever ..	14	—	—	—	—	—	—
Erysipelas ..	5	—	—	—	—	—	—



III.—Special Diseases—*contd.*

Hospital and Name of Disease.	Occurring amongst Patients.			Occurring amongst Officers.			
	Number of Cases.	In case of Patients attacked <i>while in Hospital</i> , state how long the person had been in Hospital before his attack, and for what Disease he was admitted.	Number of Deaths.	Resident Officers.		Non-Resident Officers.	
				Cases.	Deaths.	Cases.	Deaths.
PROVINCE OF UVA.							
Badulla Hospital :—							
Enteric (or Typhoid) Fever	21	—	3	—	—	—	—
Erysipelas ..	4	—	—	—	—	—	—
Koslanda Hospital :—							
Cholera ..	7	—	1	—	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Lunugala Hospital :—							
Enteric (or Typhoid) Fever	8	—	2	—	—	—	—
Erysipelas ..	4	—	1	—	—	—	—
Pneumonia ..	1	—	1	—	—	—	—
Medagama Hospital :—							
Erysipelas ..	1	—	—	—	—	—	—
Passara Hospital :—							
Enteric (or Typhoid) Fever	6	—	2	—	—	—	—
Pyæmia ..	1	—	1	—	—	—	—
PROVINCE OF SABARAGAMUWA.							
Aranayaka Hospital :—							
Erysipelas ..	1	—	—	—	—	—	—
Balangoda Hospital :—							
Enteric (or Typhoid) Fever	1	—	—	—	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Eheliyagoda Hospital :—							
Enteric (or Typhoid) Fever	20	—	7	—	—	—	—
Kahawatta Hospital :—							
Enteric (or Typhoid) Fever	4	2 for Malaria	1	—	—	—	—
Erysipelas ..	2	—	—	—	—	—	—
Kegalla Hospital :—							
Enteric (or Typhoid) Fever	9	—	2	—	—	—	—
Erysipelas ..	1	—	1	—	—	—	—
Pyæmia ..	1	—	1	—	—	—	—
Kitulgala Hospital :—							
Enteric (or Typhoid) Fever	—	—	—	1	—	—	—
Kolonna Hospital :—							
Erysipelas ..	3	—	—	—	—	—	—
Pyæmia ..	1	—	1	—	—	—	—
Undugoda Hospital :—							
Enteric (or Typhoid) Fever	2	—	1	—	—	—	—



## IV.—Water Supply, &amp;c.

Situation of Hospital.	Water available for each Patient every Day.	Source of Supply.	Quality of Water.	Arrangements as to Baths and Lavatories.	System of Sewerage.	Condition of Privies.
<b>WESTERN PROVINCE.</b>						
Angoda Infectious Diseases Hospitals	Unlimited	Reservoir	Good	A bath and separate fly-proof lavatory to each ward	Dry-earth system	Satisfactory
Awissawella	do.	do.	do.	A bath and lavatory to each ward	do.	—
Colombo.						
Borella Branch Hospital	do.	do.	do.	1 bathroom and 5 lavatories	Water carriage system	—
Borella Police Hospital	do.	do.	do.	2 bathrooms and 2 lavatories	do.	Satisfactory
Borella Prison Hospital	do.	do.	do.	2 bathrooms and 2 lavatories to each ward	do.	do.
De Soysa Lying-in Home	do.	do.	do.	Baths and shower baths	do.	do.
General Hospital	do.	do.	do.	Sufficient	do.	do.
Lady Havelock and Lady Ridgeway Hospitals	do.	do.	do.	10 bathrooms	do.	do.
Victoria Memorial Eye Hospital	do.	do.	do.	10 bathrooms and 10 lavatories	do.	Very clean
Gampaha Lady Manning Hospital	Sufficient	From wells	do.	Satisfactory	Dry-earth system	—
Hendala Leper Asylum	Ample	Reservoir, for cooking and drinking purposes	do.	24 bathrooms adjoining the wards, supplied with hot and cold water	do.	Good
Ingiriya	Unlimited	Spring water	do.	7 bathrooms attached to wards and fly-proof lavatories	do.	do.
Kalutara	do.	From wells	Satisfactory	Bathrooms attached to wards	do.	—
Kandana Sanatorium	30 to 40 gallons	do.	Bad	Baths and lavatories attached to wards	do.	—
Mahara (jail)	Unlimited	From Ragama pipe-borne	Wholesome	Satisfactory	do.	Satisfactory
Moratuwa	Sufficient	From a well	Slightly brackish	4 baths and 6 latrines	do.	—
Neboda	20 gallons (approximately)	From a well pumped to a storage tank	Good	4 bathrooms and 8 lavatories	do.	Satisfactory
Negombo	Sufficient for drinking only	From a well	do.	A bathroom and lavatory attached to each ward, water for bathing not available on the premises	do.	—
Panadure	Unlimited	do.	Satisfactory	2 baths and 2 latrines	do.	Satisfactory
Pimbura	4 gallons (approximately)	do.	Unsatisfactory	Bathrooms and lavatories are connected to wards	do.	—
Ragama Tuberculosis Hospital	Unlimited	From a large well and stored in two tanks	Good	Bathroom and lavatory in fly-proof room	do.	Clean
Watupitiwala	do.	From a well	Satisfactory	Baths attached to wards	do.	—
<b>CENTRAL PROVINCE.</b>						
Agrapatana	Unlimited	Natural spring water	Good	2 bathrooms and 2 lavatories for each ward	Dry-earth system	—
Bogawantalawa	do.	do.	do.	do.	do.	—
Dambulla	3 gallons	From a well	do.	Bathrooms and tubs provided in each ward	do.	Clean
Deltota	Unlimited	Natural spring water	Good and clean	A bathroom near each ward; tap and zinc baths provided	do.	—
Dikoya	do.	Reservoir	Pure	8 bathrooms	do.	Satisfactory
Dimbula (Kotagala)	do.	Natural spring water	Good	A bathroom attached to each ward	do.	Clean
Dolosbage	do.	do.	do.	3 bathrooms connected to wards	do.	Satisfactory
Gampola	15 gallons (approximately)	Reservoir	do.	2 bathrooms in each ward provided with zinc baths	do.	do.
Kandy	Unlimited	do.	do.	11 bathrooms	do.	do.
Lindula	do.	Natural spring water through Jewel filters	do.	A bath and lavatory in each ward	do.	Clean
Madulkele	do.	do.	do.	9 bathrooms and 13 lavatories	do.	Satisfactory
Maskeliya	Sufficient	do.	Pure	4 bathrooms	do.	Good



IV.—Water Supply. &c.—*contd.*

Situation of Hospital.	Water available for each Patient every Day.	Source of Supply.	Quality of Water.	Arrangements as to Baths and Lavatories.	System of Sewerage.	Condition of Privies.
<b>CENTRAL PROVINCE—<i>contd.</i></b>						
Matale ..	Unlimited ..	Reservoir ..	Good ..	Baths and latrines attached to each set of wards	Dry-earth system ..	Good
Maturata ..	do. ..	Natural spring water	do. ..	2 bathrooms to each ward	do. ..	Satisfactory
Mulhalkele ..	do. ..	From irrigation channel	— ..	3 lavatories and 2 bathrooms	do. ..	do.
Nawalapitiya ..	do. ..	Natural spring water	Good ..	A bath and lavatory in each ward	do. ..	do.
Nuwara Eliya ..	do. ..	Reservoir ..	Pure ..	do. ..	do. ..	do.
Pussellawa ..	do. ..	Natural spring water	Good ..	3 bathrooms	do. ..	do.
Ramboda ..	do. ..	do. ..	Unsatisfactory during rainy seasons	6 bathrooms and 6 lavatories	do. ..	do.
Teldeniya ..	Abundant in rainy season and scanty in dry season	Reservoir ..	Fairly good ..	Bathrooms and lavatories connected to wards	do. ..	—
Uda Pussellawa ..	Unlimited ..	Natural spring water, filtered	do. ..	do. ..	do. ..	Clean
<b>SOUTHERN PROVINCE.</b>						
Balapitiya ..	Unlimited ..	From a well	Poor in quality	2 bathrooms, convalescents prefer sea baths	Dry-earth system ..	—
Deniyaya ..	do. ..	Natural spring water	Good ..	6 bathrooms and 10 latrines	do. ..	—
Elpitiya ..	14 gallons ..	From a well	do. ..	2 baths and 2 lavatories in each ward	do. ..	—
Galle ..	Limited, but just sufficient	Reservoir ..	do. ..	Bathrooms and lavatories in each ward	do. ..	—
Hambantota ..	Sufficient for drinking purposes	From wells	do. ..	1 bathroom and 2 fly-proof latrines	do. ..	—
Matara ..	Unlimited ..	do. ..	Chalky and unsatisfactory	Bathrooms attached to latrines	do. ..	—
Tangalla ..	Unlimited in rainy weather, a proportionate quantity in dry weather	do. ..	Slightly brackish	A bathroom and lavatory in each ward	do. ..	—
Tissamaharama ..	Unlimited for drinking purposes	do. ..	Poor in quality	A bathroom attached to each ward	do. ..	—
Udugama ..	Sufficient ..	From a well and reservoir	Good ..	2 lavatories and 2 bathrooms for two wards and 1 each for the other wards	do. ..	Good
Unawatuna Bathfield House Hospital	do. ..	do. ..	do. ..	2 wells; water drawn out for those unable to do so	do. ..	—
<b>NORTHERN PROVINCE.</b>						
Chavakachcheri ..	Unlimited ..	From wells	Good ..	A bath attached to each ward	Dry-earth system ..	—
Jaffna ..	do. ..	do. ..	do. ..	Separate bathrooms and latrines for males and females in respective wards	do. ..	Satisfactory
Kilinochchi ..	10 gallons ..	From well and tank	do. ..	Baths and lavatories in each ward	do. ..	Clean & good
Mannar ..	Unlimited ..	From wells	do. ..	4 bathrooms and 6 lavatories	do. ..	Satisfactory
Mantota ..	do. ..	do. ..	Fairly good ..	Bathrooms and latrines separately for males and females	do. ..	In good order
Mullaitivu ..	do. ..	do. ..	do. ..	4 bathrooms, 2 for each sex, and 4 lavatories	do. ..	Satisfactory
Point Pedro ..	do. ..	do. ..	Good and pure	5 bathrooms and 8 latrines connected to wards	do. ..	do.
Talaimannar ..	do. ..	do. ..	do. ..	Baths and lavatories adjoin wards	do. ..	do.
Vavuniya ..	Sufficient ..	do. ..	Fairly good ..	2 bathrooms and 3 lavatories	do. ..	do.



IV.—Water Supply, &c.—*contd.*

Situation of Hospital.	Water available for each Patient every Day.	Source of Supply.	Quality of Water.	Arrangements as to Baths and Lavatories.	System of Sewerage.	Condition of Privies.
<b>EASTERN PROVINCE.</b>						
Batticaloa ..	Sufficient ..	From wells ..	Good ..	4 bathrooms and latrines ..	Dry-earth system ..	—
Kalmunai ..	Unlimited ..	do. ..	do. ..	A separate bathroom and latrine to each ward ..	do. ..	Clean
Mahaoya ..	Sufficient ..	do. ..	Unsatisfactory ; filtered before use ..	2 bathrooms ..	do. ..	Satisfactory
Mantivu Leper Asylum ..	Unlimited ..	Reservoir ..	Good ..	Latrines and bathrooms provided to each ward and a set of latrines and bathrooms for a group of five cottages ..	do. ..	—
Trincomalee ..	do. ..	From a well outside the premises for drinking ..	do. ..	Bathrooms and latrines connected to wards ..	do. ..	Satisfactory
<b>NORTH-WESTERN PROVINCE.</b>						
Chilaw ..	Sufficient for drinking ..	From a well ..	Good ..	Convalescents bathe in the public baths or in the river ..	Dry-earth system ..	Satisfactory
Dandagamuwa ..	Unlimited ..	do. ..	do. ..	5 bathrooms and 5 latrines ..	do. ..	—
Kurunegala ..	do. ..	do. ..	do. ..	Sufficient number of latrines ; bathrooms provided with tubs, the stream is preferred by patients ..	do. ..	—
Marawila ..	do. ..	do. ..	do. ..	2 bathrooms and 2 lavatories ..	do. ..	—
Nikaweratiya ..	do. ..	do. ..	Very hard ..	Baths and 6 lavatories ..	do. ..	Clean
Puttalam ..	do. ..	Reservoir ..	Unsatisfactory ..	4 bathrooms and 8 latrines ..	do. ..	—
Ridigama ..	12 gallons ..	From a well ..	Good ..	Baths and lavatories adjoin the wards ..	do. ..	—
<b>NORTH-CENTRAL PROVINCE.</b>						
Anuradhapura ..	Unlimited ..	From wells ..	Hard ..	7 lavatories and 7 bathrooms attached to wards ..	do. ..	—
Mihintale ..	do. ..	From a well ..	Brackish ..	3 bathrooms and latrines attached to wards ..	do. ..	Clean
Ratmale ..	Sufficient ..	do. ..	Fair ..	2 bathrooms and 2 sets lavatories ..	do. ..	—
<b>PROVINCE OF UVA.</b>						
Alutnuwara ..	Unlimited ..	From a well ..	Fair ..	Bathrooms and lavatories to each ward ..	Dry-earth system ..	—
Badulla ..	do. ..	From a mountain spring ..	Good ..	8 bathrooms and lavatories ..	do. ..	—
Buttala ..	do. ..	From a well and river water ..	Unsatisfactory ..	2 sets of bathrooms and lavatories ..	do. ..	—
Haputale ..	do. ..	From a mountain stream ..	Good ..	— ..	do. ..	Good
Koslanda ..	do. ..	do. ..	do. ..	4 bathrooms and 6 latrines ..	do. ..	—
Lunugala ..	do. ..	do. ..	do. ..	5 bathrooms ..	do. ..	—
Medagama ..	Sufficient ..	From a well for drinking ..	Fair ..	No proper baths, the stream is used by patients ..	do. ..	Good
Monaragala ..	do. ..	— ..	Soft and impure ..	Baths and latrines attached to the ward ..	do. ..	Clean
Passara ..	Unlimited ..	From a mountain stream ..	Wholesome ..	4 bathrooms ..	do. ..	—
<b>PROVINCE OF SABARAGAMUWA.</b>						
Aranayaka ..	Unlimited ..	From a well ..	Good ..	A bathroom and lavatory in each ward ..	Dry-earth system ..	—
Balangoda ..	do. ..	From a spring ..	do. ..	— ..	do. ..	—
Eheliyagoda ..	Sufficient ..	From wells ..	Unsatisfactory ..	Convalescents bathe in the stream ..	do. ..	Clean
Embilipitiya ..	do. ..	do. ..	Good ..	Baths and lavatories provided to each ward ..	do. ..	do.
Kahawatta ..	do. ..	From a natural spring ..	Satisfactory ..	2 bathrooms and latrines attached to wards ..	do. ..	Fine
Karawanella ..	Unlimited ..	From wells ..	Pure ..	Separate bathrooms for males and females ..	do. ..	—
Kegalla ..	Insufficient ..	From a well ..	do. ..	— ..	do. ..	Satisfactory
Kitulgala ..	Unlimited ..	Reservoir ..	Excellent ..	11 bathrooms with water service ..	do. ..	Clean
Kolonna ..	Sufficient ..	From wells ..	Unsatisfactory ..	— ..	do. ..	—
Rakwana ..	Unlimited ..	do. ..	Good ..	Bathrooms in each ward ..	do. ..	—
Ratnapura ..	Insufficient ..	Reservoir ..	do. ..	Bathrooms for males and females ..	do. ..	Satisfactory
Undugoda ..	do. ..	From a natural spring ..	Pure ..	Bathrooms with water service ..	do. ..	—



