LEAGUE OF NATIONS

Health Organisation

INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

Preparatory Papers :

REPORT ON HEALTH ORGANISATION IN CEYLON

GENEVA, 1937.

European Conference on Rural Hygiene (June 29th-July 7th, 1931.)

REPORT OF THE PREPARATORY COMMITTEE on the Principles governing the Organisation of Medical Assistance, the Public Health Services and Sanitation in Rural Districts. (C.H.1045.) (Ser. L.o.N. P. 1931.III.7) ... 2/- $0.50

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LEAGUE OF NATIONS

Health Organisation

INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

Preparatory Papers :

REPORT ON HEALTH ORGANISATION IN CEYLON

Series of League of Nations Publications

III. HEALTH

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INTRODUCTION.

In view of the Intergovernmental Conference of Far-Eastern Countries on Rural Hygiene, which will be held in Bandoeng (Java) from August 3rd to 13th, 1937, the participating countries have been invited to prepare national memoranda covering the items of the agenda of the Conference—*i.e.* :

I. Health and Medical Services.

II. Rural Reconstruction and Collaboration of the Population.

III. Sanitation and Sanitary Engineering.

IV. Nutrition.

V. Measures for combating Certain Diseases in Rural Districts.

Herewith is the report for Ceylon.

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INTERGOVERNMENTAL CONFERENCE OF FAR-EASTERN COUNTRIES ON RURAL HYGIENE

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

REPORT OF CEYLON

INTRODUCTION.

Ceylon is a pear-shaped island in the Indian Ocean, off the southern extremity of the Indian Peninsula, lying between 5° 55′ and 9° 50′ North latitude and 79° 42′ and 81° 53′ East longitude. Its area is 25,332 square miles, or about equal to the Netherlands and Belgium ; its greatest length from north to south is 270 miles and its greatest breadth from east to west 140 miles (see map 1).

The configuration of the island follows the mountain system which occupies the whole of the south-central region with offsets to the north and south-west. The hill country covers, roughly, one-fifth of the total area and includes several high peaks and some extensive plateaux. The coast is for the most part flat and sandy, with somewhat irregular outline due to the formation of lagoons and lakes.

The soil exhibits considerable variation in its composition. In the low country, it is derived largely from laterite (Kabuk) and deposits from the hills and from the sea. In the south and south-west, the " Kabuk " soils predominate and are of a rich red colour and clayey nature ; in the wider valleys, the soil consists mainly of alluvium, and in the north-central and eastern plains, which are extensively covered with jungle, of a dark vegetable loam. The soil of the northern part of the island is composed chiefly of an admixture of the decomposition products of marine limestone and sand, but in many places is covered with sand drifts of considerable depth. In the upland plains, the soil is derived largely from the decomposition of the gneissic and granitic masses and is frequently impregnated with iron oxide.

Ceylon is relatively a well-watered country with numerous rivers and streams ; few of the rivers, however, are large or sufficiently deep to allow of navigation, even by small craft, except in their lower reaches, with one or two exceptions, the rivers of the northern, eastern and south-eastern plains are not of large volume, and during the long, dry seasons are often reduced to puny streams meandering in irregular fashion along the sandy beds. In the western and southern areas, on the other hand, many of the rivers and their tributaries are perennial and maintain a considerable volume of water throughout the year. In ancient times, irrigation was undertaken on a large scale from artificial reservoirs or tanks and is continued at the present time.

The climate is essentially tropical without any marked seasonal variation. In the low country, the annual mean temperature is about 80° to 82° F. At higher altitudes it falls off, at a fairly steady rate, about 1° F. for each 300 feet rise in altitude. At Kandy, 1,650 feet above sea-level, it is 77° F., at Diyatalawa, 4,100 feet, it is 68° F. ; and at Nuwara Eliya, the chief hill station in the island, 6,200 feet, it is 59° F. At Colombo, the " hot weather " may be said to extend from March to May, and the " cold weather " from December to February. July and August are often pleasant, particularly on the west side of the island. The differences between the temperatures of the low-country and up-country stations

are considerable. The highest shade temperature recorded in Ceylon was 103.7° F. at Trincomalie in May 1890, and the minimum air temperature 27.1° F. at Nawara Eliya in February 1914.

The relative humidity varies generally from about 70% during the day to about 90% at night, rising as the temperature falls. Owing to the high average temperature in the low country, the absolute humidity there is high.

As is generally found in the tropics, the seasons are distinguished by differences in rainfall rather than pronounced variations in temperature. The south-west and north-east monsoon periods are usually regarded in Ceylon as lasting from April to September and October to March respectively. The change in the direction of the monsoon winds, from south-west to north-east, causes a corresponding change in the location of the heaviest rain, which is usually experienced to windward of the hills, while during the inter-monsoon seasons, local wind circulations are liable to give rain in any part of the island.

The annual average rainfall varies from 40 inches in the north-west and the south-east to over 200 inches in some parts of the interior. The annual averages (1911-1930) are 91 inches at Colombo, 87 inches at Kandy and 92 inches at Nawara Eliya.

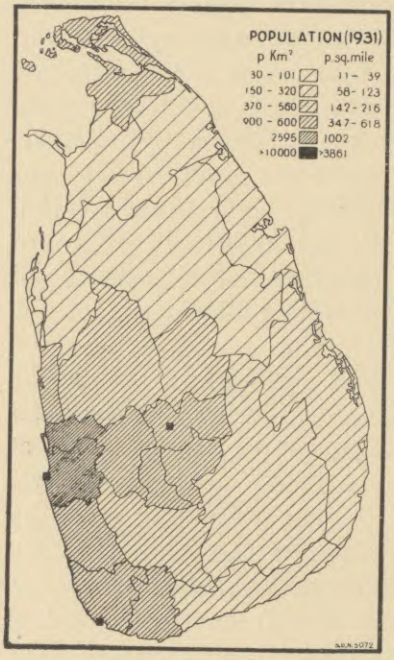
The Government is administered by a Governor, aided by a State Council consisting of fifty members elected for territorial constituencies, three ex-officio members (the Chief Secretary, Legal Secretary and Financial Secretary) called Officers of State, and eight members nominated by the Governor. The State Council concerns itself with administration as well as with legislation.

The departments of Government are divided into ten groups. Three of these groups are in charge of the Chief Secretary, the Legal Secretary and the Financial Secretary. The remaining seven groups are in charge of members of the State Council, who are elected as Chairmen of the various Executive Committees and who are styled Ministers. The Ministers, with the Officers of State, form the Board of Ministers.

All Ceylonese, both male and female, of a minimum age of 21 are included in the franchise. British subjects not

domiciled in Ceylon are allowed to qualify for the franchise in accordance with the hitherto existing constitution or on their furnishing satisfactory evidence of five years' residence and a declaration of permanent settlement in the island.

According to the decennial census taken in 1931, the population was 5,306,871, an increase of 17.94% on the population enumerated in 1921. The distribution of the population according to provinces is as follows :



Western Province .	1,445,034
Central Province . .	953,388
Southern Province .	771,204
Northern Province .	398,874
Eastern Province .	212,421
North-Western Province	546,966
North-Central Province	97,365
Province of Uva . .	303,243
Province of Sabaragamuwa .	578,368
Miscellaneous . . .	8
	5,306,871

The estimated population for 1936 was 5,631,000.

The density of population was 209 persons per square mile, and ranked above India, France and Denmark and somewhat below Japan.

The races forming the population of the island are (according to the 1931 census) :

Sinhalese . . .	3,473,030	Malays	15,977
Tamils	1,417,477	Europeans . . .	9,153
Moors	325,913	Others	32,564
Burghers and Eurasians . .	32,315	Unspecified . . .	442

The population estimated according to religion at the 1931 census is as follows :

Buddhists . . .	3,267,457	Moslems	356,888
Hindus	1,158,522	Others	938
Christians . .	523,066		

The vital statistics for 1936 are not available as yet. Those for 1935 and 1934 are abnormal owing to the epidemic of malaria on an unprecedented scale that occurred during these years. Those for 1933 are therefore given.

Births	209,032	Birth rate	38.6
Deaths	114,690	Death rate	21.2
Infant deaths . .	32,866	Infant death rate . .	157.0
Maternal deaths .	3,882	Maternal death rate	18.6

Sinhalese and Tamil are the two chief vernacular languages in the island, the former being spoken by the Sinhalese, who chiefly inhabit the western, central and southern portions of the island, and the latter by the Tamils, inhabiting the northern and eastern parts, and by the immigrant estate population. English is in general use among the people of the upper and middle classes of all communities.

Ceylon is mainly an agricultural country, its chief products being tea, rubber, coconut and rice. Approximately 43% of the total area is capable of being cultivated and 19% is cultivated. Most of the area under cultivation is situated in the hills and in the south-west of the island. Rice is the staple food of the inhabitants, and is cultivated generally throughout the country ; the amount grown, however, falls short of requirements, and rice is imported from India, Siam and Burma.

I. HEALTH AND MEDICAL SERVICES.

1. Principles governing their Organisation.

The health and medical services of the island are placed in the Ministry of Health, which controls the following departments :

(*a*) Medical and Sanitary Services ;
(*b*) Board of Quarantine ;
(*c*) The Medical College ;
(*d*) The College of Indigenous Medicine.

The director of Medical and Sanitary Services is also the Chairman, Board of Quarantine, and the Principal of the Medical College. He has nothing to do with the College of Indigenous Medicine.

Till the year 1913, officers of the Civil Medical Department, as the Department of Medical and Sanitary Services was then called, carried out both medical and sanitary duties.

In 1912, the Government appointed a committee to enquire into and report on the question of the establishment of a Sanitation Department for Ceylon. The committee recommended that a staff of officers for sanitary work be appointed to form a sanitary branch of the Medical Department. These officers were to give full time to the work and were not allowed to engage in private practice. In 1913, the sanitary branch was created. The head of this branch was placed under the head of the Medical Department. In 1919, the Government appointed a second committee to consider and report on the Sanitary Branch with reference to developing and improving its scope. This committee went into the work already done and made recommendations for the enlargement of its staff. In 1925, the Civil Medical Department was reorganised and was designated the Department of Medical and Sanitary Services. In 1933, the policy of recruiting specially for the sanitary branch was abandoned and recruitment to the general service was adopted, it being left to the Director of Medical and Sanitary Services to employ the officer either on the medical or public health side. This policy is now in operation.

The island is divided into medical districts with a medical officer in charge. Up till 1913, he was in charge of the sanitary work of his area. Medical officers also enjoyed the right of private practice and the salary was based on this fact. It was found that little or no sanitary work was done and the committee appointed in 1912 to report on the question of the establishment of a sanitation department recommended the appointment

of whole-time officers, and whole-time officers qualified in public health were appointed. The work carried out was on the district plan, medical officers of health being appointed first to provinces and later, as trained personnel increased, to smaller revenue districts. They supervised the work of sanitary inspectors stationed in local and sanitary board towns and in rural areas. The work consisted of attention to the general cleanliness of the environment, to latrine construction and to the control of epidemics.

In 1926 was introduced the *health unit type* of work, in which a complete programme according to the health needs of the area was carried out among a limited population with an adequate staff of inspectors, nurses and midwives. While in the district type of work only the environment was dealt with, in the health unit type of work the hygiene of the individual received attention as well, and health education was a special feature of the work. This type of work has proved very satisfactory, and at the present time eleven such units are in operation.

When district health work was established, curative work was carried out by the doctors in charge of hospitals and dispensaries, while the sanitary work was done by the medical officer of health. With the establishment of health unit work the medical officer of health conducted ante-natal and well baby clinics, carried out medical inspection of school-children, gave mass treatment for hookworm and malaria and administered preventive inoculations ; but, when it came to individual treatment, the cases were referred to the nearest hospital or dispensary to prevent duplication of work.

A further development is taking place at the present time in connection with malaria control, in which the health unit type of organisation is being introduced (for details see under " Malaria ") in which the field medical officer in charge will, in addition to what is done in health units, himself treat in connection with ante-natal and baby clinics, school clinics, tuberculosis clinics, venereal disease clinics, parangi and leprosy clinics.

With the type of health work that has been developed in Ceylon, it would not be possible for a medical officer to carry out ordinary curative work and preventive work at the same

time. In the first place, the man who undertakes preventive work must be specially trained for it. Ordinary curative work, especially when associated with private practice and judicial work, occupies a doctor's whole time, and does not permit him any to devote to the intensive type of preventive work that is being carried out. It would, on the other hand, be possible to secure the part-time services for special phases of preventive work, such as school health work, hookworm treatment, child welfare work, which are in tune with the type of work the medical officer ordinarily carries out.

Often the statement has been made that the health unit type of work is expensive and that it would not be possible for such work to be introduced into a country like India. The establishment of health unit work, even in one single area, will have a great beneficial effect on all the health work that is being done there, as it has happened in Ceylon, because of the setting-up of proper standards of work and procedures and of the possibility of measuring achievement.

The organisation of the central health work in the Department of Medical and Sanitary Services will be dealt with under "Curative and Preventive Activities", but here will be dealt with the *organisation of local health work.*

For local administration, the island is divided into three municipalities, twenty-seven urban district councils, one local board, seventeen sanitary boards and 390 village committees. With the exception of the village committees, the others are responsible for the health of their respective areas.

In the three municipal areas, with the revenue available, the councils are able to finance their own health departments.

In urban district council areas, the revenue is not sufficient to pay for the services of a trained full-time medical officer of health, but sufficient to pay for sanitary inspectors, nurses and midwives.

Sanitary boards do not enjoy any large revenue, but are generally able to provide for the services of a midwife.

The village committees do not receive any revenue to speak of, with the result that they are unable to provide any sanitary personnel. Sometimes, in association with a sanitary board, they pay for the services of a midwife, who works partly in

the sanitary board area and partly in the village committee area ; and, occasionally, they are able to pay for the services of a scavenging labourer for a bazaar area.

The country generally will come under one of four kinds of local authorities. The health work, except in the three municipalities, is done by the Director of Medical and Sanitary Services, although there is no legal provision for it, through the local authorities by providing them with health personnel as follows :

In the case of urban district councils, trained sanitary inspectors of the Department of Medical and Sanitary Services are seconded for service under them on favourable terms. While some urban councils have been provided with departmental public health nurses free of charge, the understanding with the central Government is that urban district councils should pay for their own nurses and midwives. As the salary of the medical officer of health is a big item, his services are provided free as a contribution of the central Government towards local health work on certain conditions.

In the case of sanitary boards, sanitary inspectors are provided free by the Government, and the supervision of the work is carried out without cost by the department medical officer of health under the chairman of the board.

In village committee areas, all health work is done by the Government.

The financial relations between the central Government and the local authorities lay down the principle that curative work should be financed by the central Government, while preventive work referring to local areas should be a charge on the revenue of such areas. The central Government bears about half the cost of the suppression of epidemics in urban district council areas, while bearing the whole cost in sanitary board and rural areas.

Co-operation with Other Government Departments.

A good deal of the success of health work in rural and sanitary board areas depends on the co-operation of the Government agent and his assistant, who are also chairmen of sanitary boards. This co-operation is always available.

The utmost co-operation is needed from the Education Department in the matter of school health work. The Director of Education has laid down health as the most important objective of education, and there is good understanding with him.

All local authorities are placed under the Commissioner of Local Government, with whom there is very good relationship. The Director of Medical and Sanitary Services is a member of the Local Government Board, of which the Commissioner of Local Government is President, and this board controls the affairs of urban district councils. In all special health matters pertaining to areas of local authorities, the advice of the Director of Medical and Sanitary Services is always sought by the Commissioner, who is ever willing to straighten out the difficulties of medical officers of health working under local authorities.

The co-operation of the Police Department is always forthcoming when dealing with outbreaks of infectious disease.

The co-operation of the Public Works, Irrigation and Railway Departments is most necessary in the matter of malaria control. While this co-operation is available in principle, as in all parts of the world, there is lack of appreciation of it on the part of subordinate personnel in carrying out the necessary measures.

The co-operation of the Agricultural Department, in which the Veterinary Department is placed, and the Co-operative Department is needed in the matter of nutrition and rural reconstruction, which are receiving the attention of the State Council.

2. Personnel.

(*a*) *Doctors.*

The training of doctors is carried out at the Ceylon Medical College, which is maintained by the Government. The college is administered by the Council of the Ceylon Medical College, with the Director of Medical and Sanitary Services as Principal, assisted by a Registrar and other members of the Medical College Council, consisting of professors, lecturers and nominated members. The course of studies extends to five years, exclusive

of the pre-medical year, and the college grants a Licence in Medicine, Surgery and Midwifery (L.M.S. Ceylon) which is registrable in England. There are at present 150 medical students and every year twelve to twenty students are passed out and registered as medical practitioners. All doctors in Government service, and the majority in private practice, obtain British qualifications in addition.

There is also a Medical Council for Ceylon affiliated to the General Medical Council in England. This body deals with the registration of qualified medical practitioners, dentists, pharmacists and midwives, and is the governing body with regard to all questions of medical ethics.

The total number of doctors registered in the island is 844. With a population of 5,631,000 in 1936, this works out at one doctor per 6,676 of population. Of the 844 doctors, 373 are in Government service and 471 outside it.

The Government has undertaken to provide medical care throughout the island, and the ratio of the Government doctor to population is one to 15,000.

While Government doctors are in all parts of the island, those in private practice are mostly in towns. The tendency is to appoint more and more Government doctors to rural areas. There is no difficulty of recruiting doctors for Government services, as there is no dearth of them.

(b) *Auxiliary Staff.*

The auxiliary staff for curative and preventive work consists of apothecaries, sanitary inspectors, nurses, midwives and vaccinators.

The apothecaries receive a two years' training at the Medical College. This training includes elementary medicine, surgery and hygiene. They are employed by the Government for the post of pharmacists in the Government hospitals, and, later in their service, are employed as officers in charge of rural dispensaries, being permitted to treat while in the service of the Government. There are 407 apothecaries in the Government service. The supply of apothecaries exceeds the demand and is likely to do so for many years.

Sanitary inspectors are trained by the Department of Medical and Sanitary Services for its own needs. The men selected for training are between the ages of 20 and 25 and have passed either the London Matriculation, Cambridge Senior Local or the Senior School Certificate of the Education Department of Ceylon. A special medical officer of health is detailed for training which is of an intensive nature of six months'duration. The daily routine work of training is as follows : 7 a.m., to 10 a.m., field work with a sanitary inspector ; 11 to 12 noon, lecture ; 2 p.m. to 4 p.m., demonstration or exercise in the field. Lecturers are specialists in their subjects and the medical officer of health in charge acts as their tutor. The final examination taken is that of the Royal Sanitary Institute, which is held in Ceylon by a local board of examiners.

The department undertakes to second for service under urban district councils sanitary inspectors on favourable terms. This arrangement has been accepted by most councils. Exclusive of those in municipalities, there are in Government service 261 inspectors. More inspectors are being trained in connection with the scheme of malaria control that is being undertaken in the island.

British qualified nursing sisters are recruited in England and are restricted to a certain limited number, and there has been no difficulty in keeping up the supply of this number, which consists of thirty-seven Europeans and six Ceylonese. The European sisters are engaged on a contract, and such of them as are admitted into the permanent nursing establishments gain pension privileges and prospects of promotion as matrons.

One hundred and twenty-four religious sisters recruited from three religious orders in Europe are employed in the non-paying wards of the General Hospital, Colombo, three district hospitals, in the two leper asylums and the tuberculosis hospital. These sisters generally serve till superannuation, and there is no difficulty in replacement from Europe, as annual replacements are few.

There are 452 Ceylonese matrons and nurses, of whom thirty-nine are public health nurses. Ceylonese nurses are trained in three training schools at Colombo, Kandy and Galle. Their numbers are below the needs of the hospitals owing to the training-schools being insufficient to supply the demand.

There is some reduction annually by nurses getting married and leaving the service as a result. The course of training is one of three years, with a subsequent period of six months' training in maternity nursing. An up-to-date training school for nurses is nearing completion in Colombo.

Public health nurses are recruited from nurses who have obtained their certificates in general nursing and are given a training in midwifery for six months, if they have not had that training already, and six months' training in public health nursing at the Kalutara Totamune health unit. The supply is not equal to the demand.

Training of midwives is carried out at the Lying-in Home in Colombo. The course up to date has been one of six months' duration and two classes of midwives are trained—viz., class I of nurses and English-speaking midwives and class II of pupils who can read and write only Sinhalese or Tamil. The nurses who undergo the course remain in Government service, but the remaining class I midwives take generally to private practice. Class II midwives are employed by the Government, local authorities and estates. Those who cannot find such employment resort to private practice in their own villages.

Training of midwives commenced in 1879, and for ten years the total trained was only eight. Since 1888 to date, 1,470 have been trained, and, of them, 446 are registered, registration being required only in areas proclaimed under Section 57 of the Medical Ordinance for the Control of Midwifery; 141 are in Government service, 126 in the service of local authorities and 96 on estates. In addition to the training given by the Government, training given at two mission hospitals in Jaffna is recognised for purposes of taking up the Government examination for the certificate of efficiency. It had long been felt that the six months' training was wholly inadequate, and arrangements have been made from this year to increase the training period from six months to eighteen months—one year being at the Lying-in Home and six months in a health unit—and to confine the admission only to women who have passed the Junior School Certificate.

It is further proposed to select the best among those in training as midwives and to give them a further training of nine months

— three months in general nursing and six months in public health nursing — for service as health visitors in the department. This will be a grade intermediate between the midwife and the public health nurse. This grade has been decided on because of the insufficiency of public health nurses and the higher pay and allowances that have to be paid to them. These health visitors will be trained in the vernacular and will be posted to rural areas under the supervision of public health nurses.

Vaccinators.

The Government trains pupil vaccinators in the offices of provincial surgeons. A six months' course of practical instruction is followed, and satisfactory candidates are employed as posts become available. The supply greatly exceeds the demand. Now, in health units, all vaccination work is being done by sanitary inspectors and public health nurses, so that these vaccinators do not work in health unit areas.

Hospital attendants, cooks and labourers from a class of semi-skilled and unskilled labour are not trained before employment. There is no shortage of this type of employee, as Government service is much sought after.

3. Curative and Preventive Activities.

The main divisions of the Department of Medical and Sanitary Services are : (1) medical, (2) sanitary, (3) laboratory.

The medical service deals with the curative side of the work of the department and with all hospitals and dispensaries.

The sanitary service deals with the preventive side of the work of the department and the activities coming under it are :

District health work,
Health unit work,
Epidemiology,
Maternity and child welfare,
School health work,
Sanitation and sanitary engineering,
Health education,
Malaria control,
Ankylostomiasis campaign,
Estate sanitation,
Vaccination against smallpox,
Leprosy survey and control,
Parangi campaign.

The laboratory service includes the work of the Director of the Bacteriological Institute and that of the Medical Entomologist.

(*i*) *Medical Activities.*

All parts of the island are generously provided by the State with hospitals and dispensaries. In and around Colombo are the General Hospital (943 beds), Lying-in Home (107 beds), Eye Hospital (56 beds), Women's Hospital (45 beds), Children's Hospital (82 beds), Female Venereal Diseases Hospital (29 beds), Police Hospital (32 beds), Tuberculosis Hospital (349 beds), Tuberculosis Sanatorium (72 beds), and Infectious Diseases Hospital (168 beds). Elsewhere in the districts there are 91 Government hospitals with 6,520 beds and a Tuberculosis Sanatorium with 44 beds. In addition, there are the prison hospitals, mental hospital and two leper asylums, with accommodation for more than 3,000 patients. The number of hospital beds provided by the Government is approximately two per 1,000 of population.

There are special out-patient departments—viz., the Anti-Tuberculosis Institute in Colombo ; nose, ear and throat clinic ; dental institutes in Colombo and Galle, and ophthalmic clinics at Colombo, Kandy, Galle, Batticaloa and Badulla.

All hospitals are maintained by the Government, which supplies all the equipment and personnel. The Government also provides free treatment (including accommodation and diet) for all non-paying patients (over 95% of admissions). Each district hospital contains medical and surgical beds and also provides lying-in accommodation for maternity cases. It also has an out-patient section, in which free treatment and medicines are provided. Government servants drawing over Rs.1,000 per annum have to pay for their medicines only at a statutory rate. Members of the public drawing over Rs.1,000 per annum are not entitled to treatment at these institutions. Hospitals were first built in centres of population where road access was good, as in Colombo, Kandy, Galle, Jaffna, Kurunegala, Badulla, Batticaloa, Ratnapura, Anuradhapura—all provincial towns. As feeders to these central

hospitals, district hospitals were subsequently built, where most needed, along main roads and serving populous districts. The largest number of hospitals are thus located in the western province and in the central province, where the first tea plantations were opened up. With the advent of rubber, estates were being opened up freely in the Western, Sabaragamuwa, Southern and Uva provinces, and more hospitals, for estate labour chiefly, were provided. For the more unhealthy and thickly populated districts, field hospitals were built in the malaria and parangi (yaws) ridden districts for the treatment of these diseases. The building of these field hospitals were of a tempory nature and the equipment was simple. All these hospitals have since been replaced by a permanent type of buildings and the equipment improved to conform to modern requirements. Some of these hospitals are found in remote places with no road suitable for wheeled traffic.

The western and central provinces are well provided with hospitals every ten to twelve miles along main traffic routes. When the sparseness of the population renders the provision of hospitals uneconomic, the Government has provided central dispensaries with their branch and visiting stations extending to the most distant villages. These are 230 central dispensaries, which are mostly in charge of qualified apothecaries, who are licensed to treat out-patients. Besides these central dispensaries, there are 165 branch dispensaries (with subsidiary stocks of medicine) and 281 visiting stations, to which stock mixtures have to be taken from the central dispensaries.

The apothecaries in charge of the central dispensaries visit these branch dispensaries and visiting stations on fixed days in the week. In addition to these visits, the apothecaries make special visits during fever seasons, or special itinerating officers are sent to distribute quinine.

More dispensaries are being opened out, and in the future it is hoped that the apothecaries in charge of dispensaries will be replaced by qualified doctors. The remote districts, which in the past were served by dispensaries, will in the future be served by cottage hospitals. Arrangements for the construction of five of them are being made.

The Government has provided sixty-six hospitals (out of ninety-one to meet the needs of rural populations) and 104 Government dispensaries (out of the 230 central dispensaries mentioned earlier) for the special needs of the planting districts (tea and rubber estates). In these hospitals, labourers are treated for a period of thirty days at 30 cents a day (payable by the estate), and any period over this is at Government expense. Government medical officers also attend on estate labourers on the estates when called for by the superintendent of the estate. For these visits, small statutory fees of Rs.2.50 per visit are recovered by the Government under the Medical Wants Ordinance and credited to revenue. For superintendents and other estate staff, medical officers are permitted to charge and recover approved fees and mileage. The Department of Medical and Sanitary Services also provides an inspecting medical staff to visit and report on housing, provision of medical aid and maternity benefit on estates and on estate sanitation. The Government also issues free drugs in bulk to estates which have estate dispensaries built and maintained by the estate. Such issues are made half-yearly and are estimated at a rate of 50 cents' worth of drugs per labourer on the estate. Estates that are provided with hospitals are allowed a rebate on the tea and rubber export duties provided they also conform to standards of housing, and sanitary accommodation. As a result of this allowance, there are now eighty-four estate hospitals built and maintained by estate proprietors and 727 estate dispensaries which receive free drugs from the Government to the value of 50 cents per labourer.

These estate hospitals and dispensaries are in charge of estate dispensers. Only one estate has a qualified medical officer in charge. The purpose of these estate hospitals and dispensaries is to provide first aid and simple treatment to the estate labourer at his own door. In all cases of serious illness, the Government medical officer has to be called in and the Government hospital is available for more expert treatment. Monthly returns of sickness and reports of death are submitted through the district medical officer to the provincial surgeon, who sends them to the inspecting medical officer and the head office.

(ii) *Sanitary Activities.*

The organisation of general health work is carried out on two plans, one on the *district plan* and the other the *health unit plan.* The object is eventually to carry out all work on the latter plan. The work was originally organised on the district plan and, in 1926, the health unit plan was introduced.

In the district plan of work, the medical officers of health are appointed to provinces and smaller revenue districts. They supervise the work of sanitary inspectors stationed in urban council, sanitary board and rural areas of their districts. The work consists chiefly of attention to general cleanliness of the environment, construction and improvement of wells, house construction, latrine construction and control of communicable diseases.

The health unit plan of work was developed in 1926 for the purpose of giving to rural areas a complete scheme of health work carried out by an adequate staff within small areas. For this purpose, the island is tentatively divided into sixty-three health districts, and eleven of these districts are being worked on this plan. In each of these districts one or more hospitals and dispensaries are included. The personnel consists of a trained full-time medical officer of health, public health nurses, at the rate of one per 8,000 of population, midwives at the rate of one per 4,000 of population, sanitary inspectors at the rate of one per 8,000 to 10,000 of population, a clerk, peon and office labourer. The work is done in association with local authorities. The activities carried out consist of a health survey, health education, tabulation and study of vital statistics, maternity and child welfare work, school health work, sanitation and control of communicable diseases, including vaccination against smallpox, anti-typhoid inoculation and mass treatment for hookworm.

Maternity and Child Welfare.

The infant and maternal problems of Ceylon are that, on an average, 35,000 babies die before they reach the first year of life and that 4,000 mothers die at child-birth.[1] The infant

[1] See also page 11.

mortality rate (average for ten years, 1925-1934) is 169 and the maternal mortality rate for the same period is 19.4. The rates for 1935 increased to 263 and 21.1 respectively on account of the epidemic of malaria on an unprecedented scale.

The personnel employed in the work consists of doctors, public health nurses, midwives and community organisations.

The work is carried out both by home visiting and by clinics. The former is carried out by the public health nurse, while the latter are conducted by the doctors, assisted by the nurse. Separate ante-natal and well baby clinics are held and the educational feature of the work is always kept in view.

During 1935, in the rural area, 4,702 clinics were held at 86 centres, as against 3,952 clinics at 78 centres in 1934.

The visits paid were as follows :

	1934	1935
Expectant mothers	8,033	10,350
Infants	28,324	28,028
Pre-school children	17,555	16,750

There were, in 1935, forty-five voluntary organisations interested in child welfare. The total income of these organisations was Rs.24,629.98, of which Rs.17,342.47, or 70%, has been expended on child welfare work. This money is spent in providing milk to infants and food to expectant mothers.

The work of the public health nurse is predominantly educational. She does this at her home visits when she instructs and demonstrates how the necessary care should be given to the expectant mother and child and by group talks at clinics. She supervises the work of the midwife. She lives in the area assigned to her and works usually with a population of 8,000. Her mode of travel is a small bull-cart or a small car.

The midwife has a definite area assigned to her. She visits differents parts of it each day to find expectant mothers. When she finds them, she makes friends with them, has them visited by the public health nurse, who provides them with ante-natal advice, gets them to visit the clinic to be examined by the doctor and observed, makes arrangements for the confinement, if it is to come off in the home, conducts the confinement

and looks after the mother and child for ten days after confinement. The activities at ante-natal clinics consist of examination of expectant mothers, taking of pelvimetric measurements, of blood pressure, of blood for Wassermann when indicated, giving of hookworm treatment, examination of urine, giving of advice by doctor and group talks by nurse.

The activities at baby clinics consist of weighing of babies, examination of babies by the doctor and giving of advice, giving of detailed advice by the nurse, group talks to mothers, "little mothers" classes, giving of milk to needy children, giving of cod-liver oil and attention to minor ailments.

Children of pre-school age are attended to at child welfare clinics and by home visits.

School Health Work.

The following is the scheme of work for children of school age, of whom there are 600,000 in the island. The scheme provides for :

(*a*) School sanitation ;
(*b*) Medical inspection of school-children ;
(*c*) Follow-up and correction of defects ;
(*d*) Control of communicable diseases ;
(*e*) Health education.

In school sanitation, in addition to the building itself as regards construction, maintenance, lighting and ventilation and school furniture, special attention is focused on provision of sanitary latrines and urinals, proper storage of drinking-water and the use of individual drinking-cups.

For medical inspection of school-children, individual record sheets are used and a full examination, which takes on an average five to six minutes, provided for. As a routine, each child is given at least three examinations during his school career—in the first, fourth and seventh standards.

The defects found are tabulated on a separate sheet in duplicate, one for the use of the head teacher and the other for the use of the medical officer. Notifications of defects are sent to the parents through the children. Defects, such as

hookworm infestation, malaria, scabies and pediculosis are dealt with in the school, and other defects are corrected at the nearest Government hospital or dispensary.

In the control of communicable diseases, arrangements are made for the head teacher to notify to the nearest medical officer of health or sanitary inspector any child sent home on suspicion of infectious disease or any child absent from school for over three days on account of illness. The children thus notified are visited by the sanitary inspector and suitable action taken. Anti-typhoid inoculation, anti-smallpox vaccination, hookworm treatment and quinine for malaria are administered.

With regard to health education in schools, courses are given in teacher-training schools and to teachers already in service by medical officers of health and school medical officers. School health education is divided into two :

(*a*) Health education procedures ;

(*b*) Health instruction.

Health education procedures include items by proper practice of which desirable health habits can be inculcated. The items are :

(1) Daily morning inspection ;
(2) Use of health habit-training booklet ;
(3) Weighing and measuring ;
(4) Use of handkerchief ;
(5) Proper storage of drinking-water ;
(6) Use of individual drinking-cups ;
(7) Pupil participation in the maintenance of sanitary facilities ;
(8) Midday meal ;
(9) Health clubs ;
(10) Organised play and games ;
(11) Use of first-aid cabinet ;
(12) Maintenance of health diary ;
(13) Parent teacher associations ;
(14) Parents' day ;
(15) School health demonstrations.

Health instruction includes items in which knowledge is imparted in the usual way. The items are :

(1) Direct teaching of hygiene, first aid and home nursing and mothercraft ;

(2) Teaching by correlation ;

(3) Visual methods—posters, scrap-books and health magazines ;

(4) Dramatisation ;

(5) Oral methods—songs and debates ;

(6) Field visits to village homes, latrines, water supplies, food handling establishments, mosquito-breeding places, fly-breeding places, medical officer of health's office, sanitary inspector's office, office of local authority, child welfare clinics, hospital and dispensaries.

Epidemiology.

The infectious diseases dealt with include the major quarantinable diseases, smallpox, plague and cholera, as well as typhoid fever, dysentery, chickenpox, measles, mumps, whooping-cough and diphtheria. The quarantine and prevention of diseases ordinance provides for the notification of all infectious diseases and of fevers of seven days' duration and over. The responsibility is placed for notification on the medical practitioner, ayurvedic physician or other person professing to treat and on every occupant of the house in which the case occurs.

On receipt of the notification, the case is investigated by a sanitary inspector, who takes immediate action to isolate the patient and notifies the medical officer of health. When in doubt about diagnosis, the sanitary inspector calls in the nearest Government medical officer or apothecary.

In the case of smallpox, plague and cholera, the medical officer of health promptly visits and takes suitable action to diagnose and isolate the patient in an infectious diseases hospital and to segregate the contacts in a temporary camp.

In the case of other diseases, isolation is generally carried out in the home, and as many as possible are induced to go into hospital. There is authority in the above-mentioned ordinance to remove patients to hospital.

Diagnosis is confirmed bacteriologically in the case of plague, cholera, typhoid fever and diphtheria by material being sent to the bacteriologist in Colombo.

Those isolated in the home are visited by the sanitary inspector to see that isolation is properly carried out and that the instructions given regarding prevention of spread of infection are observed. He makes a final visit to release the patient and to clean up the premises. Concurrent disinfection is carried out. Contacts are observed for the requisite period, and, in the case of smallpox, typhoid, plague and cholera, vaccination is carried out. In the case of typhoid, cholera and dysentery, disinfection of wells is carried out with tropical chloride of lime.

Vaccination against Smallpox.

Primary vaccination is compulsory in the island and secondary vaccination only during outbreaks of smallpox. The vaccine is prepared at the vaccine establishment in Colombo, and the department has a vaccination section which is charged with the duty of carrying out a systematic annual programme. Monthly lists of births in the villages are supplied to the district vaccinator by the headman, and each householder is served with a notice requiring him to enter the names of all unvaccinated persons in the household. From these schedules, monthly programmes of vaccination are drawn up and carried out at convenient centres. All householders who have failed to get their children vaccinated after due notice and subsequent warning have been given are prosecuted under the vaccination ordinance. During outbreaks of smallpox, house-to-house vaccination is carried out. Ceylon is pretty well protected by the systematic scheme of compulsory vaccination, which has been in force for over fifty years.

Health Education.

There is a separate section in the department on health education in charge of a special officer who has charge of all education material, which consists of models, posters, leaflets on health topics, lanterns and lantern-slides, cinema outfit and films.

The work in the field is carried out by the medical officer of health and his staff. Lectures on health subjects, with and without the aid of the lantern and cinema, are regularly given by the medical officers of health. Health talks are given by sanitary inspectors in villages and schools and by public health nurses in health unit areas. Health and baby weeks and health exhibitions are organised periodically by medical officers of health in their respective areas.

Articles on health are supplied to the vernacular Press and radio talks given. A periodical entitled the *Ceylon Health News* is issued once in two months by the department. Mention has been made under school health work of school health education.

Parangi Campaign.

This consisted of a special staff of itinerating medical officers with headquarters at convenient centres. They planned out systematic itineraries to cover all the villages affected with parangi (yaws). Thirteen medical officers were at one time employed, but the number has now been reduced to one. The salvarsan preparation used in the treatment has been very popular and successful and the number of cases of acute manifestations of the disease have been reduced to vanishing point. These itinerating officers also give simple treatment to the villagers.

Sanitation and sanitary engineering, malaria control, ankylostomiasis campaign, leprosy survey and control have been dealt with in Section V. Estate sanitation has been dealt with earlier.

(iii) Laboratory Work.

The laboratory services consists of :

(1) The Bacteriological Institute
(2) The Pasteur Institute ;
(3) Out-station laboratories ; and
(4) The vaccine establishment, all under the Director of the Bacteriological Institute ;
(5) Medical entomology, under the Medical Entomologist.

The Bacteriological Institute in Colombo carries out the diagnosis of specimens sent from all over the island, with the

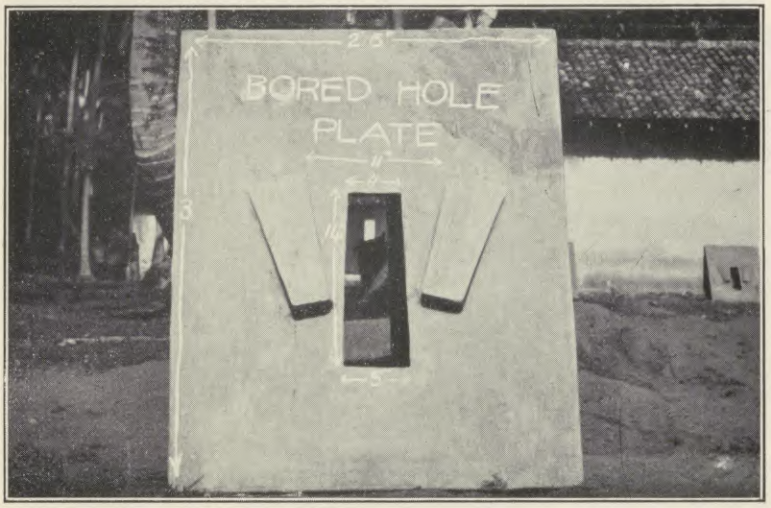


Figure 1. — Cement-concrete squatting-plate.

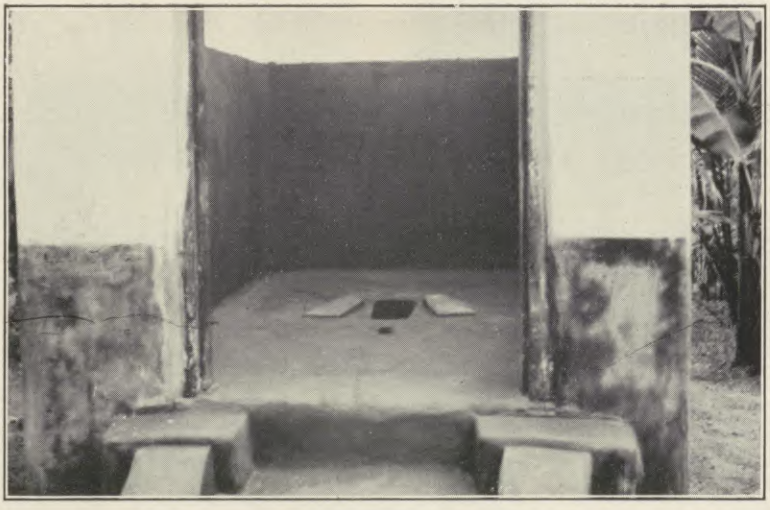


Figure 2. — Floor of bucket latrine : squatting-plate. The opening at the junction of washing (anterior area) and squatting (posterior) area carries away wash-water.

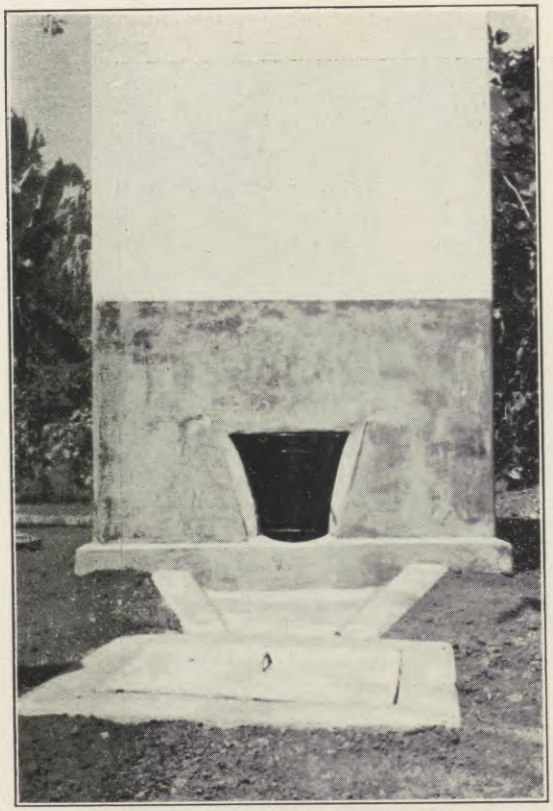


Figure 3. — Bucket latrine ; bucket chamber conforming to shape and size of standard-size bucket, and sealed pit for disposal of wash-water.

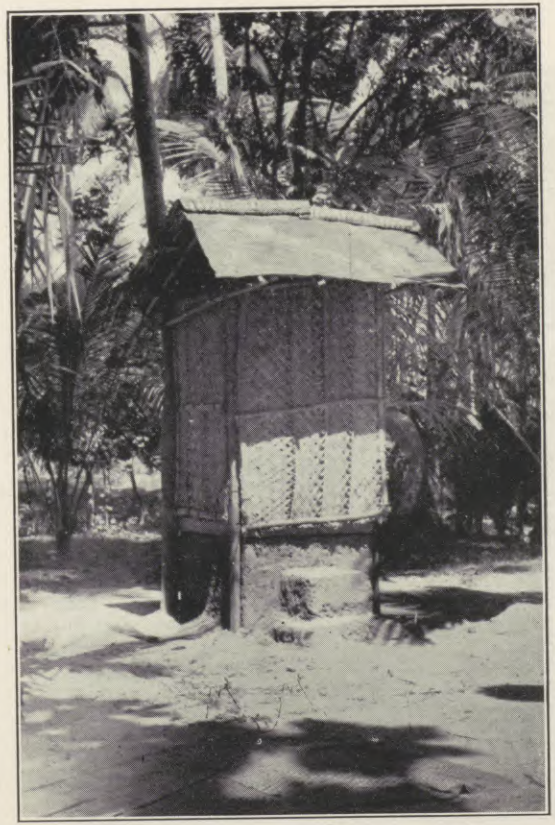


Figure 4. — Pit latrine (mound type) : cheap.

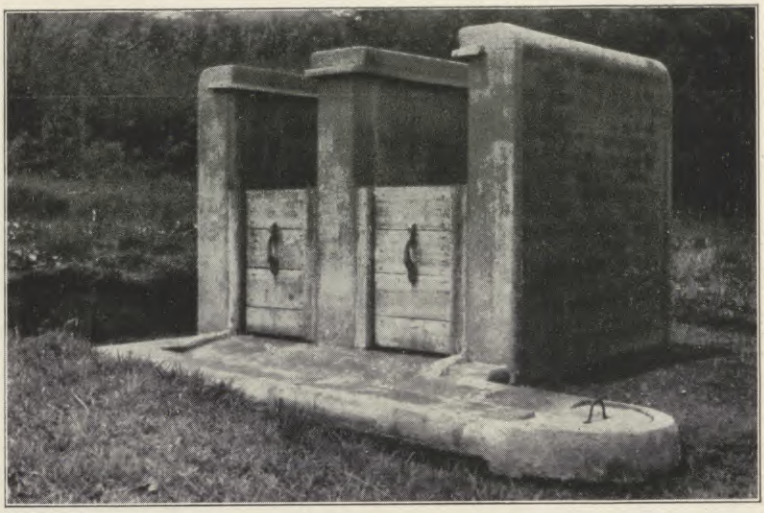


Figure 5. — Larval trap for cow-dung.

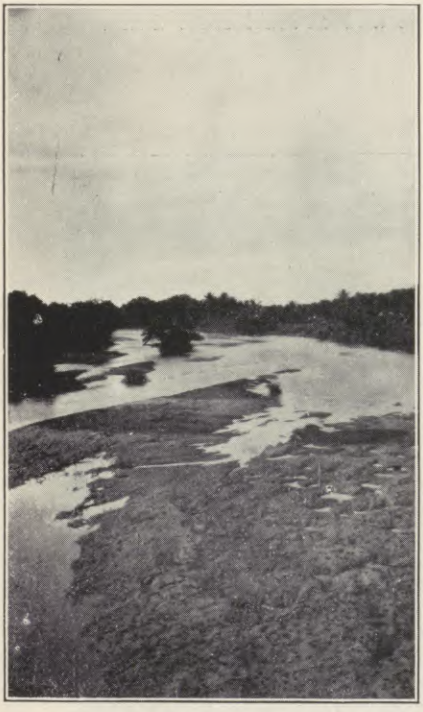


Figure 6. — River-bed showing sandy pools : the *A. culicifacies* favourite breeding-ground.

Figure 7. — Unbuilt dug well : anopheles breeding-place.

Figure 8. — Bamboo stake fences and channel cross dikes.

Figure 9. — Concrete tetrahedron blocks.

Figure 10. — Stone-filled wire groyne at bend.

PLAGUE.

Figure 11. — Portion of bazaar closed down on account of outbreak of plague.

Figure 12. — Laying of rat-traps in buildings.

Figure 13. — Fumigation of rat holes with calcium cyanide (cyanagas).

Figure 14. — Re-bagging of rice when *boutique* is being evacuated of goods.

Figure 15. — Breaking-down of rat harbourages—wattle-and-daub walls.

Figure 16. — Buildings being dealt with to let in the sun.

Figure 17. — Rat-proof grain store : Note 9-inch ledge three feet from bottom of wall.

exception of the municipality of Colombo, which has its own diagnostic service, and the preparation of vaccine.

At the Pasteur Institute, the brains of dogs and other animal suspected of having suffered from rabies are examined and preventive inoculation is given. During 1935, the number of brains examined was 513 and the number of persons who received preventive inoculation was 1,875.

There are small laboratories in charge of technicians attached to two of the hospitals in Colombo, eight of the out-station hospitals and one at Mandapam quarantine camp. The specimens examined are urine, fæces, blood and smears. At Mandapam camp, special cholera-carrier work has been carried out.

The Medical Entomologist is chiefly occupied with malaria research, but carries out investigations into other matters, such as filariasis, fly control, etc. He also carries out flea surveys.

4. Budgets.

The annexed statement gives in a tabulated form the annual budgets of the central Government and the local authorities, consisting of three municipalities, twenty-seven urban district councils, one local board town and 101 sanitary board towns (controlled by seventeen sanitary boards) and of forty-five voluntary organisations, excluding those in the municipal towns.

It gives, in detail, information with regard to the above groups' annual revenue, annual expenditure in all activities, the expenditure on public health and medical care, and also the percentage, which the last item forms of each of the first two. The population served by each group and the *per capita* cost of public health and medical care are given.

It will be observed that the *per capita* cost of public health and medical care borne by the central Government is Rs.2.09, and that of the local authorities (all combined) is Rs.2.33. Among the local authorities, the cost varies from Rs.2.72 to Rs.1.88, the municipalities bearing Rs.2.19, urban district councils Rs.2.72, sanitary boards Rs.1.88. There is only one local board town the *per capita* cost based on its own population is comparatively higher, being Rs.4.06, due to its small population. The sum spent per head on public health and medical

Expenditure on Public Health and Medical Care.

Expending authorities	Expenditure on public health and medical care	Total population on February 26th, 1931	*Per capita* cost	Total expenditure	Percentage of expenditure on public health and medical care to total expenditure	Total revenue	Percentage of expenditure on public health and medical care to total revenue	Percentage of expenditure on public health and medical care to total expenditure of the island
	Rs.			Rs.		Rs.		
(1) Central Government (Ceylon)	11,720,371	5,598,467	2.09	106,635,054 [1]	10.99	98,993,552 [1]	11.83	9.91
(2) 132 local authorities in Ceylon.	2,018,663	862,692	2.33	11,588,484 [1]	17.41	10,854,107 [1]	18.59	1.70
(*a*) 3 municipalities .	789,935	359,726	2.19	8,104,611 [1]	9.74	7,355,620	10.71	0.67
(*b*) 27 urban district councils	927,912	344,252	2.72	2,881,284 [1]	32.20	2,813,285 [1]	32.98	0.78
(*c*) 101 sanitary board towns	296,535	157,660	1.88	588,690	50.37	671,129	44.18	0.25
(*d*) 1 local board . . .	4,281	1,054	4.06	13,899	30.80	14,073	30.41	0.004
(3) Total (Ceylon Govt. and local authorities).	13,739,034	5,598,467	2.45	118,223,538	11.62	109,847,659	12.50	11.62
(4) 45 voluntary organisations (excluding organisations in municipalities) . . .	17,343	—	—	—	—	24,630	70.41	—

[1] Total expenditure exceeds total revenue, the excess being drawn either from loans or surplus balance.

care by the Government and the local authorities combined amounts to Rs. 2.45 per year.

The central Government spends on public health and medical care about 11% of the total expenditure and the local authorities all combined spend 17.4% of their total expenditure per year. The two together spend 11.6% of the total expenditure.

Of the total revenue of each of these authorities, the central Government spends on public health and medical care 11.8% and the local authorities 18.6%. The municipalities spend 10.7%, the urban district councils 33%, sanitary board towns 44%, and the only local board town 30.4% of their respective revenues. The central Government and the local authorities combined spend per year 12.5% of their total revenue.

The voluntary organisations have spent 70.4% of their revenue on public health and medical care.

II. RURAL RECONSTRUCTION AND COLLABORATION OF THE POPULATION.

The unsatisfactory conditions under which the villager lived was brought home very forcibly to the public during the recent unprecedented outbreak of malaria. It was found that many lived on the verge of starvation and their malnourished condition contributed in no small measure to the excessive mortality from the disease. As a result of this, a good deal of thought has been given to the improvement of the villager's lot, and the subject of rural reconstruction has been taken up by the Executive Committee of Home Affairs, which is preparing to undertake measures to improve his living conditions. There are several colonisation schemes already in operation in which the villager is being assisted to become a peasant proprietor.

Public health work has passed from the period when police methods were employed to one when persuasion and co-operation are the watchwords for successful achievement. With the inauguration of health unit work in Ceylon in 1926, the collaboration of the population has been kept to the forefront. It has been recognised that a prosecution gets only one thing done and at the same time creates an enemy, but,

if persuasion could achieve the same result, not only is the work being done in a permanent manner, but the goodwill of the people is also being secured.

In securing the co-operation of the people, the methods in health education already enumerated have been used and are being continued. These have created public opinion in favour of health work. Such methods in themselves are insufficient to achieve immediate results in public health work. What has achieved such results is the actual carrying-out of work among the people and getting them to take a hand in it. This has been seen in connection with health and baby weeks organised in local areas, where the various competitions have speeded up work.

Then, again, in the case of maternity and child welfare work, attendance has increased as the people got to know what the work actually consisted of and meant for them. When child welfare clinics have been held in school buildings, some person in the area, after seeing the nature of the work, has come forward and built a proper building as a mark of co-operation with the work. All child welfare work is sponsored by local voluntary organisations.

In carrying out general health work, a procedure that is securing results is the organisation of work through *health leagues*. This was first developed in connection with the construction of latrines. Taking people individually and getting them to build latrines was a slow and unwelcome process. Then was adopted the idea of organising the people of a village to carry out latrine construction. This became possible with the introduction of the cement concrete squatting-plate, which made the latrine more attractive and thereby created more interest in it.

With the organisation of the people for health work, it has been possible to completely sanitate villages within short periods of time. A village that would have taken many months to complete, and then after a prosecution or two with the sanitary inspector working on his own, can now be completed in two or three months and goodwill added to the work.

Health leagues are organised for individual villages, because people of one village cannot be made to take an interest in

the affairs of another village. The formation of the league is carried out by the sanitary inspector, who first gets to know well the people of the locality. There are invariably parties in a village, and it is important to see that the leader of the wrong party is not chosen to give the lead. A meeting is summoned by the most influential person in the area, and at it the objects are explained and the league formed. Nominally, every person in the village becomes a member. An influential committee which actually does the work is formed. No subscriptions are asked for from the people. Some definite health activity is assigned, and that is usually latrine construction. The committee makes it its business to get together some money from among themselves and commence the construction of squatting-plates in the village under the guidance of the sanitary inspector, who supplies the moulds. The plates are sold to the people on the instalment plan, and recoveries are made by the committee, the inspector having nothing to do with such recoveries. Where the people are poor, the committee supply free plates. The village is divided up among the members of the committee, who see that everybody constructs his latrine. When latrine work has been completed, another activity is undertaken, such as clearing of rank vegetation and refuse. This is followed by improvement of wells. The league undertakes to see that all cases of communicable diseases in the area are reported and instructions of the inspector are observed. Some leagues have provided child-welfare centres and funds for milk for infants. They assist in inducing people to take hookworm treatment, to get inoculated against typhoid and to take quinine for malaria.

The interest of the members of the league is maintained by holding regularly the monthly meetings, at which work achieved and work to be done are discussed. Their work is encouraged by visits of important officials and others.

The work done through health leagues has been so encouraging that the policy of the department is to organise these leagues in all places and to get work done through them.

It has always been felt that it is difficult to influence the ideas of the adult population, and therefore much attention is being paid to the education of the school-child in health

matters. The programme to train him in health habits has been outlined earlier. Here, again, the collaboration of the population is sought through the organisation of parent-teacher associations.

III. SANITATION AND SANITARY ENGINEERING.

1. Housing.

The Housing and Town Improvement Ordinance, No. 19 of 1915, operates in areas under local authorities and in rural areas in certain fast-growing bazaars specially proclaimed under the ordinance, while in the remainder of the rural section no control is exercised.

There are a number of colonisation schemes in which peasants are being provided with land on which they could settle. Government assistance is provided to the settlers to construct their dwellings. These dwellings are built of temporary material, consisting of mud floor, wattle and daub walls and cadjan roof in conformity with plans supplied by the Department of Medical and Sanitary Services. The plan of building for a single man consists of a verandah 6 feet wide, a room 12 feet by 15 feet, a small back verandah and a kitchen ; while a building for a married man consists of a front verandah, two rooms 12 feet by 10 feet each and a kitchen. Each building is also provided with a latrine.

Rural houses are built of wattle and daub walls with cadjan roof ; of cadjan walls and roof in the case of the very poor ; and of brick or cabook, mud or lime plastered and tiled roof. The floor is generally of mud, while in many it is cemented. The type of house varies with the means of the individual. Ventilation and lighting cannot be said to be entirely satisfactory, but windows to houses are being more and more provided.

Housing schemes for the poorer classes have been undertaken by the municipalities of Colombo and Kandy. The first housing scheme for an urban district council area has been completed by that of Dehiwela—Mount Lavinia, and other urban district councils are taking action to follow the good example set.

2. Water Supply.

The majority of the rural population depend on wells for their water supply. Some take their water from streams, rivers and tanks. The townships in the rural area, especially those up-country and under local authorities, have public pipe-borne supplies obtained from upland streams impounded in reservoirs. The department has a type plan of a sanitary well which is followed in the case of all public wells, as well as in the majority of private wells that are well constructed. The Government makes a yearly contribution towards construction of wells in rural areas, and local authorities also provide public wells in their areas. The contribution of the Government towards construction of wells for the last ten years has been as follows :

	Rs.		Rs.
1926/27	60,000	1931/32	25,000
1927/28	1,00,000	1932/33	25,000
1928/29	1,00,000	1933/34	25,000
1929/30	1,00,000	1934/35	25,000
1930/31	50,000	1935/36	40,000

Villages are composed of hamlets, and, in providing wells protected from pollution, it is being kept in mind that a well serves only its immediate hamlet and not the whole village.

Much has to be done in the way of provision of protected water supplies, and everybody is alive to its importance. The aim in the case of towns is to provide pipe-borne water. Much has been done in this direction and a good deal of investigation work is being carried out for towns that are not so provided. In the case of water supplies for towns, the cost, which is met, in the first instance, by the Government, is given to the local authority partly as a grant and partly as a loan.

3. Disposal of House Refuse and Other Wastes.

Garbage and refuse in rural areas are burnt up as collected, but now a movement is afoot to collect them in manure-pits so as to use them as manure.

In townships under local authorities, they are stored in covered bins and collected daily by the scavenging service for disposal, which is by dumping, filling low-lying places, incineration or composting. By the last-mentioned method, both dry refuse and night soil are disposed of at the same time, resulting in a manure, which is sold at Rs.5 per ton. The only nuisance resulting from it is the breeding of flies, and therefore the process should be carried out at some distance from dwellings.

In bazaar areas in the rural section, co-operative scavenging and conservancy is organised. The people contribute the cost of the service and the work is supervised by the sanitary inspector.

Cattle-dung is collected and disposed of as manure for paddy-fields, grassfields, vegetable and flower gardens. At dairies and cattle-sheds it is stored in covered bins and daily removed for disposal away from the dairy.

There are no built drains in rural areas. Rainwater is taken off by means of earth drains and sullage water is merely thrown on the surface of the land. In townships under local authorities, surface cement drains are provided. The local authority provides only the front drains, but the back drains are provided by the owners of houses and are very necessary for keeping back areas of dwellings clean. In the case of tenements and *boutiques*, the association of a 6-feet pavement with the back drain adds greatly to the cleanliness of back areas.

The proper disposal of human excreta is still one of the most important public health problems in Ceylon. A good deal of work has been done in this connection and much attention continues to be paid to it. In rural areas, the type of latrine constructed is the pit latrine, which are of four varietes—*viz.*, the deep-pit, the bored-hole, mound and the trench latrine—the variety constructed depending on the nature of the soil available in the rural areas (Figures 1-4).

In good laterite soil, deep-pit or bored-hole latrines with a pit of an average depth of 20 feet are constructed. In sandy soil and in areas where subsoil water is high, mound latrines are built, the pits being lined with empty tar-barrels. Trench latrines are built for festival camps, the average depth of the

pit being 4 feet. In townships, the type of latrine used is the bucket latrine.

In all these varieties of latrines, details with regard to construction of the squatting-plate, bucket chamber, superstructures and arrangements for final disposal of water are very closely and carefully looked into.

Only cement concrete squatting-plates are approved of. Attention is paid to their proper construction in moulds especially designed for the purpose with due provision for necessary dishing, size and shape of squatting-holes, location and direction of foot-rests. Plates are of two sizes, 3 feet 6 inches by 3 feet 3 inches and 2 feet 6 inches by 3 feet, the former for deep-pit and the latter for mound, bored-hole and bucket latrines.

The superstructure is usually of temporary or semi-permanent materials ; expensive ones are, as a rule, avoided in connection with pit latrines. In case of bucket latrines, permanent superstructures are provided whenever parties can afford them.

The disposal of night-soil is either by trenching or composting.

Public latrines are provided by local authorities in townships and in public places in rural areas. The central Government makes annually a contribution towards their construction. The amounts contributed during the last ten years are as follows :

	Rs.		Rs.
1926/27	50,000	1931/32	10,000
1927/28	75,000	1932/33	10,000
1928/29	75,000	1933/34	—
1929/30	75,000	1934/35	—
1930/31	75,000	1935/36	—

The small contribution and absence of contribution during the last years have been due to reduction in revenue consequent on financial depression.

4. Campaign against Flies.

Flies that we are concerned with are house flies. They are dealt with as part of the routine work of the sanitary inspector by specially looking out for breeding-places and dealing with them. In spite of such action, the flies abound in bazaar areas,

where measures are enforced to keep all cooked food under cover. Special investigations and control measures have been carried out at Nawara Eliya, where the fly has two seasons and is a nuisance. Investigations have shown that the manuring of vegetable and flower gardens with cow-dung and the storing of cow-dung at dairies are potent sources of this. In dealing with the latter, larval traps have been tried out (Figure 5). While they have worked excellently at the racecourse in dealing with house-dung, they have not proved wholly satisfactory in dealing with cow-dung. It was estimated that, in the case of cow-dung, it dealt with about 40% of the larvæ, but the other 60% pupated in the manure itself and emerged as adults. The manuring of vegetable and flower gardens is a matter difficult to control. The local authority is now taking action to cart away daily out of the town all the dung produced in the place and to release manure after the dung has broken down to such an extent as not to prove attractive for the breeding of flies.

IV. NUTRITION.

1. Composition of Food and Method of its Preparation.

The staple articles of diet of the people of Ceylon are :

(*a*) Rice and preparations of rice and rice-flour.

(*b*) Coconut, which is usually included in some form or another in all the three principal meals of the day.

(*c*) Any of the following classes of vegetables, which are cooked into curries of various types :

(*i*) Leafy vegetables ;
(*ii*) Yams and tubers ;
(*iii*) Beans, lentils, peas and dhals ;
(*iv*) Gourds ;
(*v*) Vegetable fruits.

(*d*) Curry stuffs, such as chillies, coriander, saffron, mustard, tamarind, cinnamon, onions, garlic, vinegar, cloves, cardamom and nutmegs.

(*e*) Fresh fruits, of which the chief are bananas, citrons (oranges and limes), papaw, and, in season, mangoes, ripe jak.

Morning Meal.

For this, usually one or other of the following preparations of rice-flour is used :

(1) Hoppers—baked from rice-flour and coconut milk ;

(2) Pittu—rice-flour and coconut milk steamed in bamboo cases ;

(3) String hoppers—rice-flour with water pressed through a mould and steamed ;

(4) Roti—rice-flour and scraped coconut mixed and roasted ;

(5) Milk rice—*i.e.*, rice boiled with coconut milk ;

(6) Boiled rice and sambol, which is a mixture of condiments.

In season, and when available, cassava, sweet-potatoes, boiled jak and yams are used occasionally instead of the above preparations of rice.

Little or no milk is used by the masses and the fluid taken is either water or plain coffee or tea sweetened with sugar.

Midday Meal.

This consists of boiled rice with one or more curries and sambols, the number and variety of the latter varying with the economic condition of the persons concerned. The curries are not used in large quantities, but are used as an appetiser to consume the rice.

In making curries, coconut, milk, curry stuffs, like chillies, saffron, etc., are invariably used. Meat, fish and dry fish, when used, are also curried. Green leaves, of which there are numerous kinds, are usually cut up into very thin pieces and cooked dry with coconut scrapings. This preparation is called " Mellum ". Dry fish may be fried or cooked as a curry.

Night Meal.

This is similar to the midday meal. Of the three meals, the heaviest is usually the midday meal. Among the poorer classes, for the midday meal, some article like boiled jak or boiled green gram, boiled bread-fruit or cassava may be substituted instead of the rice and curry.

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

The rice consumed by the masses is mainly imported rice from Burma, Siam and India. This rice is milled and white and constitutes two-thirds of all rice consumed in the island ; the other third being locally grown rice, which is usually hand-pounded and therefore containing more of the pericarp and, in consequence, darker in colour.

All rice used is par-boiled. Raw rice is usually used for preparing rice-flour, and, except in a few ares, is not used for preparing the boiled rice used in the main meals.

From this it will be apparent that the country rice used is of greater nutritive value than the highly milled rice imported into this country.

Vegetables.

The following statement shows the vitamin A and B content of some of the local vegetables as revealed in a biological assay recently carried out :

Category I. Leaves.

Sinhalese name	Tamil name	Botanical name	Vitamin A units per gramme	Vitamin B potency to dried yeast
Kankun	Panankeerai	*Ipomooa aquatica*	7	1.2
Mukunuenna	Ponnankarni	*Altornathora sessilis*	3	—
Kohila	Koila	*Lasia spinosa*	8	1.2
Niviti	Pasali	*Basella rubra*	6	1.5
Gas niviti	Sirupassali	*Talinum patons*	7	3.4
Kura tampala	Arra-keerai	*Amarantus viridis*	5	V.L.
Gotukola	Vallarai	*Centella asiatica*	10	—

All these are rich in iron and other minerals.

Category II. Fruits.

Sinhalese name	Tamil name	Botanical name	Vitamin A units per gramme	Vitamin B potency to dried yeast
Wambatu (brinjal)	Katherikkai	*Solanum melengona*	1	1
Murunga	Murungakkai	*Moringa oleifera*	7	1
Bandakka	Akaasa-kathericai	*Hibiscus esculentus*	1.4	1.2
Malu-kesel	Vaalakkai	*Musa paradisicaca*	0.5	1
Tomatoes			good	

Category III. Gourds.

Alu Puhul (ash)	Sambal poosanikkai	*Benicasa hispida*	V.L.	V.L.
Diya labu	Surakkai	*Lagenaria leucantha*	V.L.	V.L.
Wattakka	Poosanikkai	*Cucurbita maxima*	7	1.3
Pathola	Pudalankai	*Trichosanthus anguinal*	0.6	0.5

Some of these have values in iron and minerals.

This assay has also shown that all green leaves are rich in iron.

From an examination of the composition of the food of the people of the country it will be evident that, as milk and milk products hardly enter into the dietary of the people, the supply of lime has to be dependent on the green leafy and other vegetables.

The limited work done seems to indicate that the percentage of lime present in the articles examined varies in different localities and that, generally, the calcium content is low, except in the northern section of the country.

Leafy vegetables are included extensively in the dietary of the people, and at some health exhibitions recently held as many as 150 to 200 varieties of leaves used as food have been exhibited.

Below is given the composition of some of the vegetables in common use :

Vegetable	Water	Protein	Oil	Carbo-hydrate	Fibre	Ash	Vitamin A units determined
Cucumber	95.4	0.87	0.16	7.87	0.71	0.40	10
Snake gourd	94.6	0.63	0.13	4.25	0.13	0.28	—
Pumpkin.	89.0	1.70	0.70	6.60	1.70	0.60	70
Spinach	90.6	2.50	0.50	3.80	0.90	1.70	402
Tampala (leaf)	81.4	4.50	0.57	8.40	2.00	3.16	—
Kankun (leaf).	89.7	4.25	0.04	3.64	0.70	1.67	—
Sweet potatoes	71.1	1.50	0.40	24.70	1.30	1.00	85
Manioc.	74.2	1.10	0.18	22.90	1.15	0.52	—
Yams	63.7	2.86	0.05	27.31	1.03	1.45	—

Toddy is the fermented juice of the coconut, palmyrah or kitul flower. It is used as a drink by the working-classes. From it is made an alcoholic drink called "arrack", the coconut toddy being used, as where the distilleries are situated only the coconut palm is available. Toddy is rich in yeast, and an analysis of the sediment of toddy has been shown to contain about 65% yeast. There appears to be much value in toddy to workers subsisting on an almost entirely carbohydrate diet.

Chillies, which are very much used in the preparation of the curries, have been shown to be extremely rich in vitamin C.

Coconut.

The kernel of the coconut and the oil extracted from it is extensively used for the preparation of curries and for preparing sweets, and is the main fat factor found in the diet. Coconut-oil does not contain any vitamin A. Coconut-oil from sun-dried coconut contains vitamin D; but, as most of the coconut-oil to-day is prepared in mills from artificially smoked coconut, it will not contain any vitamin D.

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

Below is given the composition of what could be considered as an adequate diet for an adult made up of articles that are usually consumed by the people of this country. It should not be considered, however, that, as a general rule, the diets of the masses are made up as such.

Article of food	Quantity	Cost	Proteins	Carbohydrates	Fats	Calories
	Oz	Cents	Grammes	Grammes	Grammes	
Polished rice	16	6	33.6	384.0	2.40	1,694
Dhal	2	1	13.2	32.4	2.10	201
Dried fish	2	1½	31.0	—	6.00	178
Vegetables, yams	2	½	1.0	1.3	0.12	109
Onions	2	½	0.8	6.0	—	
Gotukola	2	½	1.0	1.5	2.0	
Bananas	2	1	1.0	4.6	—	23
Coconut (fresh)	1	1	1.6	8.0	14.30	167
Coconut-oil	1	1	—	—	28.00	252
Sugar	1	½	—	27.0	—	108
Total curry stuff		13½	83.2	475.0	55.00	2,732
Cooking		1½				
		15				

The above gives what should form an adequate diet for an average adult not doing hard manual labour. It will be seen that the proportion of proteins, 83.2 grammes ; carbohydrates, 475 grammes, and fats, 55 grammes, is satisfactory and that the allowance for calories (2,732) is slightly below the standard for more temperate climates. The above diet, although adequate, is far from being optimal for health, growth, maintenance and development. The digestibility and assimilability is inferior to a diet made up of a better type of foods. The proportion of proteins of high biological value is poor, and the supply of vitamins and minerals, particularly calcium, is entirely dependent on the supply of the green leaves and onions included. This is unsatisfactory, particularly if the soils are poor in calcium.

It will be seen that the cost is about 15 cents per adult per day. For a family, say, of seven—*i.e.*, a man with wife and five children of the ages of 2, 4, 6, 8 and 10, who together will give an adult value of five—the cost will be 75 cents per day. Considering the fact that the wages of working-classes vary from 40 cents to about Rs.1 per day, it will be seen that the average wage is insufficient, on the above basis, for the maintenance of adequate nutrition.

4. Diet and Health : Deficiency Diseases.

It is evident from a study of the composition of the food of the people of this country that it is not satisfactory for ideal development and health. Even an adequate diet (as shown in Section 3) made up from all the available commodities in use in the country has been shown to be not optimal. When it is further considered that, owing to the low economic condition of large numbers of the people, the adequacy of the food is still further likely to be adversely affected, there is little doubt that ill-health, bad development and proneness to disease are being produced in the people as a result of the diet.

Examination of the diet shows that it is liable to have three special defects—viz., (1) that it is defective in proteins of high biological value ; (2) that there is a deficiency of the important vitamin A, and (3) that there is a deficiency of minerals, particularly of the mineral calcium.

That these deficiencies are affecting health is proved further by the following facts :

(1) The Registrar-General, in his annual returns, gives the number of deaths due to rickets usually as over 3,000. For the decade 1923 to 1932, the average number of deaths given was 4,339. Rickets is rare in this country, and, on an examination of this discrepancy, it was found that the name " Rickets " was the translation for a condition given in the local registrars' returns as " *Mandama* ". The local registrars, except for the thirty-seven principal towns in the island, are laymen, and, when the cause of death is given as " *Mandama* ", it is interpreted as " Rickets ". This explains how such a large number of deaths as due to rickets was returned.

The name " *Mandama* " is given by local native physicians to a diseased condition having the following signs and symptoms : stunted growth, scaly discharge from the eyes eventually leading to blindness (keratomalacia and xerophthalmia), an acne-like skin eruption (since given the name of phrynoderma), irregular and frequent bowel movement and sometimes even prolapse of the rectum, pot-belly and wasting. This condition is usually present during the age period 1 to 10 years. Further investigations have shown that these symptoms are mainly due to vitamin A deficiency. When it is considered that, in a country where milk is not used after weaning and where the source of vitamin A is only green leaves and a few vegetables, which are unsuitable to young children, it is not surprising that this condition is so extensively present.

It is not essentially a fatal disease, and when as much as 3% of all deaths are attributed to this cause the extent of damage to health from this one cause could be easily gauged.

(2) Recent studies by Dr. L. Nicholls have shown the extent of prevalence of phrynoderma and sore mouth among school-children and their association with vitamin deficiency. That phrynoderma is due to vitamin A deficiency can be proved clinically, in that the condition disappears with the administration of cod-liver oil, now so largely used at child welfare centres and school clinics.

(3) It has been shown that a large percentage of blindness in this country is due to keratomalacia and xerophthalmia, resulting from vitamin A deficiency. At the deaf and blind institute, 65% of the cases of blindness have been shown to be due to this cause.

(4) The wide prevalence of dental defects, irregular development of teeth, etc., have been attributed to defective nutrition.

(5) The weights of school-children for age and height of the better-class schools, where the diets are very much superior to those of the vernacular schools, have been compared with the same weights of the latter schools, and it has been shown that the weights of the former are much superior to those of the latter.

(6) The excessive maternal mortality [1] in this country has been partly attributed to under-nutrition of the poorer classes. A condition seen in a good majority of expectant mothers is a stomatitis and glossitis in which the lips and tongue are cracked, a condition which rapidly improves with the administration of calcium, showing that this condition is evidently due to a deficiency of calcium. In the case of infantile mortality, about one-third of the deaths are given as due to convulsions, and, of the deaths from convulsions, about two-thirds are under 3 months of age. About another third of the deaths are given as due to diseases of the integumentary system. This again is, a case where the local native physicians ascribe the cause of death to erythema and impetigo developing in feeble and debilitated infants born to mothers whose health has been affected by under-nutrition, hookworm and malaria.

As regards the more well-known deficiency diseases, like scurvy, beriberi and pellagra, they are not known to occur in this country, except in unusual circumstances. True cases of rickets do occur but rarely ; and, when the history is gone into in these cases, it invariably turns out that the child had been ill during infancy and had been kept indoors, thus depriving it of sunlight.

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[1] See pages 11 and 24,

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

The following matters need consideration in a co-ordinated nutrition policy :

(1) Investigation into local nutrition problems ;

(2) Increase of the general food supply of the people and improvement of their economic condition ;

(3) Increase in the production of special foods, such as milk and other foods, containing vitamin A and calcium ;

(4) Education of the people as to what constitutes a correct diet and to get them to take it.

For the carrying out of the above, there should be a division of nutrition in the Health and Medical Services, the functions of which should be :

(1) Analysis of local foods ;

(2) Prescribing of diets for various institutions ;

(3) Teaching of the principles of tropical nutrition ;

(4) Inspection of school-children and inmates of institutions for nutritional defects ;

(5) Establishment of standards of inspection ;

(6) Carrying-out of regional and seasonal nutrition surveys ;

(7) Co-operation with the Education Department in regard to free meals given in schools and the teachings of dietetics ;

(8) Co-operation with the Agricultural Department for the promotion of animal husbandry and the production of crops in those areas where the nutrition of the masses is most unsatisfactory ;

(9) Co-operation with other Government departments such as the Co-operative department, the Marketing Board, etc., which may be able to assist in nutrition matters.

To ensure the necessary collaboration, there should be a central committee, advisory in nature and composed of members of the Health, Agricultural, Educational and other interested departments, including the director of the division of nutrition.

Measures should be taken to improve the earning capacity of the individual and to have a minimum wage that would ensure the wage-earner and his family adequate nourishment. The Co-operative Department should take in hand the matter of stopping the villager from getting into the hands of the moneylender. The Agricultural Department should take action to increase the local food production, to improve the breed of cattle and to get people to keep cows for the milk they will produce. The planting of fruit-trees and vegetables should receive attention.

The Marketing Board could arrange for the transport of certain food products which are abundant in one locality to a locality where they are not. The Education Department should make the teaching of dietetics and the training of children in proper food habits compulsory in all schools. This will necessitate the teaching of dietetics to the teachers. A good deal of educational work can be carried out at child welfare centres and in the homes of the people by the health staff in the course of their routine duties.

Education is necessary to impress on the population the importance of milk and milk products in their diet, the need for eating protein of high biological value, as religious scruples prevent them from doing so, and for seeing that the diet contains sufficient vitamin A and calcium.

V. MEASURES FOR COMBATING CERTAIN DISEASES IN RURAL DISTRICTS.

1. Malaria (Figures 6-10).

Malaria control is placed in the care of a committee of the Department of Medical and Sanitary Services. The members are the Assistant Director of Sanitary Services (Chairman), the Medical Entomologist, the Sanitary Engineer, the Superintendent of Anti-malaria Campaigns, the Senior Medical Officer, Headquarters, and the medical officer attached to headquarters, who serves as secretary.

The duties of the committee are :

(1) To periodically review the malaria situation in the island ;

(2) To suggest measures to combat it ;

(3) To initiate and carry out intensive malaria campaigns in centres approved by the Director of Medical and Sanitary Services ;

(4) To consider the results of all investigations made at various malarial centres and discuss their practical application;

(5) To consider programmes and cost of malaria control.

The staff at each campaign centre consists of sanitary inspectors trained in malaria work, entomological assistants, who are put on mosquito survey work, and a labour force varying from thirty to forty men, all of whom work under the supervision of the medical officer of health of the area.

Each centre has a well-equipped laboratory for malaria work, which consists of :

(1) Anti-mosquito measures ;
(2) Quinine distribution ;
(3) Education.

Anti-mosquito measures include (*a*) permanent measures, such as filling and draining ; (*b*) temporary measures, such as canalisation, training and grading of existing streams, drains, etc., oiling, paris green distribution, use of larvivorous fish.

Quinine distribution is systematically carried out among school-children.

Educational work consists of public lectures, lantern lectures, talks, demonstrations and distribution of leaflets and posters.

The cost of all work is borne by the central Government. When work reaches a maintenance basis, local authorities contribute towards it either wholly or in part.

In addition to the above type of work for centres of population in which intensive anti-larval work is carried out, the following type of work has been organised from this year for rural areas in the malarial zone : Medical officers have been assigned, on an average, each to 40,000 population and are provided with sanitary inspectors and midwives, while health visitors will be

provided later as they become available. The programme of work outlined is as follows :

(*a*) Anti-malarial work :

(1) Keeping track of the incidence of malaria ;

(2) Making quinine available to all through priests, schoolmasters, headmen, health leagues, etc., and seeing that people take adequate treatment for their attacks.

(3) On increase of malaria, organisation of treatment centres ;

(4) Prophylactic administration of quinine in schools ;

(5) Survey of villages by sanitary inspectors and taking action to deal with breeding-places.

(6) Study of the problem of malaria in the locality ;

(7) Educational work.

(*b*) Maternity and child welfare work through organisation of ante-natal and baby clinics, home visits and supervision of midwives.

(*c*) School health work. A complete programme will be carried out, paying special attention to malaria and nutrition.

(*d*) Mass treatment for hookworm. This will be part of the anti-malaria programme, as control of it will have an effect on the resistance to malaria.

(*e*) Supervision of the work of dispensaries in charge of apothecaries.

(*f*) Holding of special clinics : school clinics, ante-natal and baby clinics, tuberculosis clinics, venereal disease clinics, parangi (yaws) and leprosy clinics as required.

(*g*) Control of communicable diseases.

(*h*) General sanitary work.

(*i*) Health education.

It will be noted that the above is a comprehensive health programme, paying special attention to malaria and making it part and parcel of general health work. This type of work has been organised in the north-western province and action is being taken to train personnel for similar work in the other provinces. It is hoped to completely organise the work throughout the island during this year and the early part of next.

2. Plague.

Plague is endemic in the city of Colombo and the occurrence of this disease in the rural districts of Ceylon is due to transport of infected fleas—*Xenopsylla cheopis*—through bags of rice and similar merchandise bought at Colombo. It is therefore essentially a disease of the bazaar areas in the rural districts.

Steps that are adopted in Ceylon to combat the disease in rural areas can be conveniently described as follows :

(1) Control measures during the prevalence of the disease ;
(2) Routine preventive measures at other times.

(1) Control measures during the prevalence of the disease, classify themselves under two heads ; (*a*) dealing with human case and contact ; (*b*) dealing with rat population.

As soon as a case of human plague is detected or notified, arrangements are made to isolate the patient in an infectious diseases hospital and segregate the contacts in a camp specially put up for the purpose if a permanent building is not available. Investigations are made to determine if the case is an indigenous or an imported one. In the former event, the area is declared a diseased locality under the Quarantine and Prevention of Diseases Ordinance. Mass inoculation against plague is given to all and anti-rat work commenced. Anti-rat work during an outbreak consists in evacuation of the area of the people after an inventory of their belongings has been made and after the houses have been sealed up and guards placed over them (Figure 11). Simultaneously with this, a rat campaign is started and carried out intensively by means of traps, poison baits and fumigation of rat-holes (Figures 12, 13).

After evacuation of the buildings, the goods are not disturbed till as many rats as possible have been caught. All rats caught are examined and the number infected with plague determined. When the daily catch dwindles down to a very low number, evacuation of the goods is commenced (Figure 14). After the evacuation of the goods, the buildings are so dealt with as to remove all shelters for rats and all insanitary lofts and extensions that may be found in them (Figures 15, 16). Fumigation with cyanide products is carried out and all rat-holes closed thereafter.

When the area has been thoroughly cleaned up, the existence of any infection is tested by letting loose guinea-pigs in the closed-up buildings. At the same time as these tests are carried out, the question of necessary improvements to the buildings to be done by the owners is gone into before they are allowed to be reoccupied.

(2) Routine anti-plague measures at other times. — The routine work carried out in small towns and large bazaar areas as a preventive measure against plague consists of :

(*a*) Routine rat-trapping and their examination ;

(*b*) Provision of rat-proof grain-bins for premises storing up to fifteen bags of rice ;

(*c*) Provision of rat-proof grain-stores for trade premises storing quantities of rice over fifteen bags (Figure 17) ;

(*d*) Periodical fumigation of rat-holes and rat-burrows in the provision stores and *boutiques ;*

(*e*) Structural improvements to all provision stores so as to render them rat proof.

3. Ankylostomiasis.

Ankylostomiasis is combated in Ceylon by three chief methods :

(1) Mass treatment of the population owing to the very widespread incidence of the disease ;

(2) Intensive latrine construction as a means of preventing soil pollution ;

(3) Persistent health education by talks, lantern lectures, cinema shows and demonstrations, etc.

The organisation and activity are as follows : There is a special ankylostomiasis campaign staff, which consists of a medical superintendent, his office staff, a central laboratory and a field staff. The laboratory section is located in the head office of the campaign in Colombo and consists of eight microscopists, whose duty is to carry out routine examinations of fæces sent from the field and do the egg counts of specimens sent before and after treatment.

The field staff consists of thirty-two dispensers, who are attached to medical officers in charge of hospitals and dispensaries medical officers of health and apothecaries for varying periods. The work of these dispensers is to administer mass treatment under the supervision of qualified medical officers, give talks and lectures to the people on the prevention and control of hookworm disease, collect specimens of fæces before and after treatment and send them to the central laboratory for examination.

In addition to the field staff of the campaign, treatment is also given by the officers in charge of Government hospitals and dispensaries to as many as possible of those attending those institutions. Mass treatment is given as a routine during seasonal activities by medical officers of health, both in villages and in schools, in their respective areas.

In the estates, the field staff of the campaign itinerate throughout the year and give mass treatment. In addition to this, the estate medical staff also administers treatment to estate labourers, who also receive mass treatment at the quarantine camp at Mandapam while passing through from South India to Ceylon. Thus, continuous treatment is carried throughout the whole island. Drugs used for mass treatment are oil of chenopodium and tetrachlorethylene. In this, as in other health activities, co-operation of the Government agents, chief and minor headmen and of the estate superintendents is always secured.

While mass treatment is being given to the people, intensive latrine construction is carried out by the sanitary inspectors under the direction of the medical officers of health. The regulations for the prevention of ankylostomiasis framed under the Quarantine and Prevention of Diseases Ordinance provide the necessary legislation for enforcing latrine construction. Much progress has been made in this direction in the rural areas by construction of bored-hole, deep-pit and mound latrines.

Mass education of the people with regard to the cause and prevention of ankylostomiasis is carried out by the dispensers of the campaign staff as a routine propaganda work on days preceding the day of treatment. In addition to the above, lectures with the aid of lantern-slides and cinema films are

also delivered by sanitary inspectors and medical officers of health periodically and during the seasonal activity of mass treatment.

4. Tuberculosis.

The form of tuberculosis that is largely prevalent in Ceylon is tuberculosis of the lungs. There is in Colombo a tuberculosis dispensary, and outside Colombo there are two sanatoria for care of early cases and one hospital for advanced cases. The dispensary in Colombo serves as the clearing-house for cases to the sanatoria and the hospital.

Cases discovered in the rural section of the island are admitted into the local hospital first, where they remain till accommodation at one of the institutions can be found by the dispensary at Colombo. At the same time, the contacts of the case are kept under observation at their homes and periodically examined by the medical officer of health.

At the institutions, cases are kept for about six months, during which time they receive, in addition to sanatoria care and treatment, all necessary training regarding their own care at home and about the precautions they should adopt to prevent the spread of infection. When patients are discharged from these institutions, the medical officer of health of the locality to which the patient is going is notified. He and the sanitary inspector visit him and give instruction regarding domiciliary care. The sanitary inspector visits the patients twice a month, and the medical officer of health keeps the contacts under observation and examines them once in six months.

In case of patients that do not seek hospital or institutional care, the procedure outlined above regarding visits to them by sanitary inspectors and the medical officer of health and about the care of contacts is also followed.

With a view to providing better isolation facilities at homes where such are not available, both of patients discharged from institutions and of those that do not enter hospitals at all, attempts have recently been made as an experiment in one area to provide, with the help of voluntary anti-tuberculosis associations, open-air shelters or booths for housing the patients separate from other inmates of the house.

While the above control measures are carried out as a routine in connection with tuberculosis patients and contacts, the housing conditions in the rural districts receive the constant attention of the medical officer of health, and gradual improvements with regard to lighting and ventilation, structural conditions and drainage to rural dwellings are effected.

Notification of cases, though considerably improved in recent years, has not been as satisfactory as desired. The majority of cases come to the knowledge of the authorities through the dispensary at Colombo when they go for treatment. Some are detected by sanitary inspectors and public health nurses and others notified direct by attending physicians to the local medical officers of health.

5. Pneumonia.

Pneumonia claims about 5% of the deaths of the island from all causes, of which approximately half occurs in the rural areas. It is not, however, a notifiable disease in these areas, and hence the incidence of the disease cannot be properly estimated.

Facilities are available for early hospitalisation and necessary treatment of cases. In this disease, the rural population avails itself freely of hospital treatment.

Apart from this, no specific measures are adopted for combating this disease.

6. Yaws.

Yaws—locally known as "parangi"—has been an endemic disease in the rural districts of the island, more in evidence in some than in others.

The measures adopted to combat the disease have yielded very good results, so much so that the disease has fast disappeared, and any that still exists can only be seen in remote and inaccessible parts of the country.

The organisation for the control consists of (1) treatment in the hospital and dispensaries ; (2) mass treatment in the affected villages by itinerating medical officers. Apart from cases that attend out-patients' departments in hospitals and dispensaries, the bulk of the cases are got at in the villages. A rough survey

of known cases of "parangi" and of similar skin diseases is made by the headman of each village, and the list of the patients is sent to the itinerating medical officer of the area through the revenue officer in charge of the district. When the lists are received, the medical officer draws up a programme of mass treatment and sends a copy to the revenue officer, who directs the village headmen to produce all patients at the central spot on the day and at the time fixed for treatment indicated in the programme.

Two injections of N.A.B. are given for cure, and the effect is so dramatic that people willingly attend the treatment centres. If for any reason any patient on the list is missed or requires more injections, he is referred to the nearest hospital or dispensary for further treatment, and the itinerating medical officer moves on to the next village on his programme. In this manner, the medical officer covers up his area and visits the same village twice in the year.

The above procedure has brought the disease completely under control, and it has been possible to reduce the number of itinerating officers to the very minimum, as the disease has been considerably eradicated.

7. Leprosy.

This is a disease that has been prevalent in Ceylon for some time. In the past, the incidence of the disease was estimated from the cases isolated in the two asylums in the island accommodating 940 patients. Recently, an island-wide leprosy survey has been commenced by two specially trained medical officers. They have completed the survey in the western and eastern provinces and the work is being carried on in the southern. The object of the survey is to determine the correct incidence of the disease, to detect cases at an early stage of the disease and to plan out an organisation for the treatment of cases, isolation of infectious cases, examination of contacts and general follow-up work.

The plan of survey adopted is to look for cases amongst the relations of the cases of leprosy admitted into the asylums in past years and gradually trace new cases from them. The

school-children are examined as a routine for detection of early cases.

When the survey of an area is over, the leprosy survey officers organise clinics in different centres attached to hospitals or dispensaries in the area and hand over the routine control work to medical officers, who give clinic treatment, and to medical officers of health, who do the follow-up work. The leprosy survey officers co-ordinate and keep trace of the whole work in the island in their central office at Colombo.

When the cases have been detected, the medical officer of health maintains a register of all cases and contacts by each sanitary inspector's range. Infective cases are isolated in the asylum under the Leprosy Ordinance. The anæsthetic skin cases and the nerve cases are sent regularly for clinic treatment. The contacts are looked up once a quarter by the sanitary inspector and once in six months by the medical officer of health. All records as regards the progress made by the patients and the health of contacts are maintained by the medical officer of health.

When cases are discharged on parole from the asylum, the sanitary inspectors keep them under observation along with the other contacts.

In addition to the above routine, publicity and educational work is carried out by the medical officers of health and sanitary inspectors by periodical talks, lectures and demonstrations on various aspects of the disease, its prevention and control.

8. Mental Diseases and Drug Addictions.

Mental Diseases.

There are no special measures adopted for combating incidence of mental diseases. Facilities are available for care and treatment of patients suffering from mental diseases in the mental hospital maintained by the department of Medical and Sanitary Services.

Drug Addictions.

Except the number of registered consumers of opium, no accurate and dependable statistics of drug addictions are available.

Control against drug addictions is exercised by rigid enforcement of the Poisons, Opium and Dangerous Drugs Ordinance. The entire control with regard to opium and dangerous drugs is now vested chiefly in the hands of the Director of Medical and Sanitary Services.

On January 1st, 1936, the Poisons, Opium and Dangerous Drugs Ordinance, No. 17 of 1929, as amended by Ordinance No. 43 of 1935, was brought into force. This ordinance is intended to regulate and control the import, export, sale and consumption of opium and dangerous drugs as required by the opium and narcotic drugs Coventions.

The new ordinance defines dangerous drugs, prohibits imports and exports of such drugs without the necessary licences and import and export certificates from the Director of Medical and Sanitary Services. Only qualified medical people, such as medical practitioners, dentists or veterinary surgeons are permitted by the ordinance to prescribe a dangerous drug and to supply a quantity for patients or animals not exceeding three days' requirements.

A pharmacist must have his premises licensed for the purpose by the Director before he can dispense a dangerous drug to any person, and he can only serve the prescription made by any of the above-mentioned people. Possession of dangerous drugs or retail trade is otherwise forbidden.

The cultivation of the poppy plant, coca plant and hemp plant is prohibited. The manufacture, consumption, import and export of the resin of the hemp plant and all preparations, such as bhang, hashish and ganja, of which resin forms the base, are also prohibited.

The import of opium is prohibited except by the Director of Medical and Sanitary Services on the authority of the Governor. The Director of Medical and Sanitary Services sells opium to consumers registered before 1927. The procedure adopted of registration of consumers is that in each district there is a board of which the Government agent or the assistant Government agent is the chairman, to whom applications are made by the applicant consumer. If the board recommend, he is issued a registration certificate, which is not transferable and which states the amount he can buy.

Opium is sold under the direction of the Director of Medical and Sanitary Services from hospitals or opium depots to registered vederalas (practitioners of indigenous medicine). No new consumers have been registered since 1927. The total number of consumers in 1935 was 2,601.

Smoking-opium is sold to consumers registered before 1921, and this habit is confined as a rule to Moors and Malays. The major components of the population are not addicted to this habit.

Addiction to ganja is probably on the increase, owing to total prohibition and the consequent urge on the part of illicit importers and retailers to find new markets. In certain areas in the central part of the island it is reported that ganja leaves were used to increase the strength of kitul toddy.

The only two dangerous drugs that are imported illicitly in any quantity are opium and ganja. There is, fortunately, little or no market in Ceylon for cocaine. The Customs, the police and the excise departments are wide awake with regard to the detection of these crimes and the offenders are brought to court and severely punished.

As will be seen from the above account, the measures adopted for combating these addictions are directed mostly towards the control of import and sale of these drugs and thus exercise the check necessary to reduce addictions to these drugs.

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